

COMMISSION 27 OF THE I.A.U.

INFORMATION BULLETIN ON VARIABLE STARS

Nos. 2101 - 2200

1982 March - 1982 September

EDITOR: B. SZEIDL, KONKOLY OBSERVATORY

1525 BUDAPEST, Box 67, HUNGARY

HU ISSN 0374-0676

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2101

Konkoly Observatory
Budapest
1982 March 4
HU ISSN 0374-0676

PHOTOELECTRIC PHOTOMETRY OF THE ECLIPSING
BINARY DM PERSEI

DM Per (BD +55°616 = HD 14871) was discovered as an Algol type eclipsing binary by Hoffmeister (1943). The first light elements are also given by Hoffmeister (1944). Kukarkin and Ghiz (1949) obtained a new value of the period and a first detailed photoelectric study of the system was made by Colacevich (1950) who pointed out a strange behavior of the light curve at the end of primary minimum where the total light of the system remains nearly constant in between 0.08 and 0.10 phases and then reaches the maximum value gradually. Colacevich deduced the geometric elements and also the absolute dimensions of the system combining his photometric data with the spectroscopic elements obtained by Deutsch (1945). Recently, Scaltriti (1976) obtained a photoelectric light curve in yellow colour. Scaltriti solved his curve with the method of Russell-Merrill and gave the new light elements as,

$$\text{Min I Hel} = + 24\ 41920.4543 + 2.\overset{d}{7}277427.E.$$

+6 +8

He also pointed out that the depth of primary minimum is changing and there exist some distortions in the light curve.

This interesting system was observed photoelectrically at the Ege University Observatory on 18 nights in 1980 and 1981 observational periods, and a total of 741 and 737 individual points were obtained in blue and yellow colours, respectively. The observations were made with the 48 cm Cassegrain telescope equipped with an unrefrigerated EMI 9781 A photomultiplier tube.

BD + 55°590 and BD + 55°587 were used as comparison and check star, respectively. No evidence for the variability of the comparison star was found. All the differential observations (variable minus comparison) were corrected for the differential extinction using the extinction coefficients for each night.

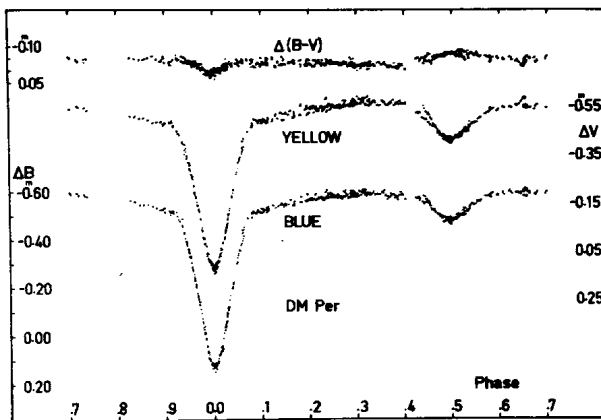


Figure 1

The light and colour curves are presented in Figure 1 where the magnitude differences have been plotted against the phases calculated with the elements given by Scaltriti (1976). The observed minima, the depth variability of primary minimum and a noticeable displacement of mid-secondary had been reported by the author previously (Sezer, 1980). Now it can be seen from the light and colour curves that the system is reddening at the primary minimum while it is bluer at the secondary minimum which is consistent with the spectral types of the components (B5 + A6) given in the literature.

Actually the total light of the system remains nearly constant at the end of the primary minimum and then it reaches the maximum around 0.3 phase which confirms the existence of similar distortions reported in other publications cited above. In addition to the variations at the depth of primary minimum the secondary one also varies from night to night. The analysis is in progress.

This project is partly supported by the Turkish Scientific and Technical Research Council.

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References:

- Colacevich, A.: 1950, Mem.Soc.Astron.Ital. 21, 275.
Deutsch, A.J.: 1945, Astrophys.J. 102, 496.
Hoffmeister, C.: 1943, Astron.Nachr. 274, 36.
Hoffmeister, C.: 1944, Mitt.Veränderl.Sterne. No. 85.
Kukarkin, B.V. and Ghiz, E.K.: 1949, VS Bull. 6, 335.
Scaltriti, F.: 1976, Astron.Astrophys.Suppl. 25, 291.
Sezer, C.: 1980, IBVS No. 1899.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2102

Konkoly Observatory
Budapest
1982 March 8
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATION OF W UMa (BD + 56⁰1400)

This short period ($0^d.33363808$) well known eclipsing variable has been observed numerous times by many observers. A complete set of photographic, visual and photoelectric data have been available for the last 79 years.

Since the system is well known for variations of period, the available data as far as 1903 were compiled and O-C variation were investigated.

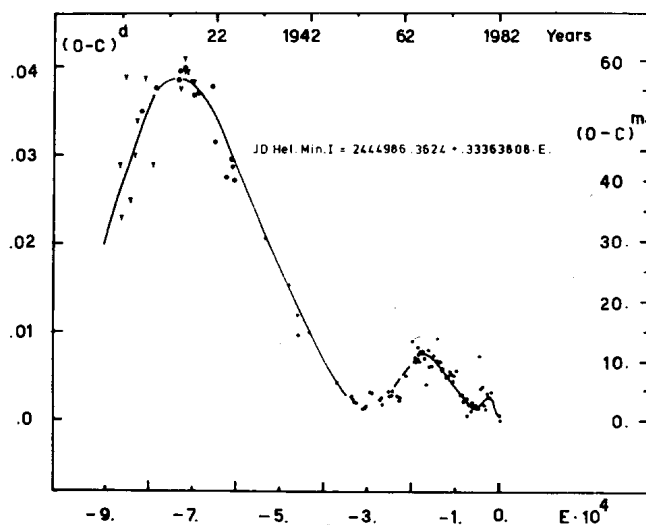


Fig.1: Compilation of O-C variation for various years. Triangles, open dots and filled dots refer to photographic, visual and photoelectric observations.

In Figure 1, we present O-C variation from 1903 to 1982 (110 points). The last two dots correspond to latest observations obtained at the Ege University Observatory with 48 cm Cassegrain telescope.

The star was photoelectrically observed and two accurate minimum times were determined according to the chord bisection method. These are,

JD Hel Min I = 244 4986.3624	January 16, 1982
JD Hel Min II = 244 4986.5290	"
JD Hel Min I = 244 4987.3639	January 17, 1982

We adopted JD Hel Min I = 244 4986.3624 (first minimum) as T_0 and 0.33363808 (Cester, 1973) as the period and all available 110 (photographic, visual and photoelectric) JD Min I values were recalculated and new O-C values obtained (see Figure 1).

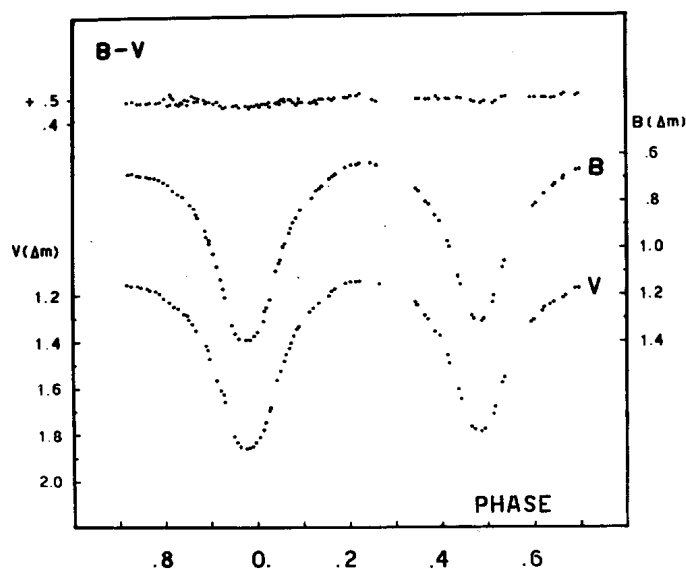


Fig. 2: The light curve of the star obtained on two nights (16, 17 January, 1982) consecutively.

In Figure 2 we present the average light curve obtained on 16 and 17 January 1982. The first night, a complete light curve was obtained, the second night only the primary minima repeated.

Acknowledgements:

We would like to thank to Mr. Kücükçak and to Mr. O. Tümer for their help.

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Reference:

Tunca, Z., Tümer, O., Evren, S., 1979 IBVS No. 1607.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2103

Konkoly Observatory
Budapest
1982 March 8

HU ISSN 0374-0676

PHOTOELECTRIC PHOTOMETRY OF Ap STARS IN THE
GALACTIC CLUSTER NGC 2516: PRELIMINARY RESULTS

The galactic cluster NGC 2516 is known to contain many Ap stars of all peculiarities (Abt and Morgan 1969; Dachs 1972; Hartoog 1976; Maitzen 1981 etc.) and so is of particular interest for the study of the evolution of such stars. Four of these, which had a slightly greater dispersion than others in the Geneva photometric measures, were systematically checked for variability during the years 1981-82 at La Silla Observatory, with the 70cm Swiss telescope. These are Cox 15 (HD 65987), 24 (HD 66318), 38 (CpD-60° 00981) and Cox C (CpD-60° 00978). HD 65950, which is a Mn star, does not vary significantly and was used as a comparison star together with CpD-60° 00982.

Cox 15 (SiSr) has a peak-to-peak amplitude of no more than $0^{\text{m}}.025$ in [U-B] and of $0^{\text{m}}.017$ in V. Twenty-one measurements of this star have been made between February and April 1981, each one consisting in the sequence C_1 -V- C_2 -V- C_2 -V- C_1 (C_1 and C_2 are the above-mentioned comparison stars). The most likely period seems to be 1.41 days, with a double wave in [U-B], but the V lightcurve is very scattered and more measurements are being made to clarify this point.

Cox 24 (Si) shows no detectable variation: eight measurements show a standard deviation of only $0^{\text{m}}.0024$ in V, which surely is close to their intrinsic scatter.

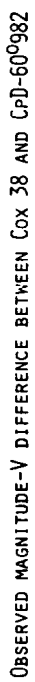


Figure 1

Cox 38 has been measured nine times in 1981 and shows no intrinsic variation, the r.m.s. deviation being $0^m.0026$ in V; however, one measurement yields a magnitude of 9.65 instead of 9.51, and the three magnitudes of the sequence are monotonically increasing, while the colours remain completely normal. This suggested an eclipse, and the star was observed again in December 1981 and January 1982 in order to find other minima. Two were indeed found (see the figure, where the magnitude differences between Cox 38 and CpD-60⁰982 are represented) and one of them may well be a secondary minimum; however, as it has been measured mainly during twilight, and although the sky was measured simultaneously with a double-beam photometer, this still has to be ascertained. A rough estimate of the half-period, or of the period itself can be made and lead to the following ephemeris:

$$\begin{aligned} \text{HJD (Min.)} &= 2444985.877 + 3.157 \text{ E} \\ &\pm .005 \pm .007 \end{aligned}$$

More measures will be made in order to complete the lightcurve. The absence of intrinsic variation may imply that the magnetic and rotation axes are parallel, if the "spots" are located near the magnetic poles and if the rotation axis is normal to the orbital plane.

Cox C (Si) has a very significant variation of $0^m.06$ in [U-B] and of $0^m.03$ in V. Its most probable period is 1.81 days, and the V lightcurve is double-waved.

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References:

- Abt H.A., Morgan W.W.: 1969, *Astron. J.* 74, 813
Dachs J.: 1972, *Astron. Astrophys.* 21, 373
Hartoog M.R.: 1976, *Astrophys. J.* 205, 807
Maitzen H.M.: 1981, *Astron. Astrophys.* 96, 151

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2104

Konkoly Observatory
Budapest
1982 March 8
HU ISSN 0374-0676

BV PHOTOMETRY OF BETELGEUSE OCT 1979 TO APR 1981

We present BV photometry of Betelgeuse (α Ori = BS 2061) made by the author with a 15-cm f/6 Newtonian reflector in San Jose, California (latitude N $37^{\circ} 15' 26''$; longitude W $121^{\circ} 55' 43''$; elevation 70 meters above sea level). The photometer was designed and built by the author. It uses an uncooled RCA 931A photomultiplier tube, operated at -1000 volts, and standard UBV filters.

Table I gives 19 V magnitudes and 9 B-V colors for Betelgeuse. The 1979-1980 data generally represent two differential measurements of Betelgeuse with respect to the comparison star, which in all cases was γ Ori (= BS 1790), while the 1980-1981 data are averages of three differential measurements (except for JD 2444680, when only two measurements were made under poor seeing conditions). The column labeled ΔX in Table I is the difference in air mass between Betelgeuse and γ Ori. For γ Ori $V = 1.64$, $B-V = -0.22$ (Table 9 of Johnson et al. 1966). We often obtained the raw data directly from readings of the amplifier's ammeter, but some data were reduced from strip chart tracings. Dates for which strip chart data were taken are marked by an asterisk in Table I. The V magnitudes for the two seasons' data are plotted in Figures 1a and 1b.

We reduced the data according to the usual method of differential photometry (Equations 28a and 28b of Hardie 1962). This procedure gives differential values (ΔV , $\Delta(B-V)$); our final reduction step was simply to add these differential data to the V magnitude and B-V color of the comparison star.

2

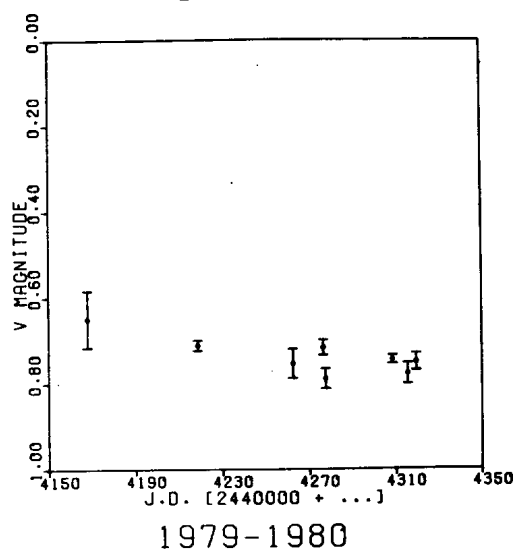


Figure 1.a

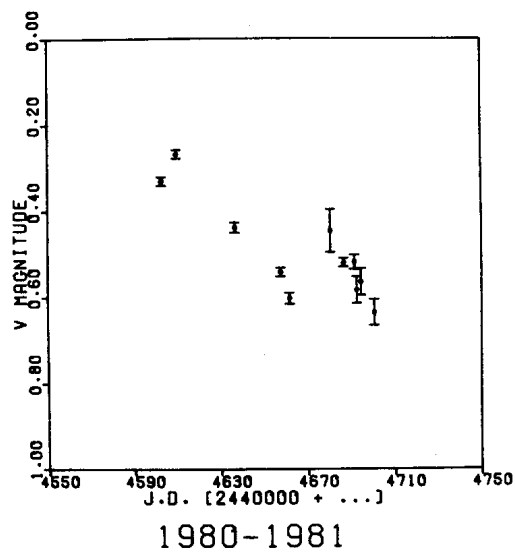


Figure 1.b

Fig. 1 Standardized V photometry of Betelgeuse made by the author in two successive observing seasons. The data are taken from Table I. The error bars are one standard deviation errors based on the scatter of the raw differential measurements, using γ Ori as comparison star.

Table I

Photometry of Betelgeuse

Julian Date (2440000 +)	V		B-V		ΔX
4167.856	0.65	± 0.07			+0.20
4218.812	0.71	0.01			+0.03
4262.725	0.76	0.03			0.00
4276.694	0.72	0.02			-0.01
4277.731	0.79	0.02			-0.05
4308.677	0.75	0.01			-0.09
4315.708	0.78	0.02			-0.19
4319.693	0.75	0.02			-0.18
4602.767	0.33	0.01	1.89	± 0.02	+0.02
*4609.654	0.27	0.01	1.86	0.03	+0.17
*4636.678	0.44	0.01	1.85	0.01	+0.02
*4657.696	0.54	0.01	1.85	0.01	-0.05
4661.782	0.60	0.01	1.85	0.03	-0.28
*4680.661	0.45	0.05			-0.09
*4686.666	0.52	0.01	1.86	0.02	-0.13
*4691.679	0.52	0.01	1.84	0.01	-0.19
*4692.663	0.58	0.03	1.85	0.01	-0.16
*4694.674	0.57	0.03	1.87	0.01	-0.21
*4700.677	0.64	0.03			-0.22

For the 1979-1980 observations our transformation coefficient $\epsilon = -0.072 \pm 0.011$. For the 1980-1981 observations with a different photomultiplier tube the appropriate transformation coefficients were $\epsilon = -0.050 \pm 0.005$, $\mu = 0.957 \pm 0.007$. Though we directly measured B-V colors on half the nights, we used $\Delta(B-V) = 2.06$ (from data in Table 9 of Johnson et al. 1966) to derive all our differential magnitudes (ΔV 's) using Hardie's Equation 28a.

The data were reduced using mean atmospheric coefficients appropriate to our site of $k_V = 0.52$ mag/air mass and $k'_{BV} = 0.37$ mag/air mass. (We assumed $k''_{BV} = -0.03$ air mass⁻¹.)

In Table I the errors quoted are one standard deviation errors (of the mean) based on the scatter of the raw differential data. The data reduction terms were calculated to the nearest 0.001 mag, and the results in Table I are rounded off to the nearest 0.01 mag. Given the uncertainty of the transformation coefficients ϵ and μ and the effects of differential extinction

and reddening, the individual standardized magnitudes and colors have typical probable errors of about ± 0.03 mag. The relative data for each season (particularly when the strip chart recorder was used) would be accurate to ± 0.02 mag or better. Data obtained when Betelgeuse and γ Ori were near the meridian ($|\Delta X| < 0.05$) are to be considered the most reliable.

We find from the data in Table I that the B-V color of Betelgeuse was constant to ± 0.01 mag on 7 of the 9 nights it was measured; on the other two nights the data are only 0.04 and 0.02 mag redder -- probably not significant differences given the accuracy of the data. Averaging the values for all 9 nights gives $\langle B-V \rangle = 1.86$. For Betelgeuse, Johnson et al. (1966, Table 9) give $\langle B-V \rangle = 1.84$, but individual B-V values in their Table 4 range from 1.829 to 1.891. Any difference between our mean color and theirs is most likely due to a slight error in our derived μ coefficient.

Figure 1a shows that the V magnitude of Betelgeuse was essentially constant in the winter of 1979-1980; excluding the first point we found $\langle V \rangle = 0.75$. Skillman (1981) measured Betelgeuse vs. γ Ori on 5 nights in January-March 1980 and found Betelgeuse constant to ± 0.02 mag. His data lead to $\langle V \rangle = 0.73$ and support our conclusions about the luminosity of Betelgeuse in the winter of 1979-1980.

Figure 1b clearly shows variations of up to half a magnitude in V with respect to the previous season's data. These data and the degree of variation compare well with the values given by Johnson et al. (1966, Table 4). They list eight V magnitudes which range from 0.726 to 0.320. The degree of irregular variation and the associated time scale (a couple months) are typical of an SRC (semi-regular supergiant of late spectral class) variable star, as Betelgeuse is indeed classified (Kukarkin et al. 1969).

We encourage further monitoring of Betelgeuse with photometric equipment. Such photometry, combined with other types of data, will tell us useful things about Betelgeuse and other late-type stars. For example, from polarimetry

data Hayes (1981) finds evidence for the growth of a surface feature on Betelgeuse in the interval November 1980 to February 1981 (when we measured a half-magnitude brightening). From speckle interferometry data Goldberg et al. (1981) also found evidence for the growth of a surface feature at the same time. It is exciting that this type of activity on Betelgeuse was measured by three very different experiments.

Acknowledgements

I would like to thank V. Loesche for his help with calibrating the electronics. The strip chart recorder was loaned by Dr. Jesse Bregman of the NASA/Ames Research Center.

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References:

- Goldberg, L., Hege, E. K., Hubbard, E. N., Strittmatter, P. A., and Cocke, W. J. 1981, preprint.
- Hardie, R. H. 1962, in Astronomical Techniques, W. A. Hiltner, ed. (Chicago: University of Chicago Press), p. 178.
- Hayes, D. P. 1981, Publ. Astr. Soc. Pacific 93, 752.
- Johnson, H. L., Mitchell, R. I., Iriarte, B., and Wisniewski, W. Z. 1966, Communic. Lunar and Planetary Lab. 4, 99.
- Kukarkin, B. V., et al. 1969, General Catalogue of Variable Stars (3rd ed., Moscow).
- Skillman, D. R. 1981, private communication.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2105

Konkoly Observatory
Budapest
1982 March 9
HU ISSN 0374-0676

ON THE NOVA-LIKE OBJECTS IN THE CENTRAL REGION OF M31

In IAU Circular No. 3643 H. Ford, R. Ciardullo and G. Jacoby reported the discovery of four unusual nova-like objects in the central region of M 31. All objects were found on two plates obtained at the 2-meter telescope of the Bulgarian Academy of Science by G.R. Ivanov (Bulgaria) and Yu.N. Efremov (USSR), on September 28 UT and October 4 UT 1981. Magnitude estimations of these objects are very difficult because of bright background and absence of deep photometrical standards. Approximate magnitudes on September 24 are given below:

No.	B
1	$\sim 20^m$
2	~ 19.5
3	~ 21.5
4	~ 19.5

All objects are weaker on the succeeding plate and are not visible on the plates obtained at the same telescope in 1980 ($B > 22^m$). On our plates with limiting magnitude $B \sim 18.5^m$ obtained in Crimea between September 24 and November 1981 the objects are not visible.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2106

Konkoly Observatory
Budapest
1982 March 12
HU ISSN 0374-0676

HD 65227: A NEW SHORT PERIOD CEPHEID OF
VERY SMALL AMPLITUDE

The spectral type of HD 65227 is given as F8 II by
Stephenson and Sanduleak (1971, LSS 878). In a program of
intermediate band and H β photometry of known supergiants

Table I
Observations of HD 65227

244	Ph.	V	b-y	M ₁	C ₁	β
4304.651	0P000	8. ^m 59	0. ^m 459	0. ^m 168	1. ^m 048	2. ^m 674
4620.712	0.033	8.60	0.460	0.176	1.057	2.672
4625.684	0.056	8.60	0.467	0.172	1.055	2.671
4936.822	0.076	8.64	0.457	0.182	1.049	2.662
4363.488	0.106	8.61	0.470	0.125	1.031	2.663
5019.667	0.123	8.63	0.484	0.162	1.045	2.656
4601.771	0.136	8.63	0.473	0.176	1.027	2.659
4344.542	0.208	8.67	0.485	0.178	1.015	2.659
4621.684	0.233	8.67	0.495	0.178	1.012	2.655
4932.818	0.252	8.69	0.492	0.177	1.006	2.660
4626.655	0.256	8.69	0.498	0.182	1.003	2.661
4670.648	0.308	8.74	0.501	0.187	0.981	2.649
4602.739	0.335	8.73	0.504	0.182	0.963	2.648
4622.693	0.440	8.78	0.522	0.196	0.928	2.649
4933.822	0.459	8.78	0.526	0.186	0.934	2.647
4627.651	0.461	8.82	0.531	0.198	0.933	2.645
4671.565	0.497	8.82	0.527	0.196	0.910	2.646
4365.592	0.519	8.83	0.526	0.208	0.888	2.629
4623.700	0.648	8.79	0.516	0.201	0.901	2.643
4934.818	0.664	8.79	0.526	0.197	0.915	2.648
4672.565	0.703	8.80	0.527	0.188	0.916	2.636
4361.542	0.706	8.79	0.532	0.175	0.903	2.638
4366.503	0.727	8.79	0.523	0.177	0.934	2.647
4935.829	0.872	8.72	0.490	0.174	0.996	2.658
4629.707	0.884	8.66	0.486	0.167	1.009	2.667
4673.537	0.902	8.64	0.471	0.172	1.023	2.676

this star was found to vary with the small visual amplitude of 0.2 mag. The observations are listed in Table I, where the phases are from the elements $\text{Max.} = \text{JD } 2444304.651 + 4^{\text{d}}.8600$. The light and color curves are shown in Figure 1.

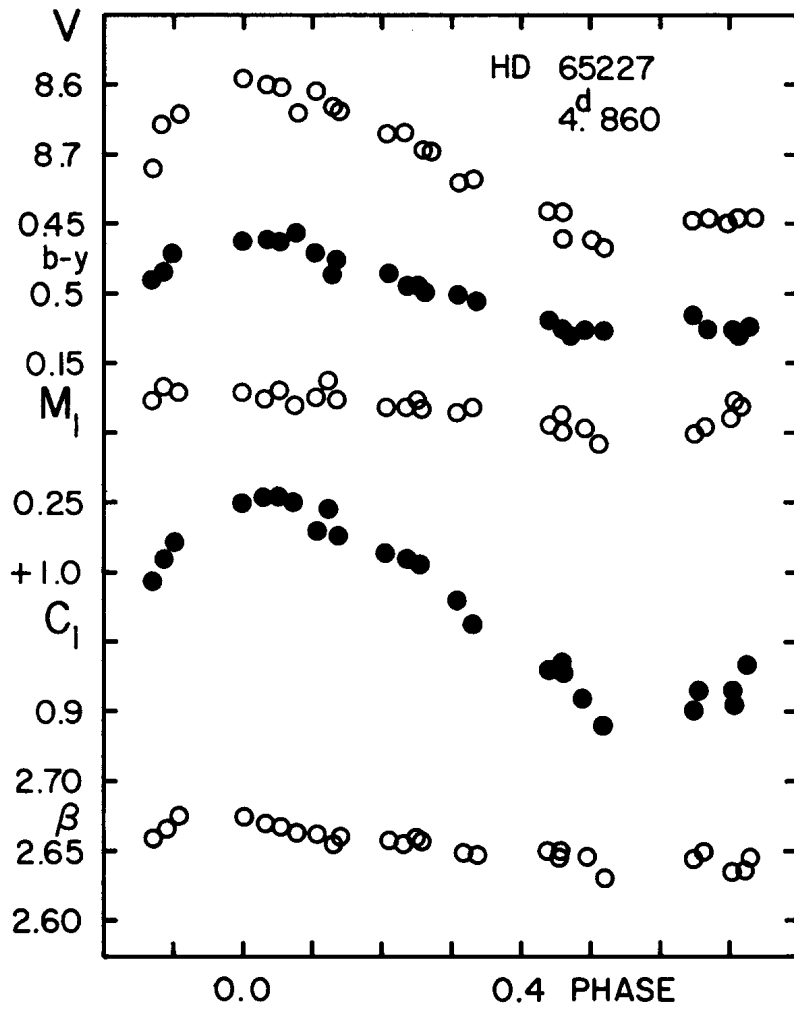


Figure 1

The star will be discussed in more detail elsewhere in connection with other short period cepheids.

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Reference:

Stephenson, C.B. and Sanduleak, N. 1971, Pub. Warner and
Swasey Obs. Vol. 1, No.1.

* Cerro Tololo Inter-American Observatory is supported by the National Science Foundation under contract No. AST 78-27879.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2107

Konkoly Observatory
Budapest
1982 March 12
HU ISSN 0374-0676

1981 UBVR PHOTOMETRIC OBSERVATIONS OF ER Vul

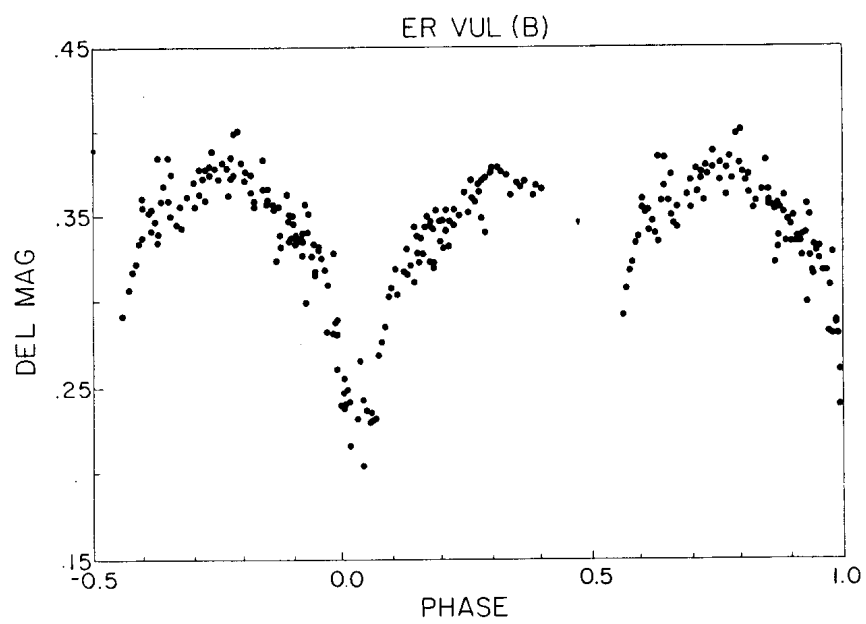
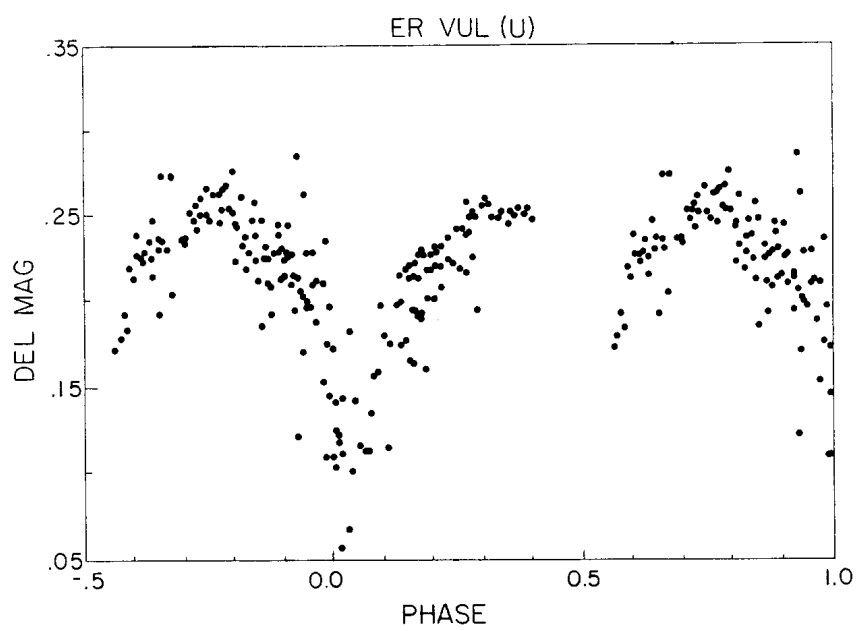
ER Vul (BD+27°3952, HD 200391, SAO 989396), first observed spectroscopically by Northcott and Bakos (1946) and subsequently by them photometrically (1955), is one of the RS CVn binaries currently being observed at the University of New Mexico's Capilla Peak observatory. The object, an eclipsing binary at right ascension $21^{\text{h}}00^{\text{m}}16.4^{\text{s}}$ and declination +27°36'33.4" (1950) was observed from August through November of 1981 with the 61-cm telescope and its single-channel photon-counting photometer. The photometer employs a liquid cooled (-20°C) EMR 641A phototube and UBVR filters obtained from Kitt Peak; its output is fed directly to a microcomputer enabling rapid data access and reduction.

The data reduction method was standard: comparison star (BD+27°3946) minus source (ER Vul) minus sky. The data were obtained with an accuracy of ± 0.01 magnitude or less, checked in real time at the telescope.

Phase calculations were accomplished using $\text{HJD} = 2440182.3212 + 0.62892990E$ (Al-Naimiy, 1978). Table I lists the dates of observation and phases covered. Figure 1 through 4 summarize the results.

Previously reported light curves by Northcott and Bakos (1976), Al-Naimiy (1978), Hrivnak (1982) and Kadouri (1981) show remarkable similarities, the most notable being the substantial difference in depth between primary and secondary minima (0.1 magnitude) and, by contrast, the similarity of the shoulders (no more than 0.02 magnitude difference).

2



3

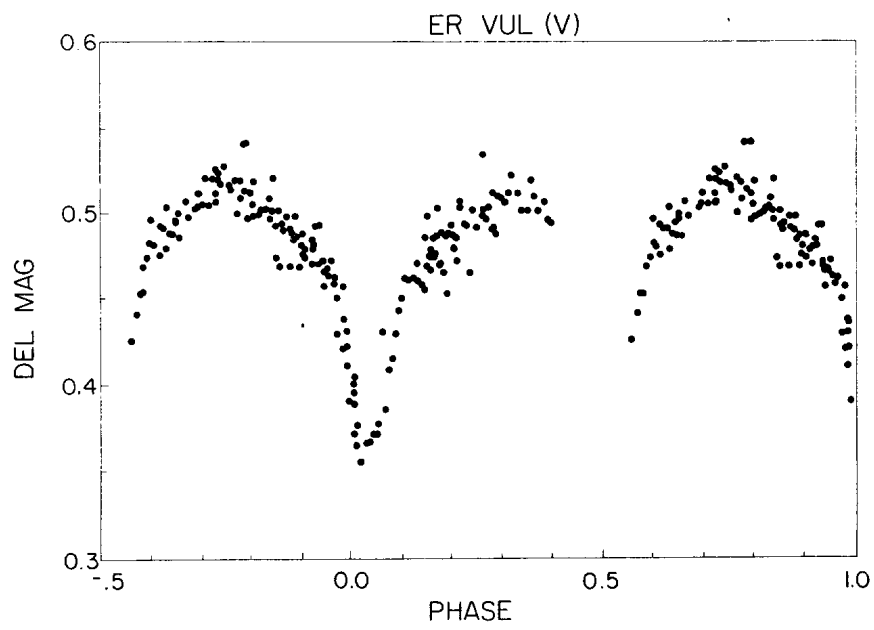


Figure 3

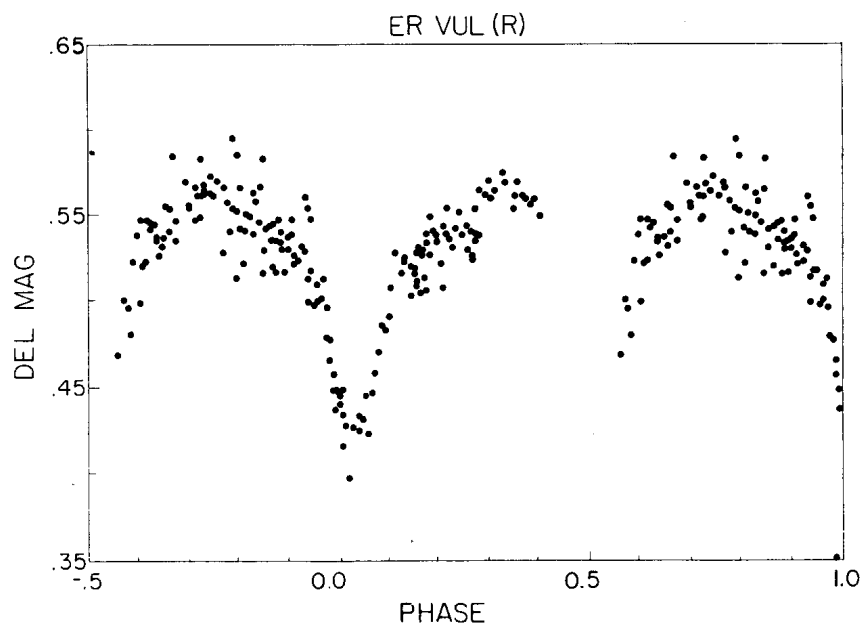


Figure 4

ER Vul 1981 Phase Log

Table I

Date	Phase	Date	Phase	Date	Phase
8-21	0.14→0.59	10-10	0.27→0.40	10-26	0.16→0.22
9- 3	0.60→0.70	10-18	0.70→0.13	11-10	0.63→0.73
9-20	0.37→0.53	10-21	0.99→0.03	11-19	0.56→0.66
9-27	0.91→0.04			11-25	0.13→0.29

Our data confirm these results. In addition, we note that (1) the intrinsic scatter in the system seems larger outside of eclipses (~ 0.04 mag) than during them, (2) variations in the light curve are noticeable over a time as short as a week. Both effects were also noted by Hrivnak (1982) and Zeilik et al. (1982).

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References:

- Al-Naimiy, H. M., 1978, IBVS #1481.
 Hrivnak, B. J., 159th meeting of the American Astronomical Society,
 Boulder, Colorado, 1982.
 Kadouri, T. H., 1981, IBVS #2057.
 Northcott, R. S. and Bakos, G. A., 1956, Astron. Journal, 61, p. 1238.
 Northcott, R. S. and Bakos, G. A., 1967, Astron. Journal, 72, p. 1.
 Zeilik, M., Elston, R., Henson, G., Smith, P., Schmolke, P., 159th
 meeting of the American Astronomical Society, Boulder, Colorado, 1982.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2108

Konkoly Observatory
Budapest
1982 March 15
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF VW CEPHEI

The eclipsing binary star of the W UMa type, VW Cep, was observed photoelectrically with the 30-cm reflector at the Mitaka campus of the Tokyo Astronomical Observatory during the nights of December 2, 3, 16 and 17, 1981. The photometer was furnished with an uncooled 1P21 photomultiplier tube and U, B, V filters in close accordance with the standard ones of Johnson. Actual observations were made with the B and V filters only, against the comparison star HD 192635 (Sp=F5). Altogether, 139 observations in V and 143 in B were obtained and they are plotted in Figure 1, where the

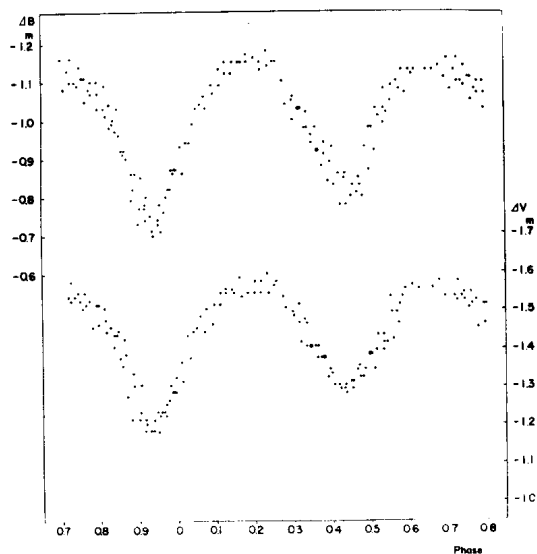


Figure 1

phases are calculated with

$$\text{Prim.Min.} = \text{JD Hel } 2443448.2663 + 0.2783176 E^d$$

which has been taken from the work of Niarchos (1980).

The present observations cover 4 primary minima and 3 secondary. The following table gives their heliocentric times with the O-C values from the above ephemeris.

Observed date	O - C	Type of minimum
Hel.JD 2444000+		
941.1435	- 0. ^d 0180	Prim.
941.9806	- 0.0163	Prim.
942.1181	- 0.0179	Sec.
954.9207	- 0.0179	Sec.
955.0581	- 0.0197	Prim.
955.8936	- 0.0191	Prim.
956.0337	- 0.0182	Sec.

From these O-C values, it is found that no appreciable period change has occurred since 1976 (Pohl et al. 1977). All the observational data given in $m_V - m_C$ are not published here, but are available on request.

I would like to express my hearty thanks to Prof. M. Kitamura of Tokyo Astronomical Observatory for his suggestion of this programme and kind guidance on the work. My sincere gratitude is also due to the entire staff of the photometric section of the Observatory for its kindness and hospitality during my six-month stay. Thanks are also extended to Drs.

A.Yamasaki and A.Okazaki for their kind discussion on photo-electric reduction.

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References:

- Rovithis, P., Rovithis-Livaniou, H., 1980, *Astrophys. Sp. Sci.*, 73, 27.
Niarchos, P. G., 1980, *I.B.V.S.* No. 1980.
Hopp, U., Witzigmann, S., Kiehl, M., 1976, *I.B.V.S.* No. 1599.
Cristescu, C., 1978, *I.B.V.S.* No. 1383.
Pohl, E., Kizilirmak, A., 1977, *I.B.V.S.* No. 1358.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2109

Konkoly Observatory
Budapest
1982 March 17
HU ISSN 0374-0676

29 DRACONIS: A NEW VARIABLE STAR

We suspected 29 Draconis = HD 160538 is an RS CVn binary because of its late spectral type, the Ca II H & K emission in its spectrum, and its apparently variable radial velocity. The spectral type is KO III according to Bidelman (1955) or K2 III according to Roman (1955), and "strong bright lines of Ca II are present" according to Bidelman (1955). Radial velocity values published by Abt and Biggs (1972) show variations larger than we felt could reasonably be blamed on observational uncertainty; except for these variations, however, we can find no direct evidence that 29 Dra is a binary system.

Photometry was begun to search for the variability which might be expected if 29 Dra were an RS CVn binary. We observed it at four different observatories on a total of 47 different nights between JD 2 444 295.97 and 2 444 556.49 in 1980. Henry observed with the 24-inch Seyfert reflector at Dyer Observatory and the No. 4 16-inch reflector at Kitt Peak National Observatory; Louth observed with his 11-inch reflector in Sedro Woolley, Washington; Renner observed with his 10-inch reflector at Scuppernong Observatory near Dousman, Wisconsin. All observed with filters selected to match V of the UBV system, although Henry obtained also a few observations at Dyer with a filter selected to match B. All used BD +75⁰647 as the comparison star. The individual differential magnitudes, corrected for differential atmospheric extinction with mean coefficients appropriate for each observatory and transformed differentially to the UBV system with coefficients determined previously, have been deposited in the I.A.U. Commission 27 Archive for Unpublished Observations of Variable Stars (Breger 1979), where they are available as file no. 94. In the reductions we used a mean color difference of $\Delta(B-V) = +0.08$, in the sense variable minus comparison.

The light curve in V is shown in the figure below, where asterisks are Henry at Dyer, circles are Henry at Kitt Peak, and plusses are Louth. Each

point is a mean of the three individual differential magnitudes obtained on each night, although the earliest point ($\Delta V = 0.332$ at JD 2 444 295.97 by Renner) is not plotted. Here we can see that 29 Dra is very definitely variable, with an overall range of $\Delta V = 0.12$, a periodicity of around 30 days, and a long-term brightening trend.

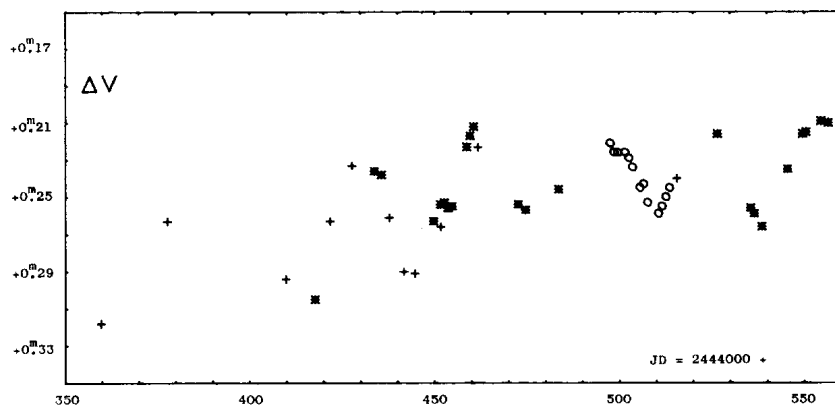


Figure 1

To determine this periodicity more precisely, we used a simple program which searched for the period which produced a magnitude vs phase plot in which the total length of line segments connecting the points was a minimum. The result was $P = 31.5^d$ with an uncertainty we estimate to be around ± 1 day. Times of maximum and minimum light, estimated graphically from the figure, are consistent with this period. A representative epoch of minimum light would be JD 2 444 445.0 $\pm 1.0^d$.

In virtually all RS CVn binaries known to be variable in light, the photometric period is within a few percent of the orbital period, as a consequence of synchronous rotation of the star responsible for the variation. Therefore we conclude this note by suggesting spectroscopic observers search for radial velocity variations in 29 Dra and predict that the period of those variations, if found, will be around 30 days. For such a bright star, $V = 6.55$ according to Roman (1955), this should not be difficult.

D.S.H. is happy to acknowledge support from N.A.S.A. research grant
NSG-7543,

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References:

- Abt, H. A. and Biggs, E. S. 1972, Bibliography of Stellar Radial Velocities
(Tucson: Kitt Peak National Observatory).
Bidelman, W. P. 1955, Ap. J. Suppl. 1, 175.
Breger, M. 1979, I.B.V.S. no. 1659.
Roman, N. G. 1955, Ap. J. Suppl. 2, 195.

- a) Guest Observer, Kitt Peak National Observatory, operated by the Association of Universities for Research in Astronomy, under contract with the National Science Foundation.
b) of the A.A.V.S.O.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2110

Konkoly Observatory
Budapest
1982 March 17
HU ISSN 0374-0676

HD 26337: A NEW RS CVn VARIABLE STAR

According to Bidelman and MacConnell (1973) HD 26337 (= SAO 130994) is a G5 IV star with Ca II H & K in emission. This made us suspect it was an RS CVn binary and (as most members of that class are) variable in light as well.

As part of a program to obtain spectroscopic observations of the Ca II H & K emission stars listed by Bidelman and MacConnell (1973) Fekel observed HD 26337 with the 91-cm reflector at Goddard Space Flight Center and with the 2.7-m and 2.1-m reflectors at McDonald Observatory of the University of Texas. The 5 Goddard observations with a dispersion of 40 Å/mm and a resolution of 2.5 Å showed moderate strength Ca II H & K emission lines. On 8 nights between JD 2444179.9 and 2444627.6 red spectrograms were obtained at McDonald with dispersions of 4.4 Å/mm or 9 Å/mm. A preliminary orbital element solution with 10 radial velocities, 8 from McDonald and 2 from other observatories, indicates an orbital period of 2.04414 ± 0.00047 and a velocity amplitude of about 50 km/sec. The observations show only one component, whose lines are substantially broadened by rotation with $V \sin i \sim 40-45$ km/sec. The H α line appears to be a relatively weak absorption feature. Spectroscopic observations are being continued to improve the orbital elements.

Differential photoelectric measurements were made at four different observatories on a total of 27 different nights between JD 2444287.55 and 2444660.60. Landis observed with the 8-inch reflector of Landis Observatory in Locust Grove, Georgia; Henry observed with the 24-inch Seyfert reflector at Dyer Observatory and the No. 4 16-inch reflector at Kitt Peak National Observatory; Renner observed with the 10-inch reflector at Scuppernon Observatory near Dousman, Wisconsin. All observed with filters chosen to match V of the UBV system, although Henry obtained also a few observations at Kitt Peak with a filter selected to match B. All used 37 Eridani as the comparison star. The individual differential magnitudes, corrected for differential at-

atmospheric extinction with mean coefficients appropriate for each observatory and transformed to the UBV system with coefficients determined previously, have been deposited in the I.A.U. Commission 27 Archive for Unpublished Observations of Variable Stars (Breger 1979), where they are available as file

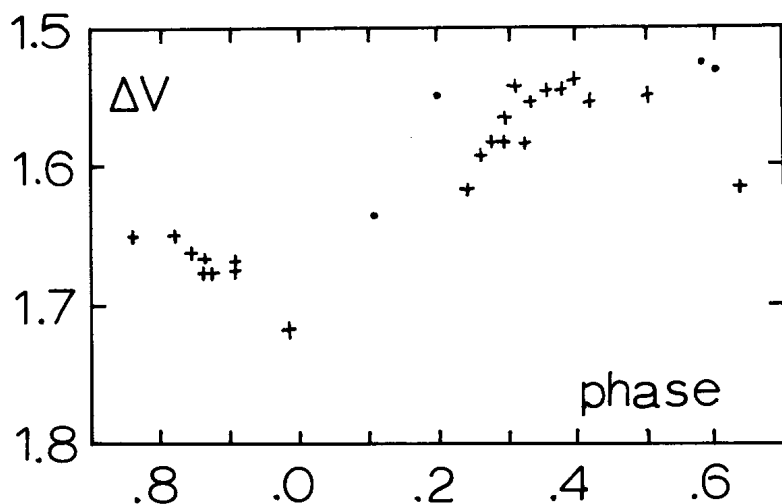


Figure 1

no. 95. In the reductions we used a mean color difference of $\Delta(B-V) = -0.^m27$, in the sense variable minus comparison.

Our photometry is best fit by a period close to but very slightly shorter than the orbital period. The light curve in V is plotted in the figure below, with a period of $2.^d038$. Each point is a mean of the two or three individual magnitudes obtained on each night. The total range is $\Delta V = 0.^m19$, but the shape seems to be somewhat variable from one year to the next. The four observations of Landis (dots), from the 1979-80 season, do not fit very well the other observations (crosses), all from the 1980-81 season. A recent epoch of minimum light would be JD 2444635.65, which corresponds to zero phase in the figure.

For our comparison star 37 Eri, Nicolet (1978) gives $V = 5.^m44$ and $B-V = 0.^m94$. Our light curve then indicates that HD 26337 varies over the range $6.^m95 < V < 7.^m15$. The color index, probably constant, is around $B-V = 0.^m67$.

It is characteristic of most RS CVn binaries that the light is variable and that the photometric period is very close to but slightly shorter than the orbital period. Such is the case with this newly discovered

RS CVn binary HD 26337, for which $P(\text{phtm.})$ is shorter than $P(\text{orb.})$ by about 0.3%.

D.S.H. is happy to acknowledge support from N.A.S.A. research grant NSG-7543.

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- Bidelman, W.P. and MacConnell, D.J. 1973, A.J. 78, 687.
Breger, M. 1979, I.B.V.S. no. 1659.
Nicolet, B. 1978, Astr. Astrophys. Suppl. 34, 1.

- a) Guest Observer, Kitt Peak National Observatory, operated by the Association of Universities for Research in Astronomy, under contract with the National Science Foundation.
b) of the A.A.V.S.O.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2111

Konkoly Observatory
Budapest
1982 March 17
HU ISSN 0374-0676

HD 136905: A NEW RS CVn VARIABLE STAR

According to Bidelman and MacConnell (1973), HD 136905 (= SAO 14099) is a K1 III + F binary with Ca II H & K in emission, although they considered the emission uncertain. Because this made us suspect it was an RS CVn binary, we began observing it spectroscopically to search for radial velocity variations and photometrically to search for light variations.

As part of a program to obtain spectroscopic observations of Ca II H & K emission stars listed by Bidelman and MacConnell (1973), Fekel observed HD 136905 with the 91-cm reflector at Goddard Space Flight Center and with the 2.7-m reflector at McDonald Observatory of the University of Texas. The 4 Goddard observations with a dispersion of 40 Å/mm and a resolution of 2.5 Å all showed weak to moderate strength Ca II H & K emission lines. On 8 nights between JD 2444355.9 and 2444739.8 red spectrograms were obtained at McDonald with a dispersion of 4.4 Å/mm. These observations show a single component of spectral type KO IV or III whose lines are broadened with $V \sin i \sim 25\text{--}30$ km/sec and whose radial velocity is variable. A period-search program applied to the 8 radial velocities yielded several possible values, but the best seemed to be 11.^d12 with an uncertainty of about ± 0.05 . A comparably good fit was given by a period with half that value, but this was considered less likely because the shape of the resulting radial velocity curve would imply an orbital eccentricity of $e \approx 0.5$, unusually large for such a short orbital period. Spectroscopic observations are being continued to determine the orbital elements.

Differential photoelectric measurements were made at two different observatories on a total of 16 different nights in 1980 between JD 2444675.90 and 2444783.80. Burke observed with the No. 4 16-inch reflector at Kitt Peak National Observatory; Henry observed with that same telescope and also with the Seyfert 24-inch reflector at Dyer Observatory. The Kitt Peak ob-

servations were made to match V of the UBV system, while those at Dyer were made to match V and B. Both observers used BD -6^o4181 as the comparison star. The individual differential magnitudes of Henry and the nightly means of Burke, corrected for differential atmospheric extinction with mean coefficients appropriate for each observatory and transformed to the UBV system with coefficients determined during the observing run or previously, have

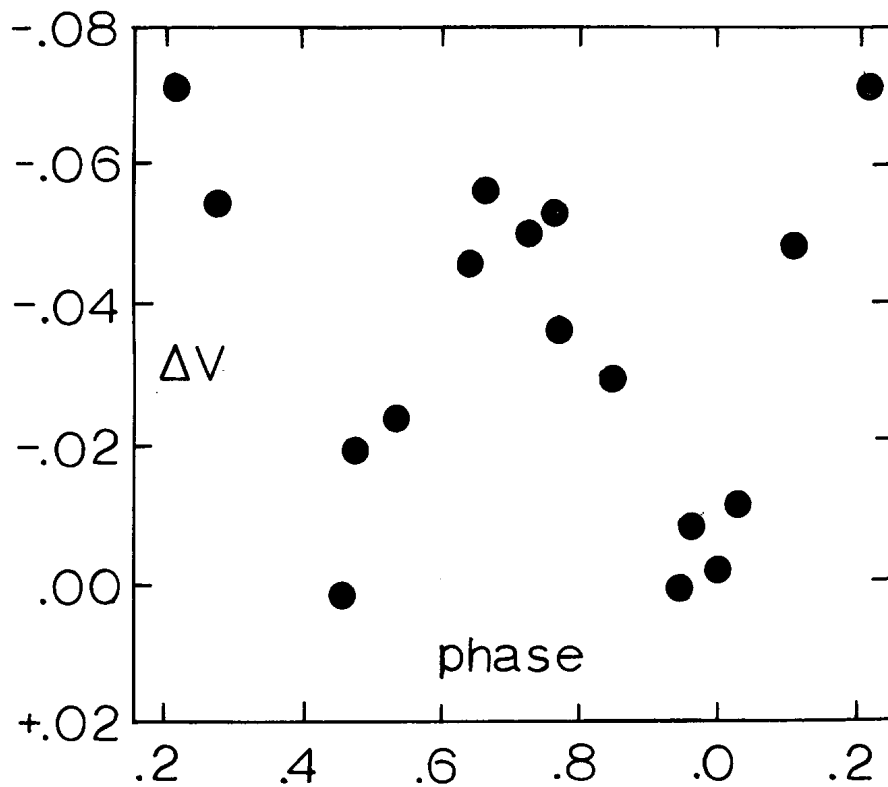


Figure 1

been deposited in the I.A.U. Archive for Unpublished Observations of Variable Stars (Breger 1979), where they are available as file no. 96. In the reductions we used a mean color difference of $\Delta(B-V) = -0.11^m$, in the sense variable minus comparison.

The light curve in V is plotted in the figure below, where each point is a nightly mean. Phase has been computed with the ephemeris

$$JD(hel.) = 2444678.4 + 11.12^d n,$$

where the initial epoch is a time of minimum light and the period is the same one found by Fekel. It can be seen that HD 136905 is definitely variable in light, with a range of $\Delta V = 0.07^m$. Further it can be seen that this light curve shows two comparably high maxima and two comparably deep minima per cycle. It is not surprising, therefore, that the photometric data can be fit almost as well by a period half that value. There is some indication that the photometric data would be fit marginally better by a period about 0.5% shorter than the orbital period, but the temporal baseline of only 108 days is sufficiently short that this should not be considered firmly established.

Recent BVRI photometry obtained by Moffett (1982) on three nights indicates $V = 7.31^m$ and $B-V = +1.02^m$.

We conclude by saying that HD 136905 is definitely an RS CVn binary and definitely variable in light, although the Ca II H & K emission is not very strong and we are not sure whether the orbital period is around 11.1^d or half that. If the former is true, then HD 136905 would be interesting as another example of an RS CVn binary in which one stellar component has two comparably large spots or spot groups, on opposite hemispheres. If the latter is true, then HD 136905 would be interesting as a rather short-period binary with a very large orbital eccentricity. Additional spectroscopy and/or photometry should be able to resolve this ambiguity.

E.W.B. is happy to acknowledge support from a William and Flora Hewlett Foundation Grant from the Research Corporation, and D.S.H. is happy to acknowledge support from N.A.S.A. research grant NSG-7543.

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References:

- Bidelman, W. P. and MacConnell, D. J. 1973, A.J. 78, 687.
Breger, M. 1979, I.B.V.S. no. 1659.
Moffett, T. J. 1982, private communication.

a) Guest Observer, Kitt Peak National Observatory, operated by the Association of Universities for Research in Astronomy, under contract with the National Science Foundation.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2112

Konkoly Observatory
Budapest
1982 March 17
HU ISSN 0374-0676

VARIABLE STARS IN THE NORTHERN LUMINOUS STARS CATALOGUES

The six catalogues of Luminous Stars in the Northern Milky Way resulting from the collaboration of the Hamburg and Warner and Swasey Observatories some twenty years ago contain a large number of objects assigned to the OB natural group as well as a few somewhat later type supergiants. As a companion piece to the writer's earlier note (IBVS No. 1958) listing the known variable stars among the objects contained in Stephenson and Sanduleak's comparable catalogue of Luminous Stars in the Southern Milky Way (1971), this note lists those northern luminous stars that are either named variables or contained in the 1951 or 1965 catalogues of stars suspected of variability. A few variables in the most recent naming lists (IBVS Nos. 1581, 1921, and 2042) may have been missed; coordinates were not readily available for some.

As before, additional spectroscopic data exist for a large proportion of the variables listed, but not for all. Also, a number of other LS objects are known to be variable, through the work of Haug (1970) for example, but are not listed in the table. Finally, it should be mentioned that charts exist for all of the LS stars.

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References:

- Haug, U., 1970, *Astron. Astrophys. Suppl.* 1, 35.
LS I: Hardorp, J., Rohlfs, K., Slettebak, A., and Stock, J., 1959.
LS II: Stock, J., Nassau, J. J., and Stephenson, C. B., 1960.
LS III: Hardorp, J., Theile, I., and Voigt, H. H., 1964.
LS IV: Nassau, J. J. and Stephenson, C. B., 1963.
LS V: Hardorp, J., Theile, I., and Voigt, H. H., 1965.
LS VI: Nassau, J. J., Stephenson, C. B., and MacConnell, D. J., 1965.
Stephenson, C. B. and Sanduleak, N., 1971, *Publ. Warner and Swasey Observatory*, Vol. 1, No.1.

Table I
Variable stars in the LS catalogue

Star No.	Spectrum	Name or Sus- pected Var. No.	Star No.	Spectrum	Name or Sus- pected Var. No.
<u>LS I</u>			<u>LS I</u>		
+53 4	OB	V353 Per	+61 164	OB h!	V594 Cas
+54 2	OB	V436 Per	+61 215	OB(ce,le)	AZ Cas
+55 7	G I	FM Cas	+61 270	OBce	KM Cas
+55 8	OB	V592 Cas	+61 303	OB	V615 Cas
+55 31	OB	V354 Per	+61 304	OBce,r	V482 Cas
+55 36	F8 I	V440 Per	+62 50	OB	V375 Cas
+56 30	OB ⁻ ce,(h)	V351 Per	+62 67	OBce,h	102302
+56 35	OB	V352 Per	+62 128	OB	κ Cas
+56 42	OB ⁻ (ce)	V438 Per	+62 165	OB	146
+56 47	OBce,h	V361 Per	+62 229	OB	TX Cas
+56 73	OB ⁺ ce	102392	+63 4	OB	DY Cep
+56 74	OB	ZZ Per	+63 30	OB	V362 Cas
+57 1	(OB)	V373 Cas	+63 39	OBce	102301
+57 3	OB	100007	+63 114	A7 Iab	BM Cas
+57 11	OBce,h	5910	+63 181	OBce,(h)	5960
+57 16	OB ⁺	102344	+65 26	OB	BK Cam
+57 50	OB ⁻ (h)	V355 Per			
+57 65	B5 Ia	V425 Per	<u>LS II</u>		
+57 98	OB ⁺ r	EO Per	+10 5	(F9 Ia)	FM Aql
+58 77	OB	100182	+15 2	F3 I	AP Her
+58 87	OB ⁺	V362 Per	+15 15	OB	V688 Aql
+58 130	G0 Ia	RX Cam	+15 17	F6 Iab	KL Aql
+59 15	OBce	QQ Cas	+16 14	F8 Iab	S Sge
+59 43	G I	DL Cas	+17 3	F4 I	FF Aql
+59 136	OB	102383	+18 4	B6 Iar	HT Sge
+59 163	OB	100249	+18 16	OB ⁺ (ce)	102965
+59 171	OB	V368 Cas	+18 17	OB	SY Sge
+59 174	OB	CC Cas	+20 8	F8 Iab	U Vul
+59 179	OB	102407	+20 19	OB ⁺ le,r	FG Sge
+59 187	B8 Iar	100276	+22 3	OB	ES Vul
+60 3	A2 Iab	8855	+23 50	OB	EV Vul
+60 42	OB	UU Cas	+24 22	A0 Iab	101901
+60 64	OB	QX Cas	+26 12	F8 Ia	X Vul
+60 125	OBce,h	5872	+27 2	F6 Ib	V473 Lyr
+60 155	A1 Ib	100108	+27 3	A4 Ib(1e)r	EP Lyr
+60 230	OB ⁻ ce	DN Cas	+27 18	F8 Ia	SV Vul
+60 262	A7 Ib	100216	+27 29	OB	EQ Vul
+61 51	OB	8880	+28 3	A1 II	V840 Cyg
+61 70	A2 Ia ⁺	V566 Cas	+29 5	Pec	BF Cyg
+61 113	OB	102294?	+29 15	B7 II	V1507 Cyg

Table I (cont.)
Variable stars in the LS catalogue

Star No.	Spectrum	Name or Sus- pected Var. No.	Star No.	Spectrum	Name or Sus- pected Var. No.
LS II			LS III		
+29 27	OBce	V1356 Cyg	+40 2	OB ⁻	V380 Cyg
+30 37	F8 Iab	DT Cyg	+41 11	OB ⁻	V1187 Cyg
+31 3	OB ⁻	V1671 Cyg	+41 18	OBh!!	V1685 Cyg
+31 17	OB	V483 Cyg	+41 31	OB ⁺ rr	V729 Cyg
+32 1	F8 I	V924 Cyg			
+33 6	OB(ce)	101894	+42 24	OB ⁻	103041
+34 20	F7 I-II	101977	+43 7	WR	V1687 Cyg
+34 28	OB	Y Cyg	+43 24	OB ⁺ le, (h)	SS Cyg
+35 8	OB ⁺ r	V1357 Cyg	+45 23	OB ⁻	V1661 Cyg
+35 33	OB ⁺ le(r)	V1676 Cyg	+47 1	OB ⁻	102967
+35 37	OB	V448 Cyg	+47 2	OB	V819 Cyg
+35 46	A2 Ia, h	V425 Cyg	+47 3	OB	RX Cyg
+35 79	F7 I	X Cyg	+47 33	OB	V530 Cyg
+36 23	WNh	101949	+47 48	OBh	V1427 Cyg
+36 27	WCh	V1042 Cyg	+48 41	OB ⁻	DL Cyg
+36 38	WCh	V1679 Cyg	+49 48	OB ⁺	KX And
+36 49	OB	KV Cyg	+51 36	OB ⁺ ce, h	V357 Lac
+36 55	OB	V382 Cyg	+52 2	OB ⁺ le, h	V1696 Cyg
+37 43	WNh	101974	+52 9	OB	8694
+37 50	OB ⁺ le, h, r	P Cyg	+53 21	OB1	V680 Cyg
+38 11	WNh	102983	+54 41	OB1	103081
+38 28	OB ⁻	V699 Cyg	+54 42	OB ⁻	V345 Lac
+38 42	WNh	V444 Cyg	+55 5	OB	8619
+38 44	OBce	V478 Cyg	+55 24	B8 II	EE Cep
+38 75	OB ⁺ ce, h, r	V1322 Cyg	+55 32	OB	8755
+39 43	OB ⁺ r	V498 Cyg	+55 34	OBle	GP Cep
+39 52	OB ⁺ le, r	V455 Cyg	+56 15	OB	AI Cep
+39 55	A5 Iab	V367 Cyg	+56 21	OB	102136
+39 60	GO I	VY Cyg	+56 41	OB ⁻	103085
+40 18	OB ⁻	V470 Cyg	+56 42	(OB ⁻)	NX Cep
+40 23	(F5 Iab)	101987	+56 79	OB ⁺	OT Lac
			+56 80	OB ⁻ (le)	CQ Cep
			+56 97	OB ⁻	102211
			+57 26	(OB ⁻)le, h	CX Cep
			+57 76	OBce	DH Cep
			+58 1	(OB1)	102069
			+58 6	OB ⁻	8645
			+59 14	OB ⁻ (h)	DL Cep
			+59 40	OB	CR Cas

Table I (cont.)
Variable stars in the LS catalogue

Star No.	Spectrum	Name or Sus- pected Var. No.	Star No.	Spectrum	Name or Sus- pected Var. No.
<u>LS III</u>			<u>LS V</u>		
+59 ⁺ I 15	OB	QQ Cas	+20 ⁺ 5	OB	100698
+60 6	cA	102128	+20 6	OB	UW Ori
+60 9	cF	IR Cep	+20 11	OB ⁺	100713
+60 I 3	A4 ⁺ Iab	8855	+20 36	OB	V963 Ori
+61 2	OB ⁺	V337 Cep	+21 11	cA	ζ Tau
+61 ⁺ 17	OB ⁻	IL Cep	+22 ⁺ 20	F2 II	SS Gem
+62 5	OB1	EM Cep	+22 33	OB	LR Gem
+62 29	OB ⁻	KZ Cep	+23 49	OB ⁻	LT Gem
+62 32	OB ⁻	NY Cep	+23 56	OB ⁺	LU Gem
+63 20	OB ⁻	CW Cep	+26 5	OB ⁺ ce	V725 Tau
+64 ⁺ 9	OB ⁻	AH Cep	+26 ⁺ 12	OB ⁻ h	V593 Tau
+66 5	OB ⁻	XZ Cep	+27 2	OBh	V722 Tau
			+27 5	OB1	ET Tau
			+33 10	A3 Ib	100474
			+34 1	OB ⁻	6063
<u>LS IV</u>					
-14 ⁺ 54	OB ⁺ r	V430 Sct	+34 ⁺ 3	OB(ce)	AE Aur
-13 44	OB(r)	W Sct	+34 25	OB	IU Aur
-12 54	OB ⁺ h,r	RY Sct	+35 1	OB	ξ Per
-12 58	OB	EQ Sct	+35 19	OB	LY Aur
-11 14	WC	CV Ser	+36 9	OB	EO Aur
-11 ⁺ 25	OB ⁺ r	7872	+36 ⁺ 11	OB	MZ Aur
-10 26	OB ⁻	V599 Aql	+39 1	OB ⁻	100363
- 9 12	OB(r)	RZ Sct	+39 16	OB1	TT Aur
- 7 35	F5 I-II	U Aql	+39 21	OB ⁻	6155
- 6 4	OB1e,h	XX Oph	+40 34	OB ⁻ (ce)	100452
- 6 ⁺ 5	F8 Ib	Y Oph	+41 ⁺ 23	A0 II	100433
- 4 13	B9 Ib	RR Sct	+41 25	OB ⁻	BF Aur
- 2 3	(A5)Ib-II	V453 Oph	+41 27	OB ⁻	100441
- 2 24	OB	V337 Aql	+42 24	OB ⁻	SX Aur
- 1 7	OB	V1331 Aql	+43 23	A9 Ia	ε Aur
+ 0 ⁺ 1	OB	V2052 Oph	+43 ⁺ 31	OB1	IY Aur
+ 1 1	OB	V986 Oph	+44 15	(OB ⁻)	KR Per
+ 3 19	OB	V1294 Aql	+47 7	OB ⁻	δ Per
+ 4 2	OB	V2048 Oph	+47 10	OB ⁻	MX Per
+ 7 1	B8 Ib-II	V784 Oph	+48 5	(OB)	ψ Per
+ 7 ⁺ 6	F5 I	RZ Oph	+50 ⁺ 6	OB ⁻	102438
+ 9 5	OB ⁺	V1182 Aql	+52 1	1e,h!	V471 Per

Table I (cont.)
Variable stars in the LS catalogue

Star No.	Spectrum	Name or Sus- pected Var. No.	Star No.	Spectrum	Name or Sus- pected Var. No.
LS V			LS VI		
+52 ¹ 11	OB	6053	+ 1 ¹ 17	OB	V454 Mon
+52 12	OB	6055	+ 2 16	OB ⁻	V498 Mon
+56 6	OBh	V356 Per	+ 2 18	B6 I-II	V505 Mon
+56 7	OB	V357 Per	+ 4 1	OB ⁻	ω Ori
+56 9	OB	V358 Per	+ 4 11	OB ⁻	V578 Mon
+56 ¹ 11	OB ⁻	5972	+ 5 ⁴	OB ⁻ h	AX Mon
+57 14	(OB)h	V424 Per	+ 6 1	F II:	SV Mon
+57 19	OB ⁻	V360 Per	+ 6 5	OB	V640 Mon
+57 21	OB ⁻	100179	+ 8 8	W(N)	100737
+34 29	OB	102471	+ 8 12	OB ⁺ h	R Mon
LS VI					
- 4 ⁴	OB	V397 Mon	+ 9 ¹ 14	OB ⁺	S Mon
- 4 20	OB	V637 Mon	+ 9 20	F8 II	UY Mon
- 3 5	OB	HI Mon	+10 4	OB ⁻	V1028 Ori
- 2 3	OB	V1030 Ori	+10 13	OB ⁻	IS Mon
- 1 1	OB ⁻	100504	+12 10	A5 Ib-II	100765
- 1 ³	OB	V901 Ori	+13 ⁹	OB ⁻	100720
- 1 17	F6 II	V526 Mon			
- 0 12	OB	V647 Mon			
+ 0 30	OB ⁺	V450 Mon			
+ 1 8	OB ⁺	6469			

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2113

Konkoly Observatory
Budapest
1982 March 19
HU ISSN 0374-0676

CENTRAL STAR OF PLANETARY NEBULA NGC 2346:

NEW ECLIPSING BINARY

NGC 2346 ($215+3^{\circ}1$; $AR_{1950} = 7^h06^m49^s.7$, $D_{1950} = -0^{\circ}43'29''$) is a bipolar planetary nebula having an A-type central star. This spectral type is too late for planetaries and the most plausible explanation seems to be a binary model of the nucleus, already discussed by Kohoutek and Senkbeil (1973), and Méndez (1978). Méndez and Niemela (1978), and Méndez (1980) observed variable radial velocity of this star with a period of 16 days.

We have searched for variability of this object since 1974 at the European Southern Observatory, La Silla, Chile. In January and February 1982 we have found drastic changes of the nuclear brightness (reported already in IAU Circ. No. 3667). Our photoelectric UBV and BV measurements of NGC 2346 are summarized in Table I. They were carried out using (A) the 50 cm telescope and a pulse counting photometer (EMI 6256A photomultiplier, diaphragm 21 arcsec), internal accuracy about ± 0.01 mag; (B) the 1 m telescope and a pulse counting photometer (EMI 9658R, dia. 22.9 arcsec), accuracy about ± 0.02 mag. In (C) we present supplementary BV measurements kindly provided by R. Kiehling with the Bochum 61 cm telescope (dia. 18.2 arcsec).

Table I contains stellar magnitudes only; the contribution of the nebular radiation was eliminated by observing through different diaphragms (15, 21, 30 and 40 arcsec). Stars in the E-regions Nos. 2-7 (Cousins, 1973) served as photometric standards. In case of observations given in (B) and (C) the brightness of NGC 2346 was referred to the local comparison star "b".

The UBV magnitudes of five comparison stars listed in Table II were measured at ESO, La Silla (50 cm and 1 m telescopes) during 1978-82; their internal accuracy is ± 0.01 mag or better.

The following conclusions can be made from the V and B light curve of NGC 2346:

1) The deep, very broad but sharp minimum at $\text{Min. I} = \text{JD } 2445010.85 \pm 0.15$ can be interpreted as a partial eclipse (probably close to totality) of the main A-type component of the close-binary system. The amplitudes are: $A_V = 2.2 \text{ mag}$, $A_B = 2.6 \text{ mag}$.

2) In January a part of the ascending branch of the previous minimum was observed, probably at $\text{Min. I} = \text{JD } 2444993.65 \pm 0.35$, so that the orbital period $P = 17.2 \pm 0.4 \text{ day}$ can be estimated.

Table I Photoelectric observations of the central star of NGC 2346 in January - February 1982

(A) Measurements with 50 cm telescope

JD 2440000+	V	B - V	U - B	n
4995.620	12.660	+0.425	+0.487	8
4997.631	11.650	0.322	0.341	9
4998.647	11.396	0.305	0.315	6
4999.686	11.338	0.285	0.290	9
5000.575	11.337	+0.277	+0.308	9

(B) Measurements with 1 m telescope

JD 2445000+	V	B - V	n
2.657	11.29	-	2
4.656	11.34	-	2
5.666	11.44	-	2
6.577	11.69	+0.28	1
7.573	11.97	0.36	1
8.572	12.40	+0.42	1

n - number of measurements

(C) Measurements with 61 cm telescope made by R. Kiehling

JD 2445000+	V	B - V	n
08.571	12.31	+0.55	1
09.561	12.92	0.67	1
10.573	13.43	0.58	2
11.568	13.04	0.62	2
12.538	12.57	0.48	2
13.538	12.20	0.50	2
14.539	11.88	0.42	1
15.535	11.54	+0.38	1

Table II UBV magnitudes of the comparison stars

Star	V	B - V	U - B	n
a	10.24	+0.14	+0.17	4
b	11.02	0.36	0.13	6
c	12.01	0.11	0.12	2
d	12.80	0.25	+0.21	7
e	13.21	+0.09	-0.15	8

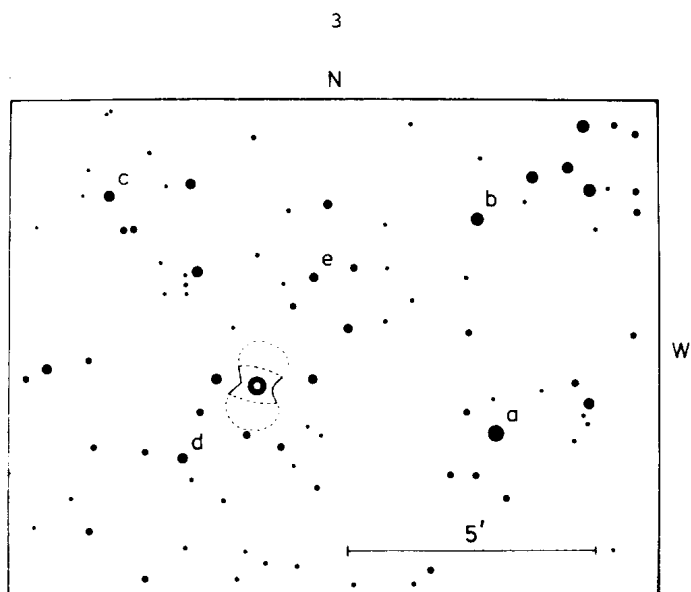


Fig.1 Finding chart for NGC 2346 and for comparison stars a, b, c, d, e.

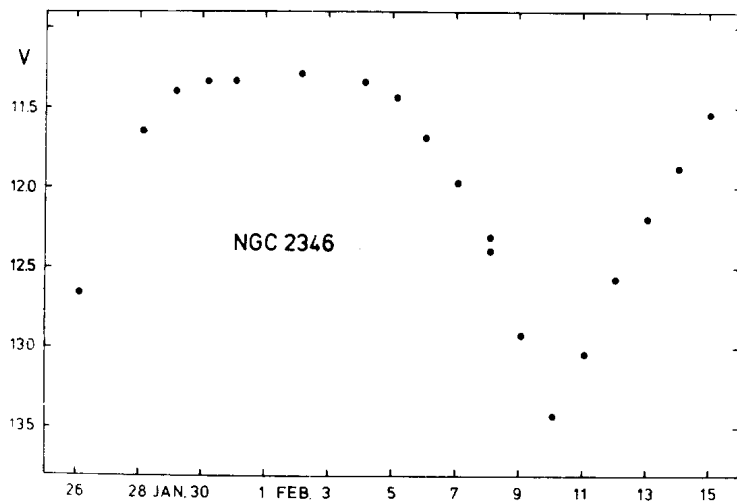


Fig.2 V light curve of the central star of NGC 2346 in 1982.

3) The extremely broad minimum and the shape of the light curve outside the eclipse could be explained by the non-spherical components and the possible gaseous stream between them.

4) The secondary component is of later spectral type, $V = 13.50$, $B - V = +0.70$ can be found assuming the total eclipse.

5) The secondary minimum has not been detected.

We tentatively classify the system as a semi-detached close binary. Adopting $K = 18 \text{ km.s}^{-1}$ for the half amplitude of the radial-velocity curve (Méndez, 1980), we obtain $a = 0.03 \text{ AU}$ for the semi-major axis of the relative orbit, and $f(M) = 0.01$ for the mass function.

There is no evidence for large light changes of NGC 2346 in the past, although small light variations were possible according to our observations. We expect that the conditions for the geometrical eclipse of the system have changed due to fast rotation of the line of apsides caused by (a) non-spherical components, (b) strongly elliptical orbit, and (c) presence of a third body (the actual planetary nucleus).

Further systematic observations are planned.

Acknowledgements: I wish to thank especially R. Kiehling for his very valuable additional observations at the Bochum 61 cm telescope, and H.M. Maitzen who left to me some of his observing time at the 1 m telescope. The observations have been collected at the European Southern Observatory, La Silla, Chile.

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References:

- Cousins, A.W.J., 1973, *Mem.Roy.Astr.Soc.* 77, 223
 Kohoutek, L., 1982, *IAU Circ. No.* 3667
 Kohoutek, L., Senkbeil, G., 1973, *Mém.Soc.Roy.Sci. Liège, Ser.VI*, 5, 485
 Méndez, R.H., 1978, *Mon.Not.Roy.Astr.Soc.* 185, 647
 Méndez, R.H., 1980, *IAU Symp. No.88*, 567
 Méndez, R.H., Niemela, V.S., 1978, *Mon.Not.Roy.Astr.Soc.* 184, 351

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2114

Konkoly Observatory
Budapest
1982 March 22
HU ISSN 0374-0676

OBSERVATIONS SPECTROSCOPIQUES ET PHOTOGRAPHIQUES
D'UNE ÉTOILE VARIABLE À TRÈS COURTE PÉRIODE

Dans un précédent article (Huang et al., 1980), nous avons publié des observations photographiques d'une nouvelle étoile variable à très courte période dans le Taureau $\alpha = 4^{\text{h}}30^{\text{min}}8$, $\delta = +23^{\circ}36'$ (1950), et nous l'avons nommée ZB 33. ZB 33 a une période de variation de 90 minutes environ et une amplitude à peu près d'une magnitude autour de 16^{m} .

Des observations spectroscopiques et photographiques ont été effectuées à l'Observatoire de Haute Provence en 1981. Des spectres de ZB 33 et d'étoiles standard ont été obtenus avec le spectrographe D, équipé d'un tube image et monté sur le télescope de 193 cm de diamètre (domaine spectral de 3750 Å à 5200 Å, dispersion de 92 Å mm⁻¹). Ils ont été dépouillés au C D C A de l'Observatoire de Nice. La figure 1 montre des enregistrements d'un spectre de ZB 33, pris le 2 janvier 1981, et de deux spectres des étoiles standard. On constate que les bandes CH à 4300 Å dans le spectre de ZB 33 sont aussi intenses que celles de l'étoile standard F0V α^1 CVn et que le rapport d'intensité de la raie K du Ca II aux raies H est aussi comparable. Nous avons mesuré encore des raies vers 4033 Å du MnI, à 4226 Å du CaI et à 4385 Å du FeI. Nous proposons donc de classer F0V l'étoile ZB 33. Sur le spectre de ZB 33 (figure 1), les trois raies en émission intenses du mercure sont dues à la pollution par des sources terrestres, le temps de pose était très long (2^h30^{min}).

Des photographies directes dans les couleurs V et B ont été obtenues au télescope de 120 cm de l'Observatoire avec un guidage automatique. Une méthode photographique de "multi-pose" a été utilisée : nous avons fait plusieurs poses successivement sur une même plaque. Les poses étaient d'environ 10 minutes. L'intervalle du temps entre deux poses était ≈ 30

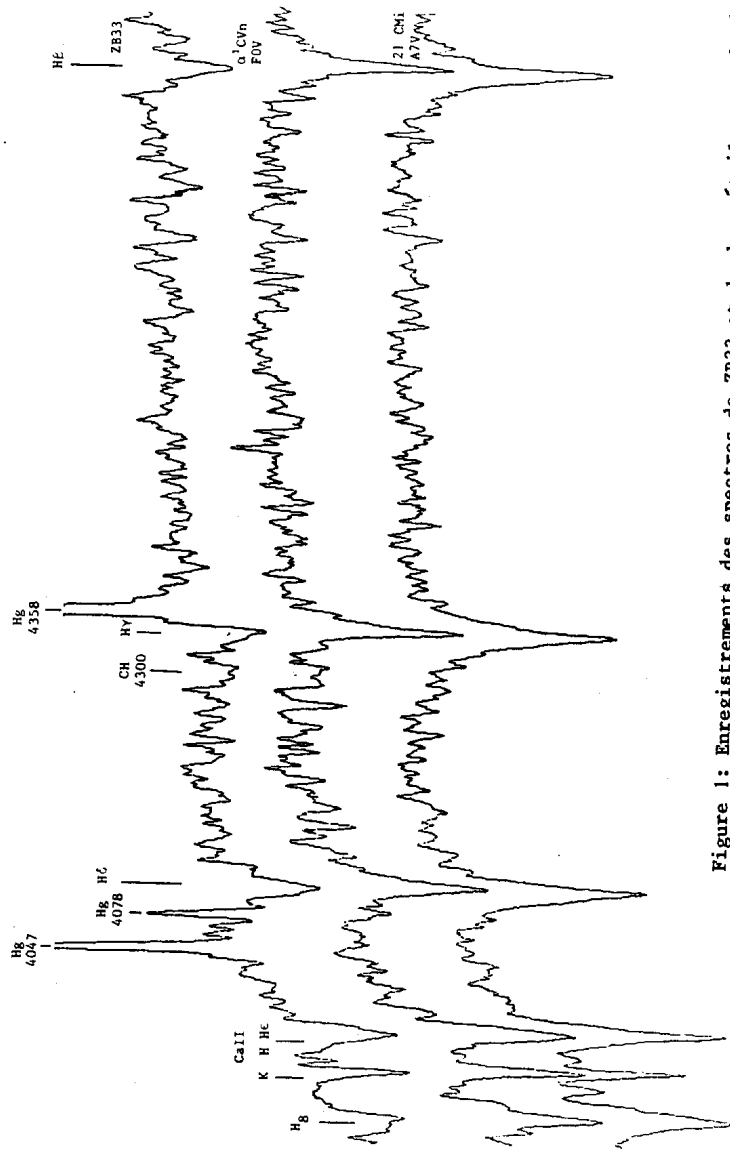


Figure 1: Enregistrements des spectres de ZB33 et de deux étoiles standard

secondes. Nous avons fait l'étalonnage des clichés avec un sensitomètre à trous conçu par D. Kohler de l'Observatoire de Haute Provence. Les clichés ont été dépouillés au C D C A de l'Observatoire de Nice. Comme il n'y a pas d'étoile standard dans notre champ, nous avons mesuré des différences de magnitude entre ZB 33 et des étoiles de comparaison pour établir la courbe de variation. La figure 2 est une reproduction de la carte Palomar de notre champ, a et b sont deux étoiles de comparaison

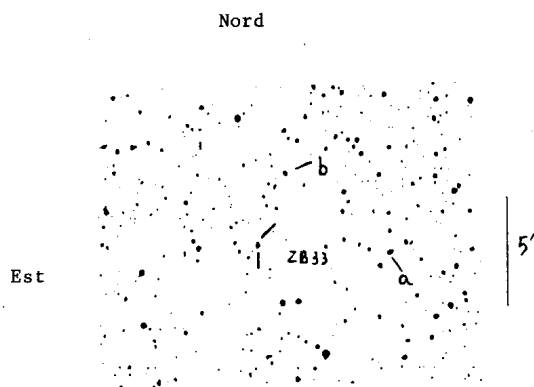


Figure 2 : Le champ stellaire de ZB 33

utilisées. La figure 3 montre une courbe de variation de lumière de ZB 33 en magnitude V. Les mesures ne tiennent pas compte de l'extinction atmosphérique. Sur la figure 3, nous avons porté les différences de magnitude entre nos deux étoiles de comparaison. On peut en déduire que la variation observée sur ZB 33 est bien significative. La courbe de variation de lumière de ZB 33 est assez symétrique avec une amplitude de $\sim 0^m.5$. D'après nos observations dans le filtre B, ZB 33 a une amplitude de $\sim 0^m.7$ autour de 16^m . Comme il n'y a pas assez de nouvelles observations photométriques, nous n'avons pas recalculé la période de variation de cette étoile, mais elle est très comparable à celle que nous avons obtenue (Huang et al., 1980).

D'après nos observations spectroscopiques et photographiques, on peut classer ZB 33 comme une variable de type céphéide naine.

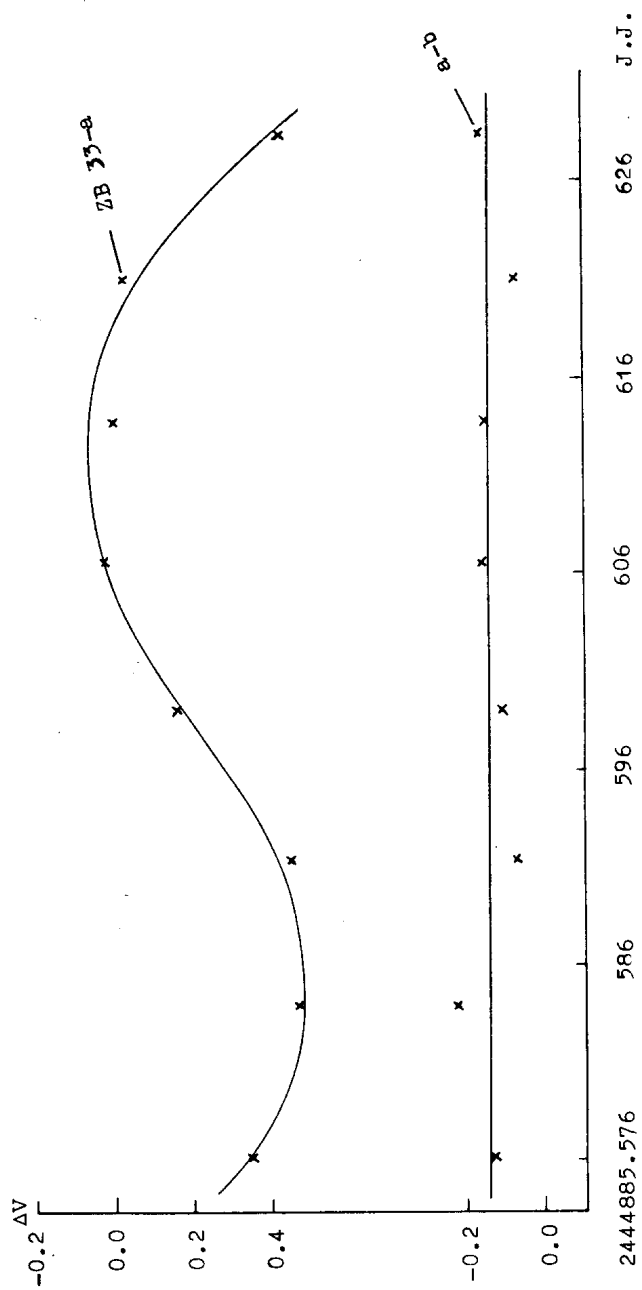


Figure 3 : Courbe de lumière de ZB 33

D'après l'intensité des bandes CH et de la raie K de son spectre, ZB 33 a un type spectral avancé : F0V qui rend ZB 33 bien distinctif, car il y a peu de variables de type F de grande amplitude parmi les céphéides naines (Auvergne, 1981). Sa période ($\sim 0^d.064$) correspond bien à la valeur théorique du mode fondamental pour ce type d'étoile (Chevalier, 1971). La différence observée entre les amplitudes dans les deux couleurs B et V est normale pour ce type d'objet (Baglin et al., 1973).

De nouvelles observations spectrographiques à plus grande dispersion réparties sur toute la période sont nécessaires pour pouvoir tracer une courbe de variation des vitesses radiales et préciser encore la classification spectrale. De nouvelles observations photométriques sont aussi indispensables pour préciser la période et mieux déterminer la courbe de lumière. Toutefois, la faible magnitude de cette étoile rend ces observations très difficiles.

Je remercie mon professeur, Ch. Fehrenbach, pour son aide dans mon travail et surtout dans l'approfondissement de mes connaissances de spectroscopie. Je remercie MM. A. Bijaoui et J. Marchal pour leurs aides au dépouillement des clichés au CDCA et je remercie beaucoup M. J. M. Le Contel pour une lecture du manuscrit et pour ses très intéressantes suggestions.

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Références:

- Auvergne, M., Thèse de Doctorat d'Etat, Nice 1981 (non publiée)
 Baglin, A., Breger, M., Chevalier, C., Hauck, B., Le Contel, J.M.,
 Sareyan, J.P. and Valtier, J.C.: 1973, *Astron. Astrophys.* **23**, 221
 Chevalier, C., 1971, *Astron. Astrophys.* **14**, 24
 Huang, C.C., 1980, *Chinese Astronomy*, **4**, 101

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2115

Konkoly Observatory
Budapest
1982 March 23

HU ISSN 0374-0676

VARIABLE STARS IN THE PLEIADES CLUSTER II

From 1981 October 18 till November 17 we performed photometry on 16 K-type stars in the Pleiades cluster. All of these stars were known or suspected to be variable on the basis of earlier work. Five of the stars were also measured a year before by Alphenaar and Van Leeuwen (1981, hereafter referred to as Paper I). The other 11 stars formed a new selection. All stars were measured using the Walraven photometer and the Dutch 91 cm telescope at La Silla, ESO (Lub, 1979). Positions and search maps of the previously measured stars can be found in Paper I, those for the new selection are given in Fig. 1. The diameter of each field is 12 arcmin and the magnitudes indicated are photographic magnitudes. The limiting magnitude is around $m_{pg} = 14.5$. Table I lists the measured stars and their visual magnitudes. The star numbers are from Hertzprung (1947).

Ten of the eleven newly selected stars were found to be variable and for the other, Hz883, no conclusions could be drawn. For 7 of these stars periods and lightcurves could be obtained, as well as for the 5 remeasured stars. All lightcurves and periods are presented in Fig. 2a, 2b, 2c and 2d as differences in $10\log(I)$ for the V channel between the given star and the substandard for the cluster, Hz804. The zeropoints for the phase calculations are at $JD=2444896.5$.

The periods of the five previously measured stars did not need to be changed. For Hz879 the shorter period given in Paper I turned out to be the right one. The lightcurve of Hz1883 was repeated accurately, but for all others there seem to be disturbing sources active.

The 7 new stars for which periods and lightcurves were obtained are also of the BY Dra type. Four of them, viz. Hz882, 1531, 2034 and 3163, resemble the lightcurve of Hz1883. Hz625 shows a broader minimum than

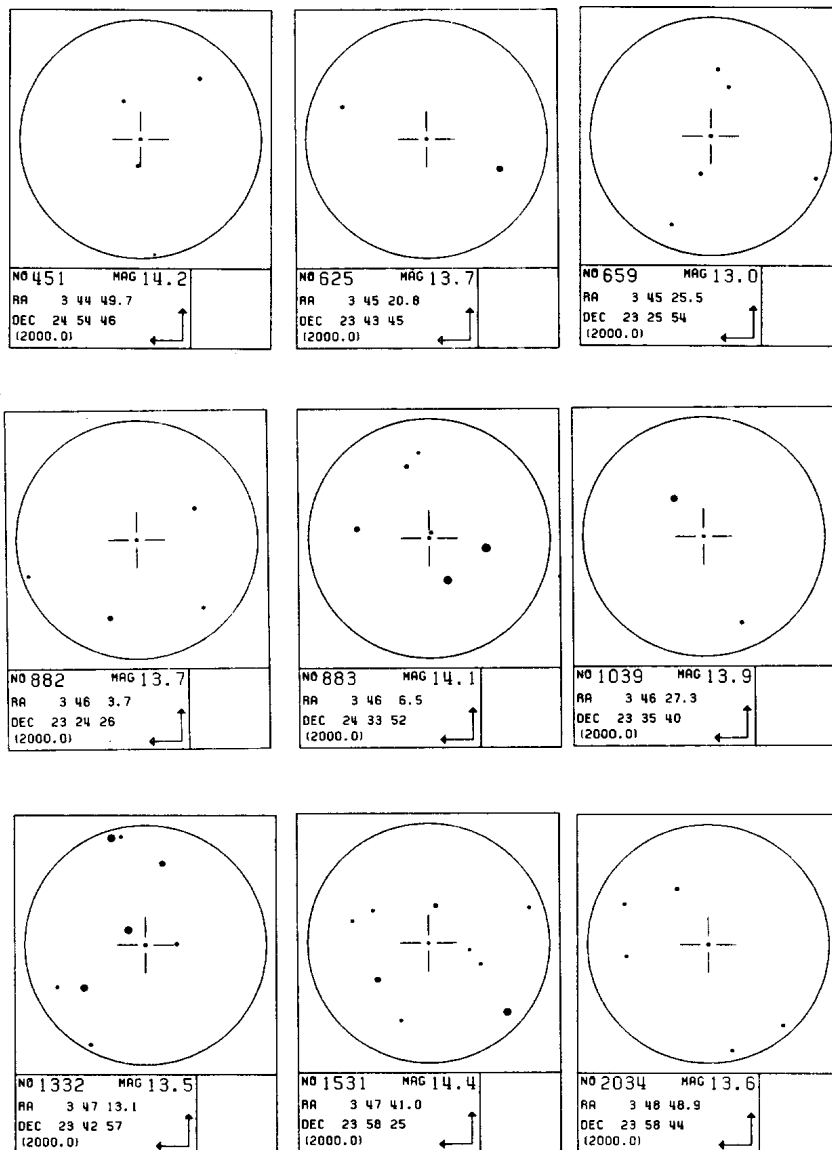


Figure 1

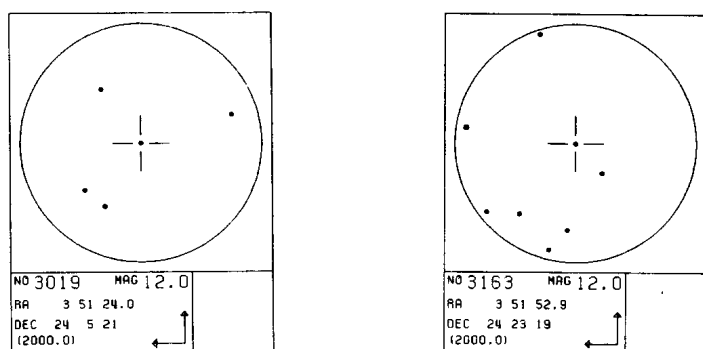


Figure 1 (cont.)

the other stars. The small amplitudes of the stars Hz1039 and 1332 do not permit detailed interpretation. Five of the new selection of stars, viz. Hz451, Hz883, Hz1039, Hz1531 and Hz2034, are known as flare stars (Haro, 1976).

Table I, Measured Stars

Hz	m_v	(V-B)
34	12.06	.43
451	13.43	.57
625	12.66	.53
659	12.02	.41
686	13.44	.52
879	12.83	.50
882	12.90	.49
883	13.05	.53
1039	13.05	.57
1124	12.32	.44
1332	12.52	.47
1531	13.58	.56
1883	12.61	.48
2034	12.65	.45
3019	13.49	.57
3163	12.73	.46

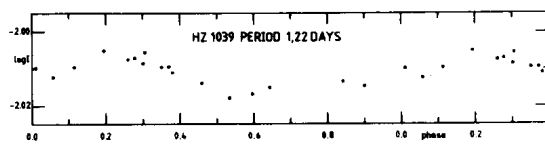
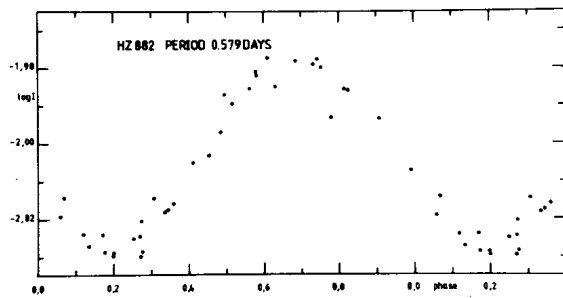
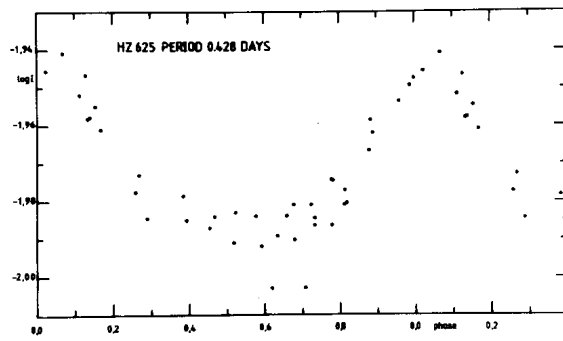


Figure 2.a

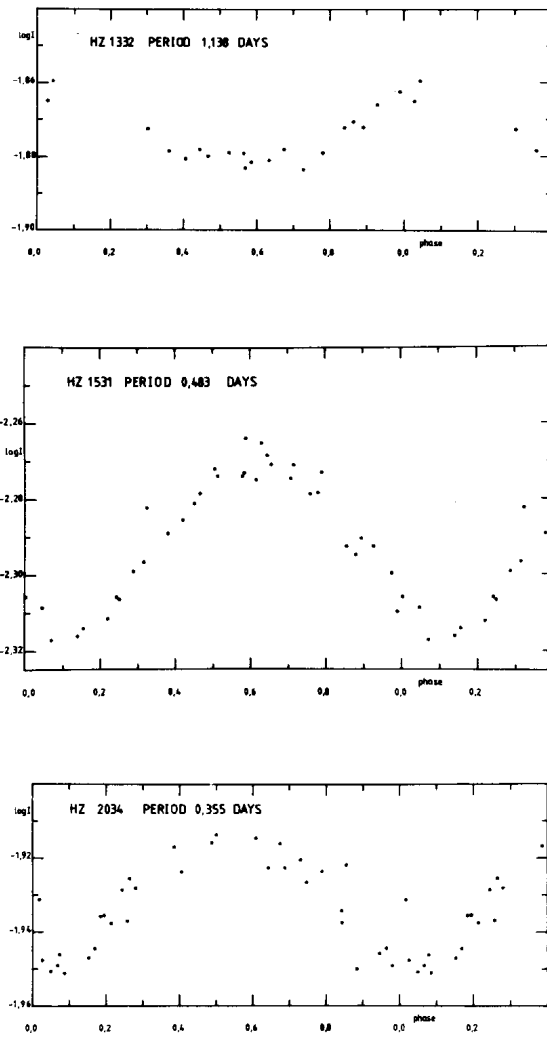


Figure 2.b

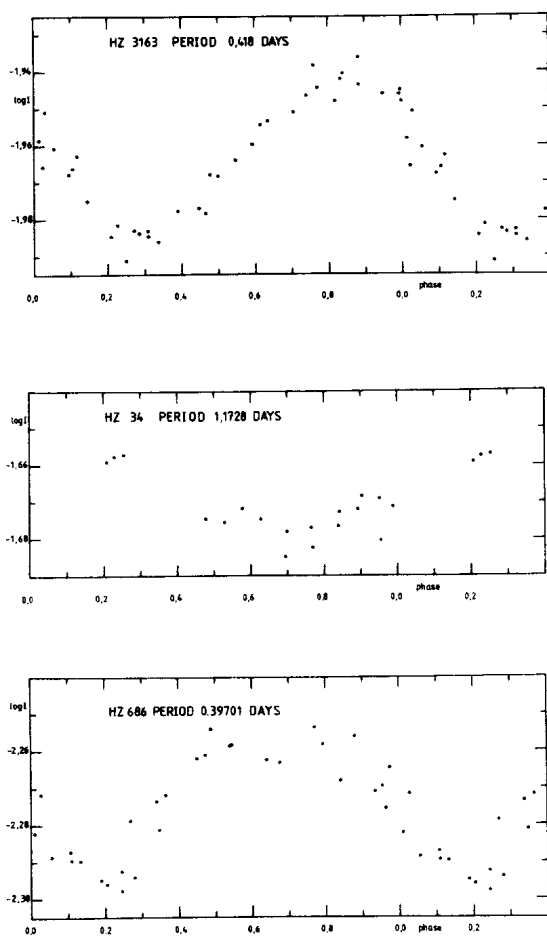


Figure 2.c

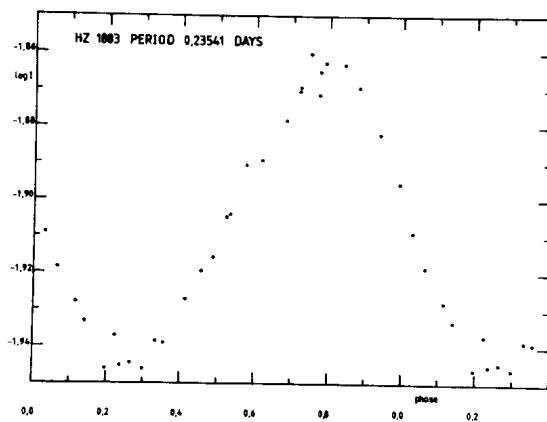
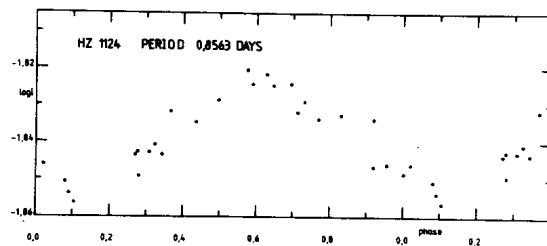
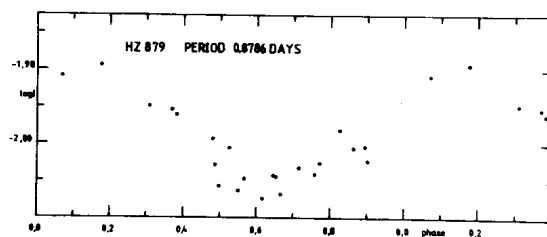


Figure 2.d

In a recent letter to Astronomy and Astrophysics the observations presented here and in Paper I are discussed in more detail, including also some spectroscopic data.

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References :

- Alphenaar, P. and Van Leeuwen, F.: 1981, IBVS 1957
Lub, J.: 1979, ESO Messenger 19, 1
Haro, G.: 1976, Ton. Obs. Bol. 2, 3
Hertzsprung, E.: 1947, Leiden Annalen 19 part A

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2116

Konkoly Observatory
Budapest
1982 March 23
HU ISSN 0374-0676

PERIODIC LIGHT VARIATIONS OF THE DWARF NOVA CN ORIONIS*

Photometric observations of CN Ori have been performed from 1981 December 3 to 18. The system decreased from an eruption and after a few days at minimum started for an other outburst. During all nights a periodic humplike feature was detected. Fig. 1 shows a condensed light curve.

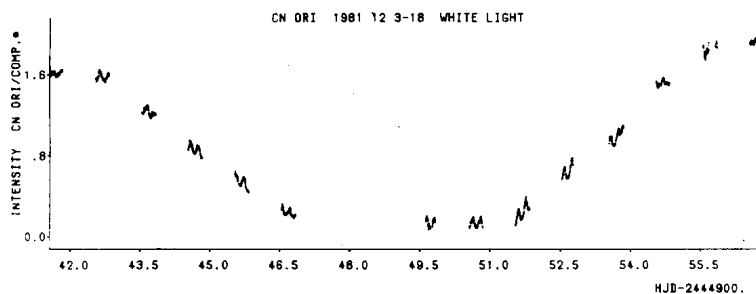


Figure 1 Light curve of CN Orionis

*Based on observations collected at the European Southern Observatory.

Using the nights with HJD-2444900 + 44 to 54 one obtains the following ephemeris for the light maximum:

$$\text{HJD}_{\text{max}} = 2444951.6150 + .16308 \cdot E$$

$\begin{array}{cc} \pm 5 & \pm 4 \end{array}$

There are considerable variations in shape and phase of the hump which are stronger during the brighter stages and prevent a more precise period determination. The hump amplitude varies not more than about 30% around the mean except during the first night when the hump is very weak. The almost periodic change in hump intensity, with a cycle of approx. 4 days, resembles the beat phenomenon of SU UMa stars. CN Ori is classified as of Z Cam type however (Bateson 1979).

No pronounced increase in hump amplitude before or during rise to maximum occurs and therefore an explanation of this outburst in terms of increased mass transfer through the hot spot producing stream seems impossible.

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Bateson, F., M., Publ. of VSS RAS NZ No. 7, 28, 1979

COMMISSION 27 OF THE I. A. U.
 INFORMATION BULLETIN ON VARIABLE STARS

Number 2117

Konkoly Observatory
 Budapest
 1982 March 25
 HU ISSN 0374-0676

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PHOTOMETRIC OBSERVATIONS OF THE ECLIPSING VARIABLE ZZ Cyg

ZZ Cyg is an eclipsing binary of EA type (F7:V + K5 IV:, 10.61 - 11.69 V, $P = 0.6286148^d$), well enough investigated as an Algol star. This system is of special interest nevertheless because there is information on possible Delta Scuti type physical variability of the hotter component: light amplitude is about 0.05^m with a period about 0.1 day (Hall, Cannon, 1974). If so, then the hotter component of the ZZ Cyg system is the first known pulsating Delta Scuti star which lies well outside the instability strip adopted now: $M_V = +4.16$, $T_e = 5920^\circ \text{K}$, these parameters are from the paper of Brancewicz and Dworak (1980). The place of the hotter component of ZZ Cyg on the HR diagram is shown in Figure 1: the star is situated to the right from the Delta Scuti instability strip.

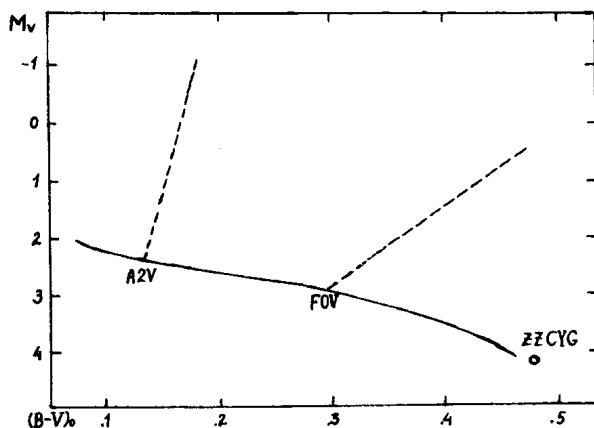


Figure 1

Mass and radius values from the same paper allow us to calculate the pulsation constant Q equal to about 0.08 and the rotation velocity $V_{\text{rot}} = 97$ km/sec (assuming the synchronism between rotation and revolution in this system) for the hotter component of ZZ Cyg. The large rotation velocity is not surprising for Delta Scuti stars, but $Q = 0.08$ is too large and this is the reason for doubts at least in the correctness of the period value.

For the direct examination of the hypothesis of the hotter component being a pulsating star we observed ZZ Cyg photoelectrically. Naturally, we are interested in the behaviour of ZZ Cyg outside the principal minimum. This star was observed at the High Altitude Station of Sternberg Astronomical Institute, near Alma-Ata. The 48-cm reflector with one-channel pulse counting photometer was used for seven nights during July-September, 1981. A diaphragm of 29" was used and consequently ZZ Cyg was observed together with the visual component ($\rho = 8''.5$). Mean accuracy of our photometry was 0.01 magnitude. During the whole observing season 450 light measurements were obtained in the BV system. BD + 46°2930 was used as a comparison star.

All light measurements made during different nights were in good accordance. This indicates the absence of any pulsational light variability of the F7-component of ZZ Cyg; at least, this concerns to short periodic light variability of Delta Scuti type.

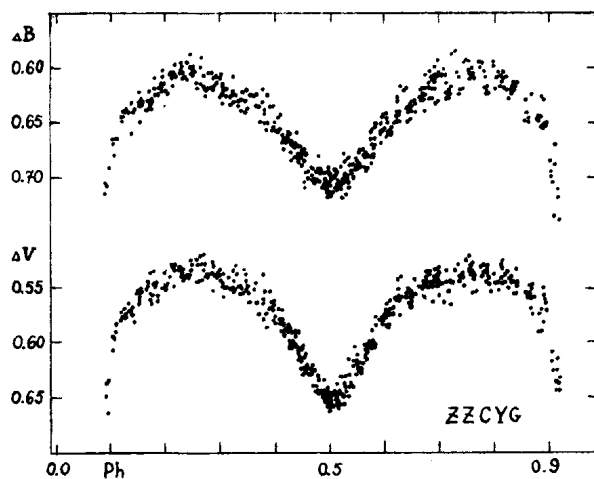


Figure 2

The mean light curve of ZZ Cyg based on our observations is shown in Figure 2, light elements are from the Third Supplement to GCVS. This light curve shows rather strong effect of ellipticity of the components.

We observed min I during the night 4/5 July, 1981:

JD Hel = 2444790.3971, O-C = +0.0120 days, the depth of min I is 1.13 in B and 1.02 in V.

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References:

- Brancewicz, H.K., Dworak, T.Z.: 1980 Acta Astron. 30, 501.
Hall, D.S., Cannon, R.O.: 1974, Acta Astron. 24, 79.

COMMISSION 27 OF THE I. A. U.
 INFORMATION BULLETIN ON VARIABLE STARS

Number 2118

Konkoly Observatory
 Budapest
 1982 March 26
 HU ISSN 0374-0676

PHOTOELECTRIC TIMES OF MINIMA
 OF ECLIPSING BINARIES

The following times of minimum light have been determined from observations through a standard Johnson-Morgan V filter and a 30 arcsec diameter diaphragm during the 1980 and 1981 observing seasons with the 38-cm f/13 Cassegrain reflecting telescope associated with the Department of Science at the Brisbane College of Advanced Education, Queensland.

The observing procedure has been described previously (Kennedy and Wisniewski, 1980).

As is done normally, a least-squares parabolic fit to the observations was used to find times of minimum light. The chord-bisection method is used as a check on the eclipses.

Table I lists the Heliocentric Julian Dates, Epochs, (O-C) values and the number of observations N, where each observation is the average of three ten-second integrations.

Table I.

Star	Min.	J.D. Hel. 2,400,000+	(O-C)	N
DI Peg	I	43,071.0029	-0 ^d .0094	58
	I	43,434.0295	-0 ^d .0097	
	I	44,543.0401	-0 ^d .0108	
	I	44,557.9879	-0 ^d .0110	
UX Eri	I	43,491.0355	-0 ^d .0339	184
	II	44,571.9592	-0 ^d .0328	
	II	44,591.9975	-0 ^d .0322	
AH Vir	I	44,723.0431	+0 ^d .0609	139
	I	44,727.9342	+0 ^d .0617	
	I	44,729.9698	+0 ^d .0597	
	II	44,730.9926	+0 ^d .0637	
	II	44,750.9637	+0 ^d .0663	
	II	44,753.0010	+0 ^d .0660	

The ephemerides used to calculate the (O-C) values in Table I are stated below.

DI Peg: J.D. Hel. Min. I = $2,437,527.3776 + 0.^d7118175$ E
 UX Eri: J.D. Hel. Min. I = $2,438,700.7228 + 0.^d44528226$ E
 AH Vir: J.D. Hel. Min. I = $2,435,245.6552 + 0.^d4075218$ E

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References:

- Binnendijk, L. 1973, Astr. J., 78, 97.
 Binnendijk, L. 1967, Astr. J., 72, 82.
 Binnendijk, L. 1960, Astr. J., 65, 358.
 Kennedy, H.D. and Wisniewski, W.K. 1980, Publ. Var. Star. Sect.,
 R.A.S.N.Z. 8, 17.
 Kennedy, H.D. 1979, I.A.U. Coll. 46, 357.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2119

Konkoly Observatory
Budapest
1982 March 29
HU ISSN 0374-0676

PHOTOELECTRIC TIMINGS OF PRIMARY MINIMUM OF TV Cas AND THE
METHOD

In this paper 4 new timings of primary minimum of the eclipsing binary TV Cas are presented. Essentially the same procedure was used as in De Landtsheer (1981), i.e. the timings are mean values of 4 separate determinations made in 4 different color-bands. However, a small improvement in the method of determination was implemented, which led to a slightly different value (+0.0003 day) for the time of primary minimum published in that paper. This calls for an explanation of our "folding-method".

In principle the folding-method is a midpoint-method. The observations of the one side of the minimum are folded on a trial time of minimum upon the other side. The time, which yields the narrowest band of points is the timing we look for.

To measure the width of the band we formerly calculated the distances of the individual points to a second order polynomial through the whole set of observations. But since the exact shape of the minimum is not known it is better to assume as little as possible in its representation. To this purpose an approximating cubic spline function gives preference to a polynomial.

So at present we draw a spline through the branch with the largest number of observations, fold the other on the trial time and compute the distances of the folded points to the spline. The time which yields the least sum of absolute values of the deviations, in the time direction, from the spline, is the one.

This procedure is similar to the approach of Kwee and Van Woerden (1956). But since the observations are folded in the time direction, we look for deviations in the time direction rather than in the magnitude direction. Since we are in search of the

narrowest band, we sum absolute values rather than squares. Not every observation can be used. Points in the bottom and the shoulders of the minimum when folded, do not add meaningful information about the time of minimum. In the case of TV Cas only points in the phase intervals 0.925-0.990 and 0.010-0.075 were used.

The folding-method may be applied to all selected points in one go. But of course they may be first divided into several subsets. Thus information may be gained about a possible asymmetry of the minimum, or, if no systematic trend is found, about the accuracy of the determination. In the case of TV Cas no asymmetry was found.

Table I
Heliocentric times of minimum of TV Cas

Hel. J.D. - 2,444,000.0	E	O-C	Number of Obs.
602.4537+ .0003	1659	+0.0014	109
843.5296+ .0003	1792	+0.0022	63
910.5965+ .0003	1829	+0.0031	118
912.4089+ .0003	1830	+0.0029	174
990.3503+ .0005	1873	+0.0028	48

The 4 new timings and the earlier published, but revised one are shown in Table I. The ephemeris $2441595.3582 + 1.8124944 E$ of Margrave (1980) was used to calculate the O-C values.

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References:

- De Landtsheer, A.C., 1981, IBVS No. 1985.
Kwee, K.K. and Van Woerden, H., 1956, B.A.N., 12, 327.
Margrave, T.E., 1980, IBVS 1869.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2120

Konkoly Observatory
Budapest
1982 March 31
HU ISSN 0374-0676

OBSERVATIONS OF EARLY-TYPE ULTRA-SHORT
PERIOD VARIABLES

Jakate (1979) proposed a new class of early-type ultra-short period variables from observations of four B2V and B3IV stars. Their periods are an hour or less and their light amplitudes between 0.015 and 0.025 magnitudes. Percy (1980) re-observed the only northern member of the group, HR8768, and confirmed it to be variable with a period and amplitude consistent with Jakate's finding. However, the range appears not to be constant, since Percy found only marginal variability on one of the two nights that HR8768 was observed.

It is clearly of great importance to confirm the existence of this new group of variable stars as it may give a new insight to the nature of β Cep variables. For this purpose, we observed the remaining three southern members with the 0.5m reflector of the Sutherland station of the South African Astronomical Observatory. All observations were made through the Johnson B filter. For HR5285 we used the comparison stars HR5294 and HR5249. For HR3467 and HR3582 we used the comparison stars HR3568 and HR3503. The results of five nights of observations are shown in the accompanying figures.

It is clear that in all cases the stars are constant to within a few thousandths of a magnitude over several hours. The reality of this group of variables must be considered doubtful at this stage. However, further observations of HR8768 are clearly required before a definite conclusion can be made.

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References:

- Jakate, S.M. 1979, Astron. J.
84, 1042.
Percy, J.R. 1980, IBVS No. 1734.

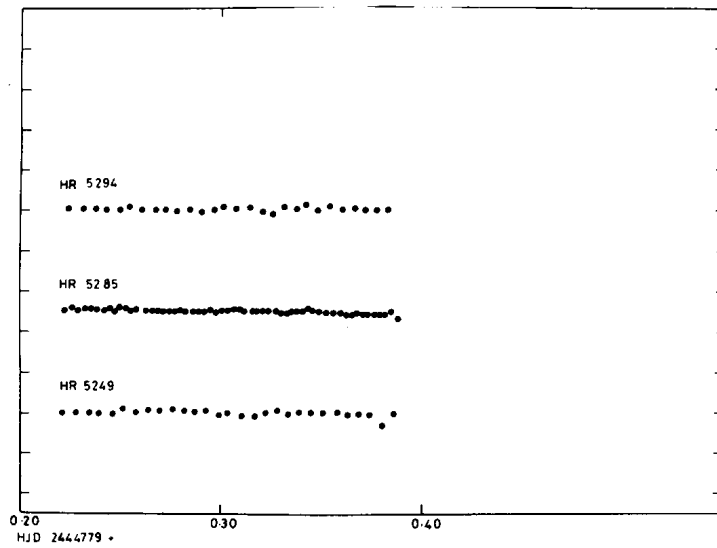


Figure 1

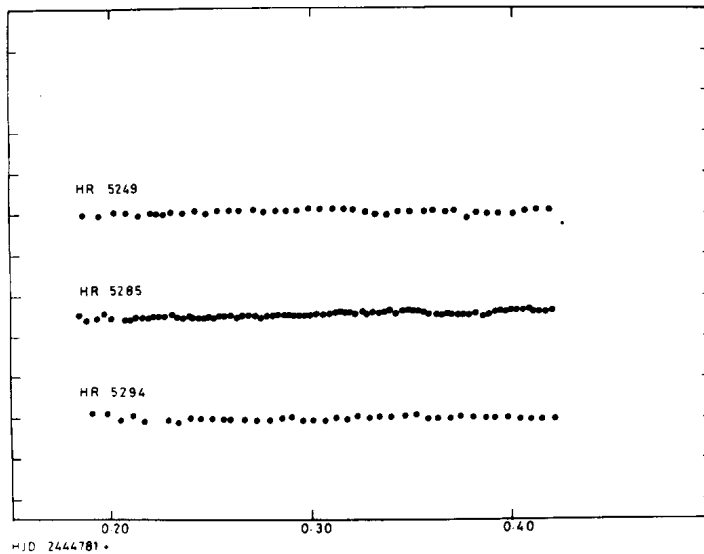


Figure 2

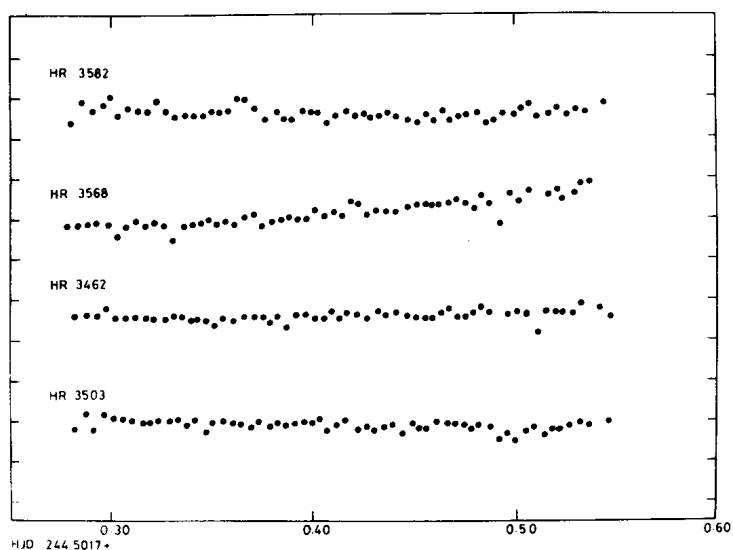
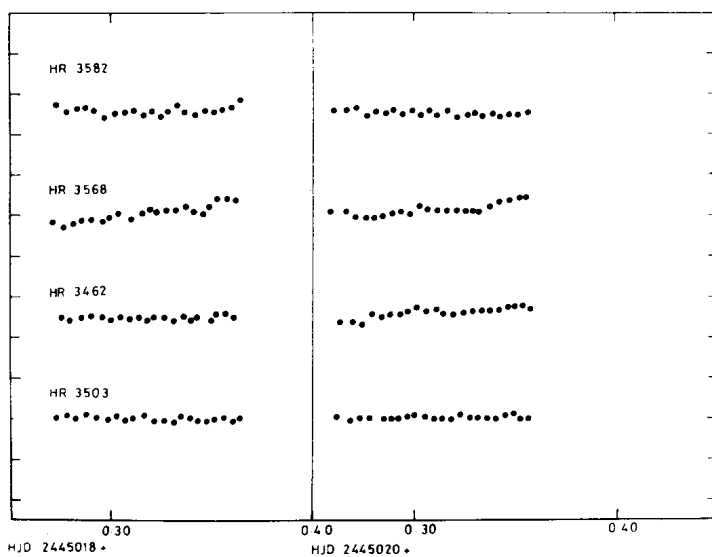


Figure 3



Figs. 1, 2, 3 and 4: Observations of suspected early-type ultra-short period variables. The tick marks are spaced at 0.02 magnitude intervals.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2121

Konkoly Observatory
Budapest
1982 April 2
HU ISSN 0374-0676

SPECTRUM VARIABILITY OF HD 147010

HD 147010 is an Ap Si star embedded in a reflection nebulosity in upper Scorpius. In the course of investigating the spectral peculiarities of Ap stars associated with nebulosities we found that HD 147010 shows spectrum variability. The most drastic changes are exhibited by the lines of Cr II. Figure 1 shows the density tracings of three of our blue plates in the region around 4000 Å. These spectra were obtained with the one meter telescope at Kavalur Observatory at a dispersion of 22 Å/mm.

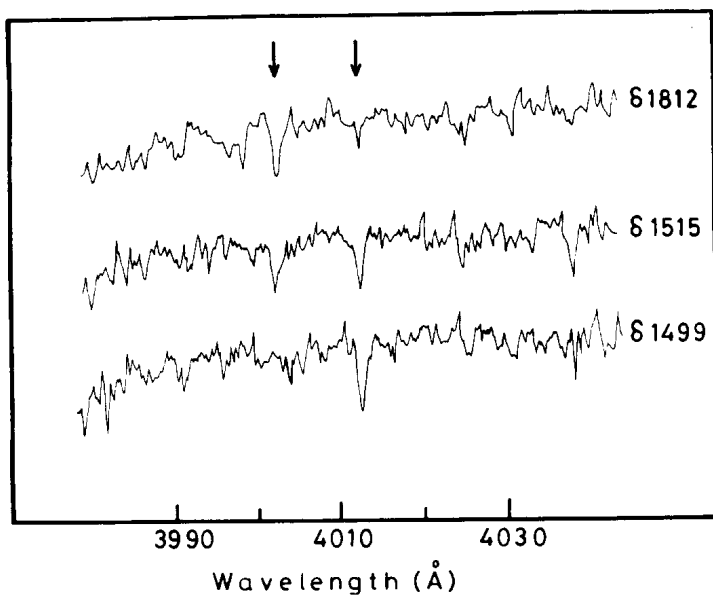


Figure 1

The line at 4012.5 is mainly due to Cr II which shows drastic changes; strong on plate δ 1499, of intermediate strength on δ 1515 and weak on δ 1812. The unidentified line at λ 4002.9 shows variations opposite in phase to that of λ 4012.5.

A comparison of the measured radial velocities of our spectrograms with that given by Abt (1973) does not indicate any variations more than those ascribable to observational errors. We conclude that this star is probably not a spectroscopic binary.

However, the variation in the line intensities is probably periodic. A rough estimate based on the consideration of the rotational velocity of this star together with the variation of the line strengths on our blue spectrograms indicates a period of 5.7 days.

Since most of the spectrum variables also show variations in light, it would be desirable to check the star for variability in light.

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Reference:

Abt, H.A.: 1973, Ap. J. Suppl. No. 26, 365

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2122

Konkoly Observatory
Budapest
1982 April 5
HU ISSN 0374-0676

THE SPECTRAL TYPE OF RW DORADUS

The short-period W UMa star RW Doradus=HDE 269320 has long been considered to be of spectral type K5 (Cannon 1921). However, reference to a low-dispersion (580 Å/mm at H γ) objective-prism plate taken with the Curtis Schmidt at Cerro Tololo by one of us (N.S.) some years ago clearly indicates, as might be expected, that the star is considerably earlier: dwarf late G is our best estimate. This determination is in good agreement with the B-V color index of +0.81 measured some years ago by Eggen.

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References:

Cannon, A. J., 1921, Harvard Bull. No. 754.

Eggen, O. J., 1961, Royal Observatory Bull. No. 31.

COMMISSION 27 OF THE I. A. U.
 INFORMATION BULLETIN ON VARIABLE STARS
 Number 2123

Konkoly Observatory
 Budapest
 1982 April 13
 HU ISSN 0374-0676

NO RAPID VARIABILITY OBSERVED
 FOR THE Be STARS HD 58050 AND β CMi

Two Be stars, HD 58050 (HR 2817, BD +15°1564, MWC 176; B2Ve, $v \sin i = 140$ km/s) and HD 58715 (β CMi, HR 2845, BD +8°1774, MWC 178; B7Ve, $v \sin i = 276$ km/s), announced in astronomical literature to be rapidly variable in light, were re-observed photoelectrically, in the UBV system, at Hvar and Sarajevo Observatories, Yugoslavia, in January 1982. Standard observational and reduction technique (Harmanec et al. 1977) was used. A 0.65-m reflector was employed at Hvar, and a 0.30-m reflector at Sarajevo observations. Basic information concerning these observations can be found in Table I. Reduction of the measurements were carried out at the Ondřejov Observatory. β CMi was used as a comparison and HD 59059 as a check star for both variables. Extinction was measured each night and taken into account in the reduction. The Hvar measurements have been transformed to the standard Johnson system, with the exception of the sole B measurements on night 3. The Sarajevo observations are - at the moment - instrumental UBV observations only.

Table I: Journal of observations

Night	Date	Intervals covered (HJD-2444000.0)	No. of ind. observations	Obs.	Remark
1	1982 Jan. 7/8	977.4174-977.4332	3	Hvar	
2	1982 Jan. 14/15	984.3743-984.5582 984.4068-984.5766	37 9	Hvar Sar.	
3	1982 Jan. 15/16	985.3618-985.3631 985.3618-985.4963	1 41	Hvar Hvar	B only
4	1982 Jan. 18/19	988.4569-988.4659 988.5250-988.5346	3 3	Hvar Hvar	
5	1982 Jan. 25/26	995.3200-995.3366 995.4762-995.5782	3 23	Hvar Hvar	

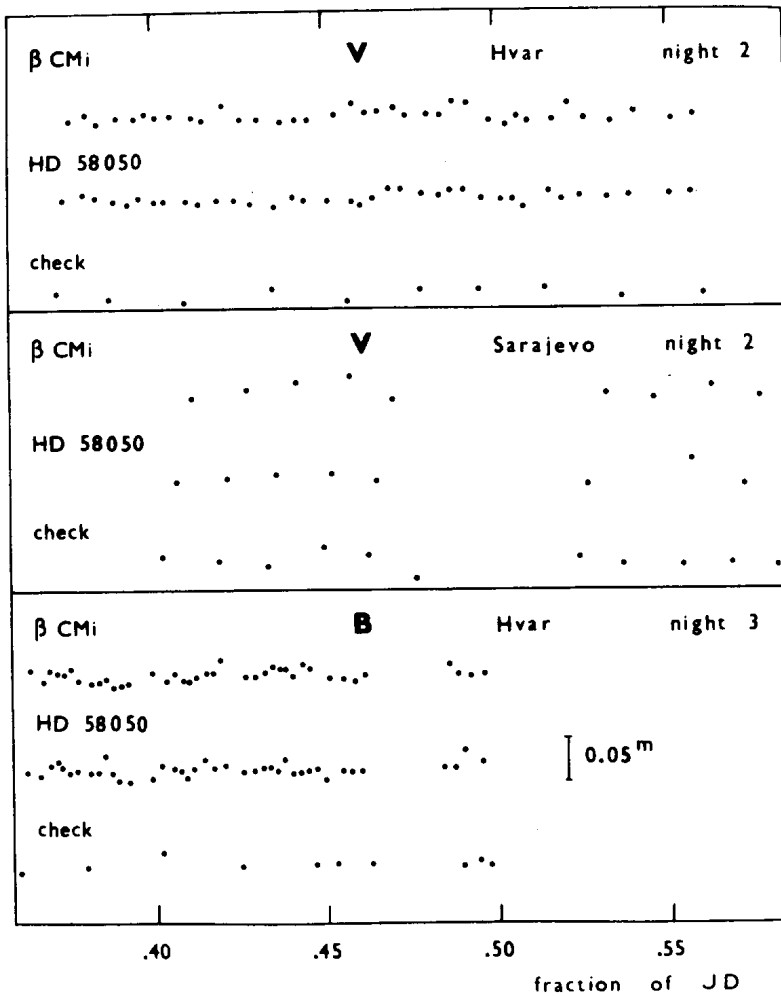


Figure 1

As Fig. 1 clearly shows, both stars were constant within 0.^m02 during the observations. We plotted the V magnitude for the first, and the B magnitude for the second long observational run (nights 2 and 3, respectively) to show that the result is independent of colour. Nightly normals from all Hvar observational runs show that the stars were constant even on a time scale of days, perhaps with the exception of a somewhat larger (0.^m03) scatter in the B-V values for β CMi.

Using a photographic photometry, Hoffmeister (1934) suggested that HD 58050 may be a short-periodic variable, with the range from 6.0^m to 6.3^m . Since December 1977, the star has been systematically observed visually by the European group of variable star observers (GEOS) and the following results were reported (Figer 1981a, b):

1. Long-term light variations with an amplitude of 0.4^m (a steep increase at the end of 1980 and a rapid fall at the beginning of 1981, after a three-year period of no long-term light changes), and

2. rapid, strictly periodic light variations superimposed over the long-term changes, with an amplitude of 0.15^m and a period of 0.12500 (or 0.14286) days, which remained unchanged during three years of the observations.

As Fig. 1 clearly shows, our photoelectric data do not confirm the presence of the periodic variations reported by Figer. It is known that in some Be stars rapid variations are present on one epoch and absent on another one. Yet, we suspect that the rapid variations reported by Figer may not exist at all. First, it is disturbing that the possible values of the period reported by Figer are practically exact submultiples of one day. Second, Figer used two comparison stars as red as G5 and K0 in his observations. We thus suspect that the variations observed may be spurious - caused by the observational technique used.

The case of β CMi is somewhat more complicated. Calder (1935) published magnitude differences between α CMi and β CMi measured photoelectrically and covering an interval of 4 1/2 hours. They seemed to indicate slight rapid variability. Smart (1936a, b) corrected these measurements for differential extinction and suggested that β CMi may be a pulsating star with a period of 1.8 hours and an amplitude of light variations of about 0.02^m . Calder (1936) objected that the original observations show that the small variations observed are definitely associated with α CMi. Subsequent measurements of β CMi by Kollnig-Schattschneider (1940) and Groeneveld (1944) are not relevant to the problem because of their relatively low precision.

Because of the expected small amplitude of the variations, our data do not exclude their presence quite conclusively. Yet, our impression from Fig. 1, and from the experiments with forming floating normals from the individual measurements, is that no significant variations with a characteristic time scale of 0.08-0.09 days are present in our data.

A more detailed investigation of both stars, and the measurements in a tabular form will be published elsewhere.

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References:

- Calder, W.A.: 1935, Harvard Bull. 899, 13
 Calder, W.A.: 1936, Observatory 59, 227
 Figer, A.: 1981a, GEOS SA 1 Circular
 Figer, A.: 1981b, Proc. of the Workshop on Pulsating B Stars, Nice (ed. by G.E.V.O.N. and C. Sterken), p. 237
 Groeneveld, I.: 1944, Veröff. Heidelberg 14, 43
 Harmanec, P., Grygar, J., Horn, J., Koubský, P., Kříž, S., Žďárský, F., Mayer, P., Ivanović, Z., Pavlovski, K.: 1977, Bull. Astr. Inst. Czech. 28, 133
 Hoffmeister, C.: 1934, Astron. Nachrichten 253, 195
 Kollnig-Schattschneider, E.: 1940, Astron. Nachrichten 271, 85
 Smart, W.M.: 1936a, Observatory 59, 32
 Smart, W.M.: 1936b, Mon. Not. Roy. Astron. Soc. 96, 258

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2124

Konkoly Observatory
Budapest
1982 April 16
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATION OF V 836 CYGNI

The variability and eclipsing character of this system (BD +35° 4496 = HD 203470) was discovered by Strohmeier, Kippenhahn and Geyer (1956) who gave it the temporary designation BV 143.

From the photographic light curve, Schmidt (1956) classified it as an Algol type variable. BV 143 was observed photoelectrically by Deinzer and Geyer (1959). According to these investigators the system was of Beta Lyrae type. Their light curve was very asymmetric in both minima and the second maximum was much brighter than the first maximum. In 1960 BV 143 was named as V 836 Cygni by Kukarkin, Efremov and Kholopov. Later the system was observed by Cester (1963) and Harris (1964, 1968). Cester and Harris analyzed the light curve using the Russell-Merrill method and gave the light elements. According to Harris (1968) the light elements are:

$$\begin{aligned} \text{Min I} &= \text{JD(HeI)} \ 24 \ 26 \ 547.5229 + 0^d65 \ 3410818 \cdot E \\ &\quad \pm \ 13 \qquad \qquad \pm \ 81 \ \text{p.e.} \end{aligned}$$

We observed the system photoelectrically on six nights in 1981 with the 48 cm Cassegrain reflector at the Ege University Observatory using EMI 9781A photomultiplier and standard B, V filters.

BD +35° 4461 and BD +35° 4460 were used as comparison and check stars, respectively. A total of 235 observational points were obtained in each colour. All the differential observations (comparison minus variable) were corrected for differential extinction with the conventional method. During the observations we obtained four primary and two secondary minima which are given in Table I. The O-C diagram of the system is given in Figure 1 using the light elements given in GCVS (1969). It can be seen from Figure 1 that the period of the system has started showing a decrease nearly since 1967. The first twelve points in Figure 1 are plotted from photographic and the others from photoelectric minima. All these points represent the primary minima. We assume that the period had no variation till 1967 so that the corrections in

the light elements were done only with the photoelectric minima obtained after 1967. The revised light elements,

$$\text{JD Hel Min I} = 24\,44\,853.4903 + 0.6534122 \cdot E$$

$$\pm 2 \qquad \qquad \pm 1$$

have been derived by the least squares method.

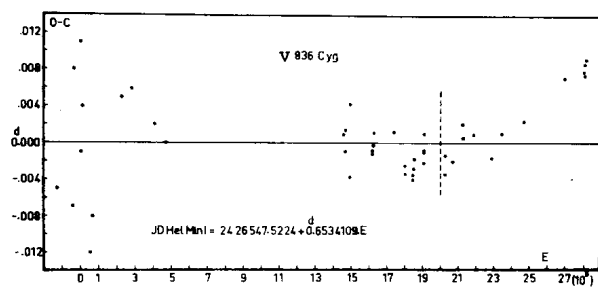


Figure 1

Table I: Times of minima of V 836 Cyg

Hel.Min.	Min.	O-C ₁	O-C ₂	Filter
24 44 853.4904	I	+0.0082	+0.0001	B
853.4900	I	+0.0078	-0.0003	V
874.3997	I	+0.0084	+0.0002	B
874.4001	I	+0.0088	+0.0006	V
879.3013	II	+0.0094	+0.0012	B,V
894.3340	II	+0.0136	+0.0054	B
894.3305	II	+0.0101	+0.0019	V
895.3097	I	+0.0092	+0.0010	B
895.3076	I	+0.0071	-0.0011	V
929.2879	I	+0.0100	+0.0018	B
929.2875	I	+0.0097	+0.0014	V

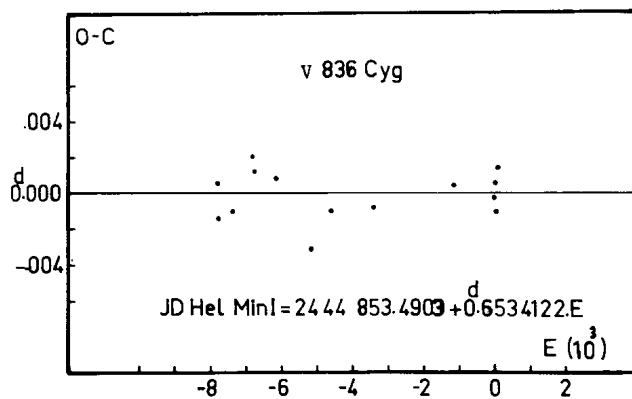


Figure 2

The $O-C_1$ values in Table I are calculated with the light elements of GCVS (1969) and the $O-C_2$ values with the above-revised elements. The O-C diagram which is plotted with the revised elements is given in Figure 2.

The light and colour curves are presented in Figure 3 where the phases have been calculated with the revised light elements. The shape of the light curve is similar to a Beta Lyrae type. The depth of secondary minima changes from night to night while the primary shows no variation. At the present time the light curves are not complete and more observations are needed.

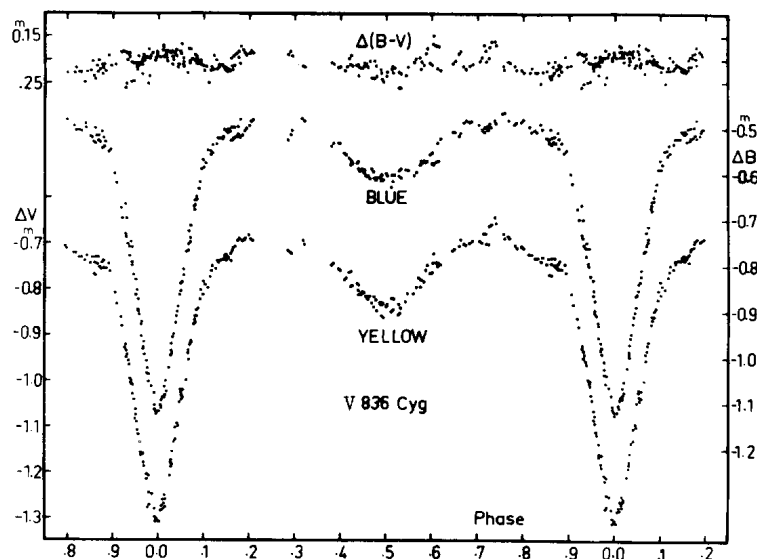


Figure 3

This project is partly supported by the Scientific and Technical Research Council of Turkey.

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References:

- Cester, B., 1963, Oss. Astronomico de Trieste, No. 317
 Deinzer, W., Geyer, E., 1959, ZfA, 47, 211
 Harris, A.J., 1964, M.S. Thesis, University of Pennsylvania
 Harris, A.J., 1968, A.J. 73, 164
 Kukarkin, B.V., Efremov, Yu.I., Kholopov, P.N., 1960, First Suppl. to the 2nd edition of the G.C.V.S., Moscow, pp. 33, 146, 201
 Schmidt, H., 1956, Kl. Veröff. Remeis-Sternwarte Bamberg, Nr. 16
 Strohmeier, W., Kippenhahn, R., Geyer, E., 1956, Kl. Veröff. Remeis-Sternwarte Bamberg, Nr. 15

ERRATUM

A label in the paper "Observations of Early-type Ultra-short Period Variables" by L.A. Balona (I.B.V.S. No. 2120) is in error. This occurs in the figures where the star labeled HR 3462 should read HR 3467.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2125

Konkoly Observatory
Budapest
1982 April 16
HU ISSN 0374-0676

A SEARCH FOR SHORT-TERM RADIAL-VELOCITY VARIATIONS
OF α And

α And is one of the most frequently observed Be stars. A very detailed spectroscopic investigation was published in a series of papers by Gulliver and Bolton (1978), Gulliver, Bolton, and Poeckert (1980) and Poeckert, Gulliver, and Marlborough (1981). In their extensive analysis they expressly paid little attention to the short-term variability which is one of the most puzzling properties of α And and which had been speculated about by several other authors before. This variability has been found by quite a number of observers in photometric as well as in spectroscopic data (for references see Horn et al. 1982, Baade 1981). The derived quasi periods cluster around 0.8d and 1.6d, but a real periodicity is apparently not maintained (Horn et al. 1982).

The time resolution of the available spectroscopic observations is not in all cases sufficient to study a variability which is not strictly periodic. Therefore we attempted to observe α And frequently during a number of consecutive nights. Unfortunately unfavourable weather conditions at Hoher List observatory during the 1981 observing season prevented us from obtaining a sufficient number of spectrograms required for a thorough analysis. In the meantime Bossi et al. (1982) announced that α And might again have entered a shell state. They claim that this

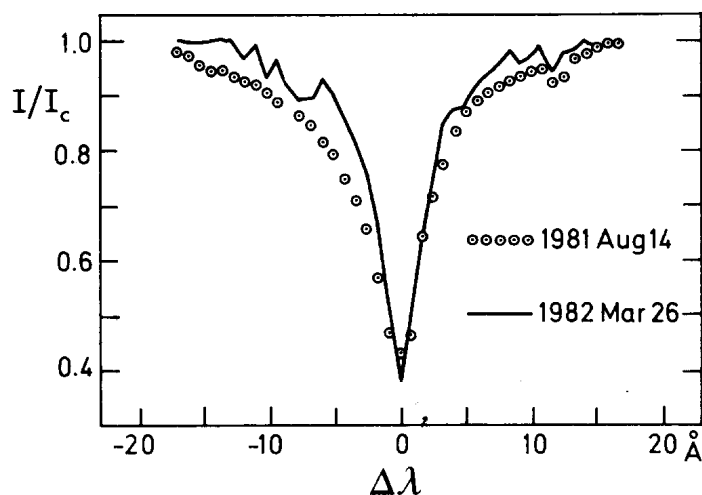


Fig. 1: H β profiles of o And

was predicted by a preceding light decrease, and one may wonder whether such a phase is characterized also by the above mentioned short-term RV variabilities. Because our last observations in 1981 were obtained during the light decrease observed by Bossi et al. and just 2 1/2 months before Bossi et al. discovered the H α shell absorption, we report our observations and publish the results of the RV measurements.

First, however, we describe the spectroscopic evolution of o And as we found it in our observations which were obtained within the last 2 1/2 years. To ensure compatibility we include only spectrograms recorded on IIA-0 plates with the Cassegrain spectrograph attached to the 106 cm reflector of Hoher List observatory. The dispersion is 31 Å/mm. The most recent observations are of March 26, 1982. Fig. 1 shows the change of the H β profile since Aug. 1981. The line is now slightly deeper, but noticeably narrower. Both trends can be traced back even further on 2 additional plates taken on Oct. 21, 1980. From Aug. 1981 to March 1982 the FWHM of H β and H γ dropped from 230 to 170 km/s and from 400 to 300 km/s, respectively. The wings of the lines are presumably filled in by emission.

Table I

Radial velocities of α And, Aug./Sept. 1981 and March 1982

J.D.-2 448 888	H β	H γ	H δ -H γ	He I, T	Qual.
4834.358	-31.6	-64.3	-43.3	-49.8	A
.377	-24.4	-36.8	-39.5	-51.7	A
.397	-25.3	-31.8	-37.8	-43.7	A
.415	-27.3	-29.8	-38.3	-47.3	A
.462	-25.9	-32.9	-32.1	-34.1	A
.488	-25.6	-27.9	-38.8	-38.4	A
.498	-25.9	-28.4	-33.2	-23.8	A
.517	-23.4	-26.7	-26.3	-31.4	A
.535	-22.1	-24.8	-27.4	-26.3	A
.568	-28.7	-25.9	-25.4	-25.2	A
.586	-28.6	-29.4	-22.5	-16.1	A
.618	-18.8	-27.1		-39.5	C
4857.385	-29.5	-29.5	-58.5	-38.6	A
.331	-21.4	-38.3	-48.6	-43.2	B
.368	-21.3	-38.8	-42.5	-43.1	B
.458	-28.1	-25.4	-38.8	-38.2	A
.475	-19.8	-31.8	-34.8	-43.6	B
.492	-21.2	-25.1	-28.9	-34.5	A
.588	-38.4	-26.1	-38.9	-17.1	A
.555	-33.8	-28.9	-32.1	-32.7	B
.644	-42.2	-36.4	-58.1	-52.8	C
4858.287	-48.2	-57.1	-72.4	-63.2	B
.385	-39.2	-43.8	-64.3	-64.8	A
.323	-37.1	-37.5	-54.6	-63.4	A
.411	-48.3	-35.9	-56.7	-69.3	A
.427	-37.8	-37.7	-48.9	-57.2	A
.488	-29.8	-29.9	-48.7	-59.5	A
.582	-35.8	-39.4	-43.9		C
.519	-33.6	-39.7	-39.7	-42.9	A
.537	-46.8	-43.8	-58.2		C
.555	-38.1	-32.9	-39.3	-25.1	A
.573	-32.3	-36.6	-45.5	-28.8	A
.591	-14.9	-33.6	-38.9	-29.4	A
.689	-38.5	-48.3	-34.2	-22.4	A
.627	-26.5	-36.8			C
.645	-58.8	-52.8	-58.8		C
4859.385	-29.8	-31.8	-48.3	-33.8	A
.322	-31.8	-42.8	-47.8	-58.4	B
.348	-32.7	-25.7	-48.3	-49.6	B
.471	-32.3	-29.5	-37.7	-42.3	A
.541	-16.9	-15.8	-44.8	-34.2	A
.566	-36.8	-31.9	-45.9	-68.7	A
.587	-23.4	-42.8	-39.6	-49.2	A
.687	-38.1	-35.8	-49.2		A
.628	-19.3	-38.8	-47.4		A
.651	-48.8	-39.8			C
5855.677	-28.1	-12.8	-29.2	-49.1	A
.683	-28.1	-13.2	-29.5	-62.1	A
.688	-16.4	-11.5		-42.6	C

A - good, B - somewhat weak, C - underexposed

Another change concerns the Ca II K line. In Aug. 1981 it was not visible, but now we clearly see a broad absorption line, about 5 Å wide (FWHM). The presence of the Ca H line is indicated by a systematic shift of H_{ϵ} by about -10 km/s. This is reminiscent of the beginning of Pleione's latest shell phase (Hirata and Kogure, 1976). Since Ca II absorptions are not in agreement with the spectral type, B 6, they are very likely broad shell features as they were found by Gulliver, Bolton and Poeckert (1980).

Altogether, our observations confirm Bossi's et al. result that o And is again in a shell state. All shell indicators are, however, still weak and, therefore, not necessarily a serious contradiction to the possible quasi periodicity of shell phases which was suggested by Fracassini et al. (1977) and Horn et al. (1982).

In 1981 a total of 46 spectrograms on Kodak IIIa-J plates were obtained during 4 nights with the same instrumentation. Passing clouds forced us to stop some exposures. The plates have to be divided into three classes according to their quality. The classifications are given together with the RVs in Table I. RV measurements were made with the ESO Grant machine. Most of the plates were measured twice. A comparison yielded as typical deviations of a single line: Balmer lines 2 - 5 km/s, He I triplet lines ($\lambda\lambda$ 3820, 4026, 4472 Å) 3 - 7 km/s. The RV of the interstellar Ca II was determined to -7.8 ± 3.1 km/s in reasonable agreement with Adams' (1949) result (-8.7 km/s, adopting a rest wavelength of 3933.664 Å).

The spectra cover the range between H_{β} and the Balmer limit, the description of the Aug. 1981 IIa-0 plate holds for them as well. There was no variation. The highest Balmer member visible is H_{16} . At the dispersion of 31 Å/mm it was not possible to search for the suspected variability of the absorption line profiles (Baade 1981). At least, the line profiles displayed during the RV measurements on the oscilloscope screen did not look unusual.

The observed range of the RV is just large enough to state that the RV was variable. We were not able to discover any regular pattern in the RV curves. Plots versus phase of all previously suggested periods

yielded negative results. A frequency spectrum obtained by means of the PDM technique does not show any conspicuous features.

We conclude that short-term, quasiperiodic RV variations are not present during the initial stage of the new, weak shell phase. All RV variations on timescales of about 1 day are probably of temporary nature only. A comparison of the 1981 and 1982 data shows an apparently significant change of the RVs derived from the Balmer lines. But one has to keep in mind that the 1982 observations were obtained within 15 minutes only. An interpretation whether this is related to the evolution of the shell has to await further observations.

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References:

- Adams, W.S., 1949. Ap.J. 109, 354.
Baade, D., 1981. Proc. Workshop Puls. B Stars (eds.: G.E.V.O.N and C. Sterken), Nice 1981, p. 267.
Bossi, M., Guerrero, G., Mantegazza, L., and Scandia, M., 1982.
Inf. Bull. Var. Stars No. 2082.

- Fracassini, M., Pasinetti, L.E., Pastori, L., 1977. *Astrophys. Spa. Sci.* 49, 145.
- Gulliver, A.F., and Bolton, C.T., 1978. *PASP* 90, 732.
- Gulliver, A.F., Bolton, C.T., and Poeckert, R., 1980. *PASP* 92, 774.
- Hirata, R., and Kogure, T., 1976. *PAS Japan* 28, 509.
- Horn, J., Koubsky, P., Arsenijewic, J., Grygar, J., Harmanec, P., Krpata, J., Kriz, S., and Pavlovski, K., 1981. *IAU Symp.* 98, 315.
- Poeckert, R., Gulliver, A.F., and Marlborough, J.M., 1981. Preprint *Dom. Astrophys. Obs.*, submitted to *PASP*.
- .

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2126

Konkoly Observatory
Budapest
1982 April 19
HU ISSN 0374-0676

H ALPHA VARIATIONS AND THE NEAR INFRARED SPECTRUM OF CI CYGNI

Since its 1975 outburst, the remarkable symbiotic star CI Cyg was gradually fading from the 9th magnitude to the present $V=10.8$. Eclipses were recorded in 1975 and 1980 when the visual magnitude of the star attained the minimum of about $V=11.2$ (Belyakina 1981, Mattei 1981).

This star was included in a program of coordinated ultraviolet (IUE) and optical observations to study the spectral variation during different activity phases. The results of the UV observations were discussed by Viotti et al. (1980) and Baratta et al. (1982). The behaviour of the emission lines of different ions may suggest a complex and extended structure of the emission envelope surrounding the eclipsed hot component (see also Michalitsianos et al. 1982).

Since July 1978, objective prism plates were secured at the Schmidt telescope of Campo Imperatore of the Roma Astronomical Observatory to follow its activity in the optical region. Large spectral variations were recorded both in the emission lines and in the blue continuum. Figure 1 shows the behaviour of H α during July 1978 to July 1981. It is evident from the figure that the line intensity has gradually decreased by a factor of about two in three years, following the long term luminosity decline of the star. A minimum was displayed during the 1980 eclipse with a mean central depth of about 40 per cent. The line was still weak in July 1980 during egress of eclipse (see the light curve in the insert of Figure 1), a result that was also found by Gevorgian (1981) with a narrowband photometry centered on H α . However, the IUE observations made during June 1979 to August 1980 showed that the Balmer continuum decreased by a factor 2.5 during eclipse (Baratta et al. 1982). Also the eclipse fading of the other Balmer lines was of about the same amplitude (cf. Mikolajewska and Mikolajewski 1982). The smaller eclipse variation

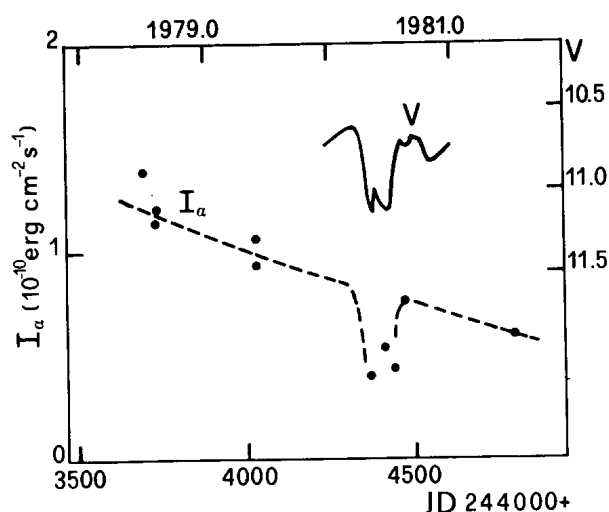


Figure 1. Intensity variation of H α in CI Cyg during 1978-1981. The 1980 eclipse is shown in the insert.

of H α should be due to the fact that the emission line originates from a more extended region around the hot component than that of the UV Balmer continuum.

To understand the nature of this star it would be of particular importance to determine the physical properties of the cool spectral component which dominates longwards of about 5000 Å. Several strong TiO absorption bands are present in our spectra, and their relative strength suggests a spectral type of about M6, slightly cooler than the previous classification of Merrill (1944) and Boyarchuk (1969). It is interesting to note that during the present phase the visual - near infrared spectrum of CI Cyg closely resembles that of the symbiotic star Z And whose cool spectral type is M6.5 (Altamore et al. 1981). In addition, according to the infrared photometry of Eiroa et al. (1982), the two stars display nearly the same IR energy distribution. This seems to indicate a similar behaviour of S-type symbiotic stars during minimum activity.

We have measured the monochromatic magnitude of CI Cyg near 8000-8800 Å for the same period of the H α observations and found a mean value of $m(8400 \text{ Å}) = 7.4 \pm 0.2$. Since the dispersion of the data should be mostly ascribed to errors of measurement, we may conclude that at present there is no evidence of variation larger than ± 0.2 magnitudes for the cool stellar component in the near infrared, during a period of time when the star underwent large

luminosity variations in the visual. It may also be noted that the infrared magnitudes of CI Cyg of Eiroa et al. in July 1981 during a phase of low activity of the star, are close to those given by Swings and Allen (1972) obtained in August 1971 when the star was bright in the visual ($V \approx 9.4$).

All those results seem to suggest that the cool component of CI Cyg is not variable. On the opposite, large IR variation has been detected in some of the D-type symbiotic stars; it would therefore be important to investigate whether the S-type symbiotic stars like CI Cyg have, on the contrary, stable cool components. A continuous photometric monitoring of these stars in the infrared is urgently needed to verify this point which is important for any modelling of the symbiotic stars.

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References:

- Altamore, A., Baratta, G.B., Cassatella, A., Friedjung, M., Giangrande, A., Ricciardi, O., Viotti, R.: 1981, *Astrophys. J.* **245**, 630.
 Baratta, G.B., Altamore, A., Cassatella, A., Friedjung, M., Ponz, D., Ricciardi, O.: 1982, *The Nature of Symbiotic Stars*, IAU Coll. No. 70, M. Friedjung and R. Viotti (eds.), D. Reidel, Dordrecht, p. 145.
 Belyakina, T.S.: 1981, *Inf. Bull. Var. Stars* No. 1974.
 Boyarchuk, A.A.: 1969, *Izv. Krym. Astrofiz. Obs.*, **39**, 124.
 Eiroa, C., Hefele, H., Qian Zhong-Yu: 1982, *The Nature of Symbiotic Stars*, D. Reidel, Dordrecht, p. 43.
 Gevorkian, G.H.: 1981, *Inf. Bull. Var. Stars* No. 2056.
 Mattei, J.A.: 1981, *North American Workshop on Symbiotic Stars*, JILA and University of Colorado, R.E. Stencel ed., p. 27.
 Merrill, P.W.: 1944, *Astrophys. J.* **99**, 15.
 Michalitsianos, A.G., Kafatos, M., Stencel, R.E., Boyarchuk, A.A.: 1982, *The Nature of Symbiotic Stars*, D. Reidel, Dordrecht, p. 141.
 Mikolajewska, J., Mikolajewski, M.: 1982, *The Nature of Symbiotic Stars*, D. Reidel, Dordrecht, p. 147.
 Viotti, R., Altamore, A., Baratta, G.B., Cassatella, A., Ponz, D., Friedjung, M., Muratorio, G.: 1980, *IAU Circular* No. 3518.

COMMISSION 27 OF THE I. A. U.
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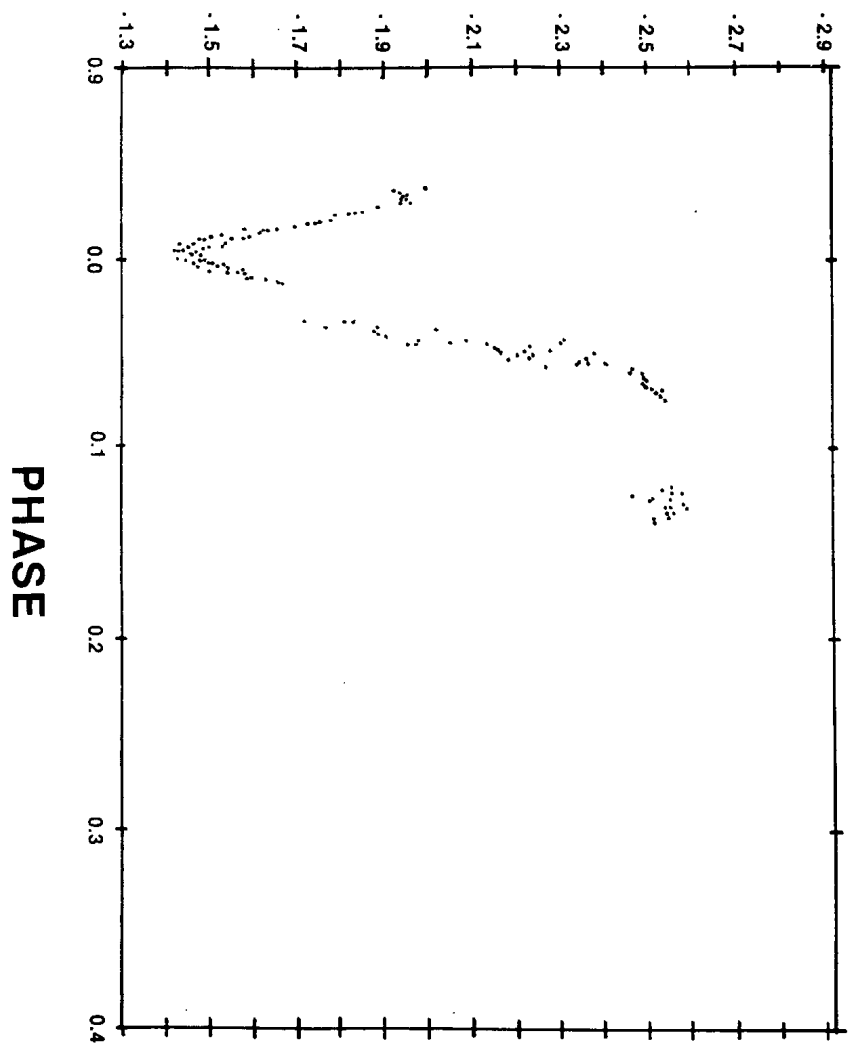
Number 2127

Konkoly Observatory
Budapest
1982 April 21
HU ISSN 0374-0676

PHOTOELECTRIC MINIMUM TIMINGS OF ALGOL

The Algol system was observed from July, 1981 through December, 1981 with the 20 cm Newtonian reflector and photoelectric photometer described by Bower (1982). The Optec photometer uses a silicon photodiode and has a diaphragm which covers an area of sky 2.9 in diameter. The comparison star was π Persei which is approximately 3° away from Algol. The sequence of observation was: comparison - comparison background - variable - variable background - comparison - comparison background. All observations were corrected for differential extinction, with an assumed extinction coefficient of $0.^m25$, and were transformed to V of the UBV system. Since the comparison and variable stars are close together and were observed when both were at least 30° above the horizon, the error in the assumption that the extinction coefficient was $0.^m25$ is reduced.

Figure 1 presents the observations, plotted as a function of phase according to the ephemeris that will be calculated from the times of minimum presented here. A list of the observations is available as IAU Commission 27 File No. 98. Assuming that the light curve described a parabolic function, a least-squares fit of the light curve yielded the following times of minimum: $HJD\ 2444904.60 \pm 0.05$ and $HJD\ 2444947.62 \pm 0.05$. A minimum between the two



determined minima, HJD 2444924.68 \pm 0.05, was selected as the epoch for equation (1). (O-C) residuals were calculated for the ephemerides from Guinan et al. (1976) and Kukarkin et al. (1969) and are listed in Table I.

A new period was determined from each of these two ephemerides by the following method. Each (O-C) residual was divided by the respective number of cycles that had elapsed since the given epoch. This value was added to the published value of the period, and the new periods are listed in Table I.

Table I

Paper	(O-C)	(O-C)/E	Period
Guinan et al. (1976)	0.0635	0.000044813	2 ^d .8672208
Kukarkin et al. (1969)	-0.0489	-0.000025750	2 ^d .8673643

The average of the new periods is 2^d.86729 \pm 0^d.00010. The ephemeris calculated from the analysis of this light curve is:

$$\text{Pr. Min.} = \text{HJD } 2444924.68 + 2^{\text{d}}.86729 \text{ E} \quad (1) \\ \pm 0.05 \pm 0^{\text{d}}.00010$$

The analysis of this light curve does not take into account the three types of variation in the interval between times of minimum in the Algol system: one with a period of 1^y.8 due to the orbital motion of Algol AB around Algol C; one with a period of 33y, due to apsidal motion; and a long-term variation described by Batten (1973).

I am grateful to R. M. Genet and N. D. Morrison for their assistance in the preparation of this paper.

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References:

- Batten, A. H.: 1973, Binary and Multiple Systems of Stars (Oxford: Pergamon Press), pp. 86-92.
- Bower, G. A.: 1982, IAPPP Communications, in press.
- Guinan, E. F., McCook, G. P., Bachmann, P. J., and Bistline, W. G.: 1976, Astron. J., 81, 58.
- Kukarkin, B. V. et al.: 1969, Gen. Cat. of Var. Stars, Moscow.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2128

Konkoly Observatory
Budapest
1982 April 26
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac IN 1981

Photoelectric observations of flare stars have been continued at the National Astronomical Observatory of the Bulgarian Academy of Sciences and the Stephanion Observatory, Greece. In this paper we report about our joint observations of the flare star EV Lac during the summer of 1981.

The equipment used at the National Astronomical Observatory consists of a 60cm Cassegrain reflector and a new one-channel UBv photometer, built at the Bulgarian Academy of Sciences. A photoncounting system with an integration time of 1 sec was used. Details of this equipment will be published elsewhere. Here we give only the transformation of the instrumental ubv system to the international UBv system for the period under consideration:

$$\begin{aligned}\Delta V &= \Delta v + 0.10 \Delta(b-v), \\ \Delta(B-V) &= 1.11 \Delta(b-v), \\ \Delta(U-B) &= 0.80 \Delta(u-b).\end{aligned}$$

At the Stephanion Observatory the observations were carried out with the 30-inch Cassegrain reflector of the Department of Geodetic Astronomy, University of Thessaloniki and a Johnson dual channel photoelectric photometer. The transformation of the Stephanion ubv system to the international UBv system for the period under consideration is given by the equations:

$$\begin{aligned}V &= v_0 + 0.011(b-v)_0 + 3.191, \\ B-V &= 0.569 + 1.022(b-v)_0, \\ U-B &= -1.858 + 0.962(u-b)_0.\end{aligned}$$

Table I contains, for each night, the monitoring intervals in UT, the colour in which the observations were made, as well as the total monitoring

time. Designation NAO or Steph. O. stands for the National Astronomical Observatory or Stephanian Observatory, respectively.

Table I
Flare star EV Lac, 1981

Date	Monitoring intervals(U.T.)	Total monit. time	Colour	NAO/Steph.O.
1981				
June				
29/30	23 ^h 40 ^m 08 ^s -00 ^h 02 ^m 15 ^s , 000545-003630,004130-005500, 005615-012100.	1 ^h 31 ^m 07 ^s	B	Steph.O.
30/1	222845-230800,231045-002630, 002930-012445.	2 50 15	B	Steph.O.
July				
1/2	225935-232835,233005-013635.	2 35 30	B	Steph.O.
2/3	221320-232535,232700-014020.	3 25 35	B	Steph.O.
August				
8/9	225140-235317,000839-001511, 001803-011305,013241-015602.	2 26 32	U	NAO
9/10	215544-005649,011647-015757.	3 42 15	U	NAO
21/22	221420-015629.	3 42 09	U	NAO
23/24	223800-011239.	2 34 39	U	NAO
September				
3	202259-212415.	1 01 14	B	NAO
5/6	221329-005738.	2 44 09	B	NAO
28	192128-232824.	4 06 56	U	NAO
Total		30 ^h 40 ^m 21 ^s		

Table II
Characteristics of the flares observed

Flare No	Date 1981	U.T	t _b min	t _a min	Duration min	I _f /I _o max	Δm mag	σ mag	P min	Air mass
	August									
1	8	23 ^h 19 ^m 54 ^s	0.57	1.1	1.7	1.63	0.53	0.03	0.55	1.008
2	8	23 27 48	0.18	9.2	9.4	12.71	2.76	0.03	7.7	1.006
3	9	00 09 59	0.48	2	2.5	1.41	0.37	0.03	0.4	1.002
4	9	00 22 36	1.43	4.4	5.8	3.16	1.25	0.03	2.4	1.004
5	9	23 28 22	3.03	6.6	9.6	2.11	0.81	0.03	3.1	1.004
6	24	00 56 20	0.25	10.7	11	7.45	2.18	0.03	10.2	1.078
	September									
7	28	19 25 10	0.25	0.8	1.1	1.38	0.35	0.03	0.2	1.025

During the total of 30^h40^m monitoring time 7 flares were observed (all of them in "u" colour), the characteristics of which are given in Table II. For each flare the following characteristics (Andrews et al., 1969) are given:

- the date and universal time of maximum,
- the duration before and after maximum (t_b and t_a respectively),

c. the total duration of the flare,

d. the value of the ratio I_f/I_0 corresponding to flare maximum, where

I_f is the total intensity of the star plus flare less sky background
and I_0 is the quiet state intensity less sky background,

e. the increase of the star magnitude at flare maximum:

$$\Delta m(u) = 2.5 \log I_f/I_0,$$

where "u" is the ultraviolet instrumental magnitude at NAO,

f. the standard deviation of random noise fluctuations in mag.

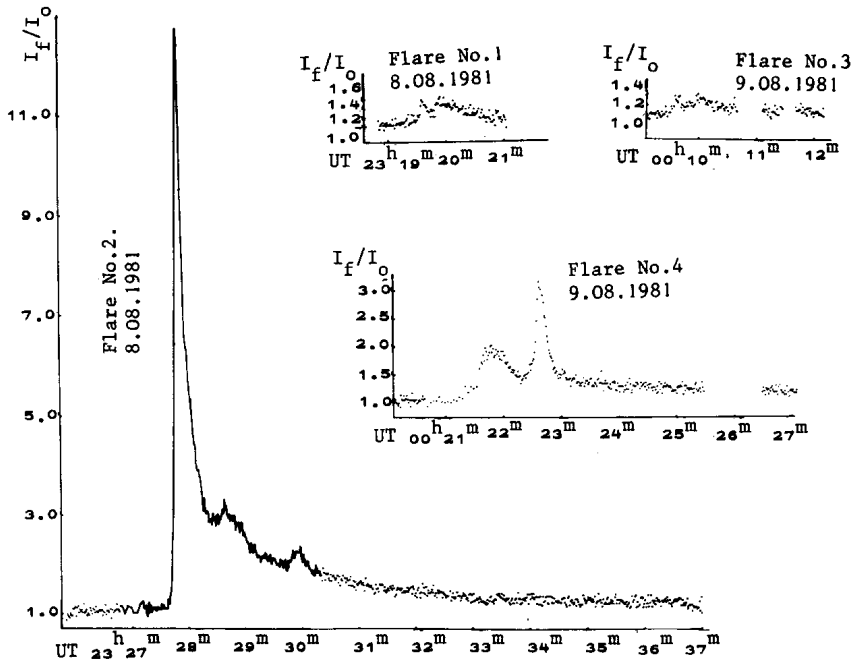
$$\sigma(\text{mag}) = 2.5 \log \frac{I_0 + \sigma}{I_0},$$

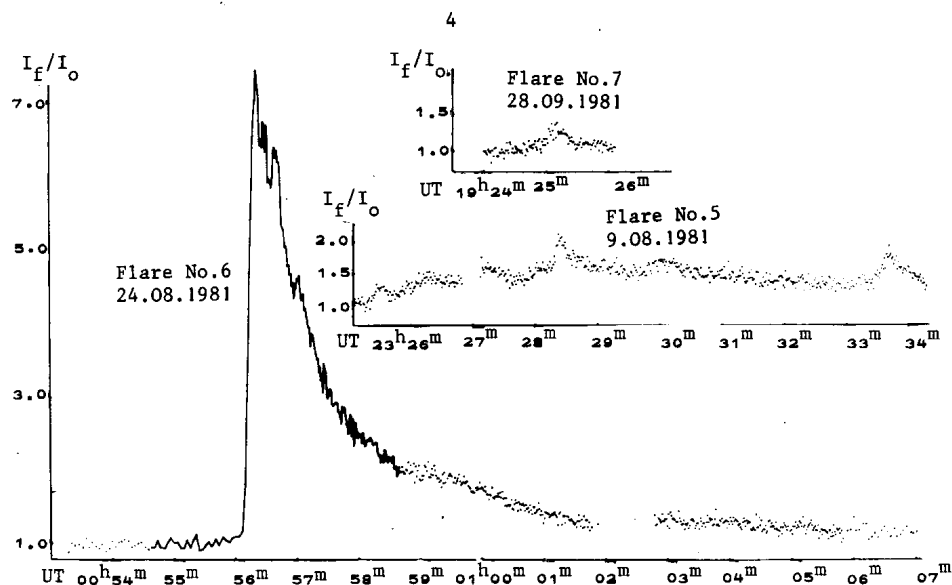
g. the integrated intensity of the flare over its total duration:

$$P = \int (I_f - I_0) / I_0 dt,$$

h. the air mass.

The light curves of the observed flares in colour "u" are shown in Figs. 1-7. We would like to draw attention to the remarkable activity of EV Lac during the night of 8/9 August 1981 with 4 flares observed within 1^h10^m.





Figures 1-7

Acknowledgements

The observations reported in this paper are part of the joint research project under the title "Study of variable stars" carried out by the Department of Astronomy with National Astronomical Observatory, Bulgarian Academy of Sciences, and the Department of Geodetic Astronomy, University of Thessaloniki, Greece. This project is part of the Program for Scientific and Technical Co-operation between Bulgaria and Greece. The authors would like to express their gratitude to the relevant authorities of the respective countries for their support.

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Andrews, A.D., Chugainov, P.F., Gershberg, R.E. and Oskanian, V.S.: 1969,
I.B.V.S. No. 326

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2129

Konkoly Observatory
Budapest
1982 April 26
HU ISSN 0374-0676

THE LIGHT VARIABILITY OF THE Be STAR HD 58050 (OT Gem)

HD 58050 is a Be star (Hubert A.M. et al., 1979) whose variability has been suspected by Hoffmeister (1934). Recently, members of European Group GEOS visually observed a remarkable increase in its brightness (Ballereau et al., 1981 and Figer, 1981a, 1981b), to which some spectral changes have been correlated (Hubert A.M. et al., 1981). Recently HD 58050 has been named OT Gem (Kholopov et al., 1981).

In his remarks, Hoffmeister also supposed a variability on short time-scale, comparing HD 58050 with HD 59059. This possibility has been also suggested by Figer (1981a, 1981b): he proposed a period of 0.1250 or 0.1429 days on the basis of visual estimates.

In order to establish the reliability of this periodicity, some photoelectric observations have been carried out in the nights of 1982 January, 30 and March, 15 and 16 at Merate Observatory. HD 59059 ($V=6.18$, $B-V=-0.03$, A0) has been used as comparison star and HD 60107 ($V=5.25$, $B-V=+0.05$, A1V) as check star. During each night no appreciable variation has been detected, as Table I and Table II show. Each ΔV (or ΔB) is the mean of several (4 or 5) measures; σ is the standard error. On the other hand, small changes in brightness are present in the night-to-night mean magnitudes. This variability on large time-scale is also proved by photographic observations (Berthold, 1982). Consequently, HD 58050 is a γ Cas variable only. Mean ΔV values of each night are, respectively: -0.185, -0.190, -0.198; no variation is found in the colour index B-V.

An additional remark must be made about HD 60107, the check star: it has been suspected to be a variable star on the basis of the photoelectric observations collected by Blanco et al. (1968), but with a great deal of prudence (FitzGerald, 1973). Eggen (1963) notes a variability in the radial velocity, too. However, HD 59059-HD 60107 differences have been constant during my ob-

Table I

Hel. J.D. 2440000 +	ΔV	σ	Hel. J.D. 2440000 +	ΔV	σ
5000.451	- 0.185	0.002	5044.318	- 0.188	0.002
.455	- 0.186	0.001	.329	- 0.189	0.007
.460	- 0.188	0.003	.341	- 0.195	0.003
.480	- 0.186	0.005	.358	- 0.189	0.004
.495	- 0.187	0.002	.369	- 0.192	0.003
.529	- 0.186	0.005	5045.278	- 0.199	0.002
.541	- 0.185	0.003	.285	- 0.199	0.001
.571	- 0.184	0.003	.295	- 0.194	0.005
.576	- 0.180	0.001	.309	- 0.199	0.002
5044.277	- 0.195	0.003	.315	- 0.200	0.005
.286	- 0.190	0.005	.341	- 0.195	0.004
.300	- 0.184	0.004			

V observations of HD 58050. ΔV are in the sense HD 59059 minus HD 58050

Table II

Hel. J.D. 2440000 +	ΔB	σ	
5000.482	- 0.060	0.002	B observations of HD 58050. ΔB are in the sense HD 59059 minus HD 58050.
.513	- 0.060	0.001	
.531	- 0.062	0.003	
.540	- 0.062	0.002	
5045.328	- 0.073	0.005	

Table III

Hel. J.D. 2440000 +	ΔV	σ	Hel. J.D. 2440000 +	ΔV	σ
5000.468	+ 0.972	0.001	5044.335	+ 0.957	0.005
.514	+ 0.959	0.005	.353	+ 0.959	0.001
.555	+ 0.959	0.006	5045.291	+ 0.960	0.003
5044.285	+ 0.964	0.004	.304	+ 0.958	0.002
.299	+ 0.966	0.004	.321	+ 0.966	0.004
.314	+ 0.953	0.004	.342	+ 0.964	0.004

V observations of HD 60107. ΔV are in the sense HD 59059 minus HD 60107.

servations, as Table III shows: FitzGerald's hypothesis about incorrect data seems to be plausible. Anyhow, further measures are desirable.

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References:

- Ballereau D., Hubert A.M., 1981, IAUC 3565
Berthold Th., 1982, private communication
Blanco V.M., Demers S., Douglass G.G., FitzGerald M.P., 1968, Publication of the USNO, Second Series, Vol. XXI
Eggen O.J., 1963, A.J., 68, 697
Figer A., 1981a, GEOS Circular SA 1
Figer A., 1981b, Workshop on Pulsating B stars, Nice, 237-246
FitzGerald M.P., 1973, A.&A. Suppl., 9, 297-311
Hoffmeister C., 1934, AN, 253, 195
Hubert A.M., Hubert H., 1979, An atlas of Be stars
Hubert A.M., Hubert H., Ballereau D., Chambon M.Th., 1981, Be stars, Munich, 195-199
Kholopov P.N., Samus N.N., Kukarkina N.P., Medvedeva G.I., Perova N.B., 1981, I.B.V.S. No.2042

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2130

Konkoly Observatory
Budapest
1982 April 28
HU ISSN 0374-0676

NEW VARIABLE STAR IN THE γ CYGNI REGION

On the observational material ($T_{\text{eff}} = 116^{\text{h}}$) obtained with the 20in./28in. Schmidt-telescope of National Astronomical Observatory at Rojen a new variable star was discovered in the γ Cygni region (the plates were centered at BD+40⁰4165).

The coordinates of this star for 1950.0 are:

$$\text{R.A.} = 20^{\text{h}}15^{\text{m}}.1, \text{ D} = 42^{\circ}49.1$$

The observational material is obtained on emulsion ORWO ZU21 with UG2 filter by the method of multiple exposures giving a possibility to observe quick variability of the order of 10 minutes time resolution. The magnitude variations of this star in U-light were:

$m_{\text{U max}} = 16^{\text{m}}.4, \quad m_{\text{U min}} > 17.5$ (i.e. the star becomes fainter than the limit of our patrol plates).

It has been found that the star shows sharp Algol-like minima of one night duration. We suppose that the probable type of variation is EA.

Between September 1979 and October 1981 we observed a few minima of the star. We give the moments of observations, when the star was found in minimum brightness:

JD 2444495.208
....763.465
....814.470
....820.533
....846.262
....897.199

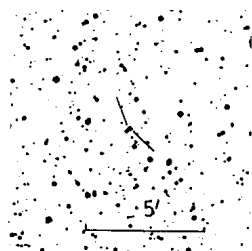


Figure 1

The identification chart of the variable star obtained from a $40^{\text{in}}/52^{\text{in}}$ Schmidt plate (Kodak 103aF + RG610 filter, 60 minutes exposure) is presented in Figure 1.

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COMMISSION 27 OF THE I. A. U.
 INFORMATION BULLETIN ON VARIABLE STARS
 Number 2131

Konkoly Observatory
 Budapest
 1982 April 28
 HU ISSN 0374-0676

NEW FLARE STARS IN THE γ CYGNI REGION

This paper presents the results of systematic observations of the γ Cygni region according to the programme of regular search for flare stars in different stellar aggregates. We obtained 123 plates with effective time 116^h between April and October 1981 with the 20in/28in Schmidt-telescope of the National Astronomical Observatory at Rojen.

The multiple exposure plates were made on ORWO ZU21 emulsion through a Schott UG2 filter.

Six new flare stars were discovered.

Table I gives the data for flare stars: the serial number of the flare stars (we continue the designations of flare stars that was begun in our previous paper (Tsvetkova (1980))); coordinates for 1950.0; the approximate minimum brightness in U-light; the observed amplitude of flares in U-light and the date of the flare up.

Table I

Number	RA(1950.0)	D(1950.0)	$m_{U \text{ min}}$	m_U	Date of flare up
R6	20 ^h 15 ^m .5	42°28.0	19 ^m .6	2 ^m .6	19.9.1981
R7	23.6	41 54.9	18.0	1.0	27.8.1981
R8 ^x	24.6	40 18.5	18.3	3.3	3.8.1981
"	"	"	"	2.1	20.9.1981
R9	25.4	41 32.1	20.0	3.8	3.6.1981
R10	25.6	41 9.4	17.5	2.3	31.7.1981
R11	33.8	41 1.0	17.8	1.0	29.8.1981

^xThe flare star R8 has shown 2 flares, it is situated in the nebulosity IC 1318b.

Taking into account of the known data on flare stars in the γ Cygni region (Melikian et al. (1980), Tsvetkova (1980) and present paper) the lower limit of the total number of flare stars in this region according to Ambartsumian's formulae (Ambartsumian et al. (1970)) is equal to 98.

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References:

- Ambartsumian, V.A., Mirzoian, L.V., et al.: 1970, *Astrofizika*, 6,7.
Melikian, N.D., et al.: 1980, *I.B.V.S.* No. 1750.
Tsvetkova, K.P.: 1980, *I.B.V.S.* No. 1887.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2132

Konkoly Observatory
Budapest
1982 April 28
HU ISSN 0374-0676

FLARE STARS IN ORION

Continuous photographic observations of the flare stars in the Orion nebula (M 42) region have been carried out at the Bulgarian National Astronomical Observatory during the year 1981.

The photographic patrol has been made with the 50/70 cm Schmidt-telescope at Rojen in U-light (ORWO ZU-21 plates with UG 2 filter).

For 22^h50^m total effective time of observations 25 plates with 137 successive exposures each of 10 minutes were obtained. The data about the discovered flares are summarized in Table I.

Table I.

Rojen Nos.	Parenago Nos.	R.A.(1900.0)	D(1900.0)	m_{Umin}	Δm_U	Date(UT)	Identification
R9		5 ^h 28 ^m .0	-5°17'	18 ^m .5	2 ^m .5	03.02.1981	
R10	1463	29.5	-4 59	18.0	3.3	02.02.1981	31(1)
R11		30.9	-6 21	20.2	8.3	02.02.1981	
R12		31.3	-5 04	21	6.9	31.01.1981	
R13		37.7	-6 49	19.2	3.4	03.02.1981	

The Rojen numeration (2) for the Orion flare stars has been continued.

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References:

- Haro G., Chavira E., 1969, Bol.Obs. Tonantzintla y Tacubaya, v.5, No.32,(1)
59-66 p.
Tsvetkov M.K. et al., IBVS No. 1889, 1980. (2)

COMMISSION 27 OF THE I. A. U. INFORMATION BULLETIN ON VARIABLE STARS

Number 2133

Konkoly Observatory
Budapest
1982 April 28
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac IN 1981

Continuous photoelectric monitoring of the flare star EV Lac has been carried out at the Stephanion Observatory during the autumn 1981 in the framework of the Program for Scientific and Technical Co-operation between the Department of Geodetic Astronomy, University of Thessaloniki-Greece and the Department of Astronomy with National Astronomical Observatory, Bulgarian Academy of Sciences - Bulgaria.

Observations have been made with the 30-inch Cassegrain reflector of the Department of Geodetic Astronomy installed at the Stephanion Observatory, and a Johnson dual channel photoelectric photometer, in the B colour of the international UBV system. The telescope and the photometer have been described elsewhere (Mavridis et al., 1982). The transformation of our instrumental uvb system to the international UBV system for the period September-October 1981 is given by the following equations:

$$\begin{aligned} V &= v_0 - 0.023(b-v)_0 + 3.202, \\ (B-V) &= 0.582 + 1.004(b-v)_0, \\ (U-B) &= -1.869 + 1.021(u-b)_0. \end{aligned}$$

The monitoring intervals in U.T. as well as the total monitoring time for each night are given in Table I. Any interruption of more than one minute has been noted. In the fourth column of Table I the standard deviation of random noise fluctuation - σ (mag) = $2.5 \log (I_0 + \sigma)/I_0$, for different times (U.T.) of the corresponding monitoring intervals is given.

During the 14.5 hours of monitoring time 3 flares were observed the characteristics of which are given in Table II. For each flare following characteristics (Andrews et al., 1969) are given:

- a. the date and universal time of maximum;

Table I
Monitoring intervals in 1981

Date	Monitoring intervals (U.T.)	Total Monitoring Time	σ (U.T.)
1981			
Sept. 28-29	21 ^h 23 ^m -21 ^h 55 ^m , 21 ^h 57 ^m -22 ^h 33 ^m , 22 35 -23 00, 23 02 -23 40, 23 42 -00 49, 00 55 -01 15, 01 17 -01 37, 01 45 -01 50.	4 ^h 03 ^m	0.02/21 ^h 43 ^m /, 0.02/22 ^h 20 ^m /, 0.03/22 50 /, 0.03/23 20 /, 0.03/00 35 /, 0.03/01 04 /, 0.03/01 08 /, 0.02/01 24 /, 0.02/01 46 /.
29-30	20 50 -21 41, 21 43 -22 24, 22 26 -00 05, 00 07 -00 47.	3 51	0.02/21 34 /, 0.02/22 00 /, 0.02/22 55 /, 0.04/00 34 /.
30	19 19 -19 55, 19 56 -20 07, 20 12 -20 42, 20 45 -21 25, 20 28 -20 30, 21 33 -21 48, 21 55 -22 16.	2 35	0.02/19 32 /, 0.02/20 00 /, 0.02/20 30 /, 0.02/21 05 /, 0.02/21 29 /, 0.02/21 40 /, 0.02/22 13 /.
Oct. 1	19 08 -19 55, 19 58 -20 05, 20 17 -20 23.	1 00	0.02/19 38 /, 0.03/20 03 /, 0.02/20 18 /.
3	19 16 -19 20, 19 23 -19 45, 19 55 -20 33, 20 35 -21 25, 21 28 -21 48, 21 50 -22 35.	2 59	0.05/19 18 /, 0.02/19 34 /, 0.03/20 23 /, 0.02/20 51 /, 0.03/21 40 /, 0.02/22 23 /.
Total = 14 ^h 28 ^m			

Table II
Characteristics of the Flares Observed

Flare No	Date 1981	U.T. max	t_b min	t_a min	Duration min	$\frac{I_f - I_o}{I_o}$ max	P min	Δm mag	σ mag	Air mass
1.	Sept. 29	1 ^h 31 ^m .6	2.60	5.24	7.84	1.024	3.90	0.77	0.02	1.66
2.	29	22 30.5	0.14	5.50	6.64	0.486	0.213	0.43	0.02	1.08
3.	Oct. 3	22 27.4	0.52	6.00	6.52	0.177	0.214	0.18	0.02	1.09

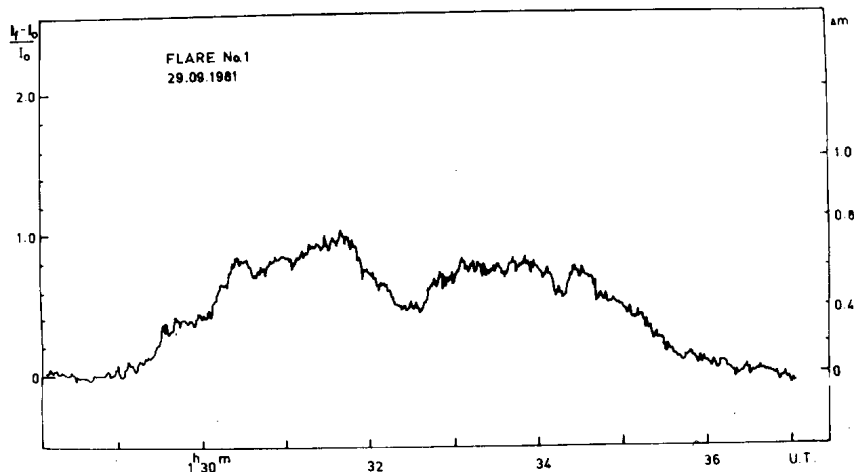


Figure 1

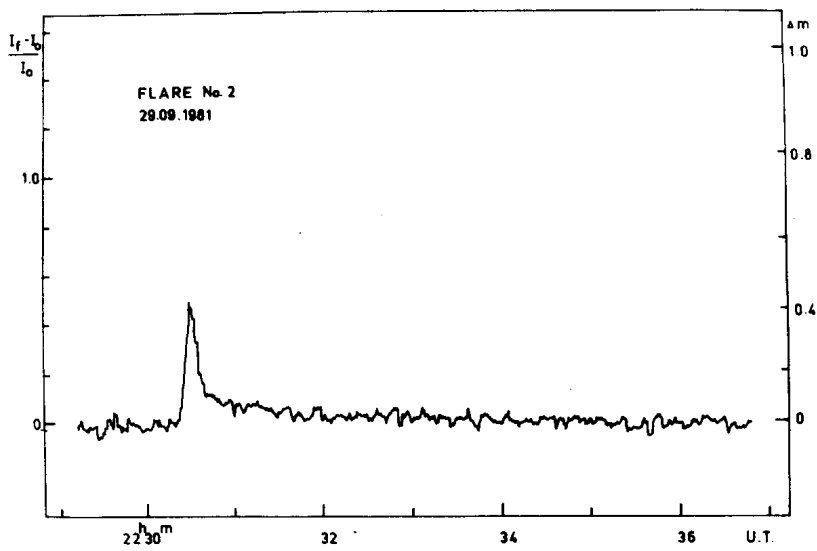


Figure 2

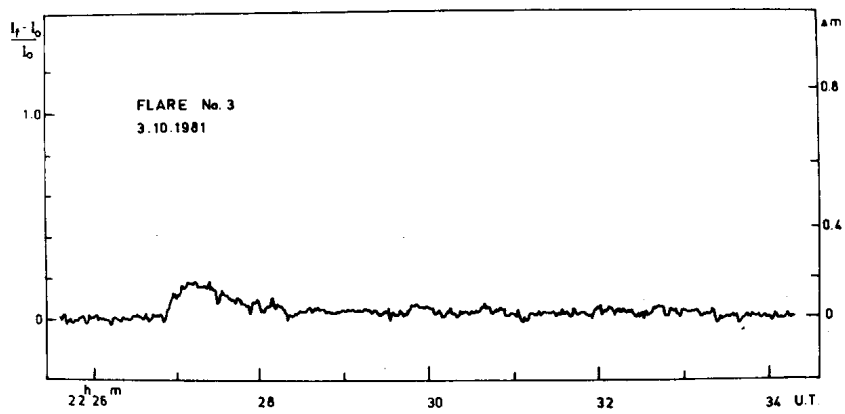


Figure 3

- b. the duration before and after maximum (t_b and t_a , respectively) as well as the total duration of the flare;
- c. the value of the ratio $(I_f - I_o)/I_o$ corresponding to flare maximum, where I_o is the intensity deflection less sky background of the quiet star and I_f is the total intensity deflection less sky background of the star plus flare;
- d. the integrated intensity of the flare over its total duration, including pre-flares, if present: $P = \int (I_f - I_o)/I_o dt$;
- e. the increase of the apparent magnitude of the star at flare maximum $\Delta m(b) = 2.5 \log (I_f/I_o)$, where b is the blue magnitude of the star in the instrumental system;
- f. the standard deviation of random noise fluctuation - $\sigma(mag) = 2.5 \log(I_o + \sigma)/I_o$, during the quiet-state phase immediately preceding the beginning of the flare;
- g. the air mass at flare maximum.

The light curves of the observed flares in the b colour are shown in Figures 1-3.

Acknowledgements

The authors would like to express their gratitude to the relevant authorities of the respective countries for their support.

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References:

- Andrews A.D., Chugainov, P.F., Gershberg R.E. and Oskanian V.S., 1969, I.B.V.S. No. 326.
- Mavridis L.N., Asteriadis G., and Mahmoud F.M., 1982, in Compendium in Astronomy, D. Reidel, Dordrecht, Holland, p. 245.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2134

Konkoly Observatory
Budapest
1982 April 28
HU ISSN 0374-0676

NEW H α - EMISSION STARS IN THE REGION OF γ CYGNI

During the period 1977-1980 an H α -survey in the region of γ Cygni has been made with the 40in/52in Schmidt-telescope of Byurakan Astrophysical Observatory.

The spectral plates were obtained by a 4 $^{\circ}$ objective prism (275 A/mm at H γ) on Kodak II F, 103 aF, and 103 aE emulsions through an RG 610 filter. The exposure times were between 30 s and 70 min and the limiting magnitude was about 18 m .5 (pg) for the exposure time of 60 min.

18 new H α - emission stars have been found which were not included in the complete lists of H α - emission stars of Dolidze (1975) and in the list of Coyne et al. (1976).

The data of observed new H α - emission stars are presented in Table I.

Table I

Designation	R.A.(1950.0)	D.(1950.0)	B _p	I _{Hα}
1	20 h 12 m .2	40 $^{\circ}$ 15'	18 m .4	2
2	14.3	42 54	19.9	3
3	15.0	41 44	17.0	3
4	15.8	41 42	13.4	3
5	16.3	41 44	14.6	3
6	17.0	41 57	17.8	3
7	17.4	41 28	18.6	2
8	19.6	41 44	18.5	2
9	20.8	39 50	18.2	2
10	21.6	42 00	18.0	2
11	22.0	43 18	19.3	2
12	22.3	40 12	18.3	2
13	22.6	41 50	18.4	2
14	28.1	39 56	17.7	1
15	28.4	40 07	17.8	2
16	30.9	39 57	21:	1
17	31.0	40 24	17.9	2
18	31.7	41 25	16.7	2

Column 1: Serial number of H α - emission stars.

Column 2 and 3: Coordinates for 1950.0.

Column 4: Photographic magnitudes measured on the POSS blue prints

(B_p) according to the method of stellar diameters.

Column 5: Intensity of H α - line in emission: 5-very strong, 4-strong, 3-medium, 2-weak and 1-very weak.

The H α - emission star No. 15 in this list is identical with the star V 1391 Cygni discovered by Romano (1969).

A more detailed study including the identification charts of the discovered H α - emission stars will be published elsewhere.

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References:

- Coyne, G. et al.: 1976, Vatican Obs. Publ., 1, No.8.
Dolidze, M.V.: 1975, Bull.Abastum.Astroph.Observ., 47.
Romano, G.: 1969, Pubbl.Osser.Astronom.Padova, No.156.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2135

Konkoly Observatory
Budapest
1982 April 30
HU ISSN 0374-0676

SPECTROPHOTOMETRIC OBSERVATIONS OF THE STAR MWC 17
IN JANUARY 1982

The star MWC 17 was discovered by Merrill et al. (1932) who classified it as a Be type star with a magnitude $m_{pg} = 12.2$. As other objects of this type (emission line stars and shell stars e.g. Z And) MWC 17 probably shows light variations.

Swings (1941) identified most of the emission lines of low ionization.

Latter the designation BQ[] indicative of a variety of hot stars which present forbidden lines together with absorption bands, was assigned to MWC 17 by Ciatti et al. (1974) on the basis of spectroscopic observations.

Table I

Spectroscopic observations of MWC 17

Plate No	Date (1982)	J.D. 2440000+	Exp. time (min.)
D 1234	January 27	4997	85
D 1238	January 30	5000 .	70
D 1240	January 31	5001	100

Table II
Relative emission line intensity for MWC 17

λ_{obs} (Å)	Elements	27.1.82	30.1.82	31.1.82
3835	H $_{\eta}$	0.30	0.32	0.15
3889	HeI (2) + H ζ	0.53	0.25	0.28
<u>3933</u>	CaII ab	0.25	0.15	0.28
3970	H ϵ + HeI	0.47	0.16	0.07
4068	[SII] (1F)	0.26	0.20	0.15
4102	H $_{\delta}$	0.61	0.15	0.23
4178	FeII (28)	0.13	0.05	0.12
<u>4227</u>	CaI ab	0.15	0.08	0.11
4233	FeII (27)	0.21	0.09	0.13
4244	[FeII] (27F)	0.24	0.19	0.19
4286	[FeII] (7F)	0.29	0.16	0.07
4341	H $_{\gamma}$	0.87	0.67	0.68
4359	[FeII] 21F + 7F	0.68	0.79	0.69
4415	FeII (32)	0.33	0.10	0.08
4452	[FeII] (7F)	0.27	0.16	0.18
4471	HeI (6)	0.27	0.06	0.07
4491	FeII (37)	0.29	0.11	0.06
4520	FeII (37)	0.30	0.09	0.07
4549	FeII (38)	0.18	0.11	0.19
4581	FeII (37)	0.32	0.14	0.21
4629	FeII (37)	0.25	0.11	0.23
4658	[FeIII] (3F)	0.21	0.15	0.13
4814	[FeII] (20F)	0.12	0.09	0.09
4861	H $_{\beta}$	1.00 >	1.00	1.00
4922	HeI (48) + FeII (42)	0.32	0.12	0.14
4955	[OIII] (1F)	0.08	0.10	0.03
5007	[OIII] (1F)	0.43	0.20	0.22
5017	HeI (4) + FeII (42)	0.43	0.20	0.20
5159	[FeII] 19F	0.16	0.11	0.07
5194	[AlIII] 3F	0.17	0.10	0.06
5266	[FeII] 19F + FeII 49	-	-	-
5331	[FeII] 3F	-	-	-

Three spectra of MWC 17 were obtained with the 80cm telescope at Observatoire de Haute-Provence in January 1982. The reciprocal dispersion was about 93 \AA mm^{-1} at H_γ . Relative intensities for emission lines were estimated from calibration curves.

Table I gives the date and exposure time.

Table II gives the identified lines, the multiplet number of the corresponding transition and the intensity of the lines relatively to $I(H_\beta) = 1.0$.

As for symbiotic stars emission lines of FeII and [FeII] are observed simultaneously and the intensity ratio $\frac{[SII]}{[FeII]}$ appears close to the unity.

Emission lines of HeI and [AIII] (IP : 27.60 eV) are observed suggesting a region ionized by a hot source and a region of low ionization which emits [FeII] lines. The value 0.06 is found for the intensity ratio $\frac{I(4471)}{I(H_\beta)}$ on January, 30 from calculations using the model of Brochlehurst (1972). This small value may be due to self absorption in the H_β line as shown by Leibowitz (1977).

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* In Table II [FeII] lines $\lambda 4359 \text{ \AA}$ are blended with Hg line at $\lambda 4358 \text{ \AA}$.

References:

- P.W. Merrill, M.L. Humason, C.G. Burwell, *Astrophys. J.* 76, 158 (1932)
- P. Swings, *Astrophys. J.* 93, 351 (1941)
- M. Brochlehurst, *Monthly Notices Roy. Astron. Soc.* 161, 145 (1972)
- A. Allen, J.P. Swings, *Monthly Notices Roy. Astron. Soc.* 161, 145 (1973)
- F. Ciatti, S. D'Odorico, A. Mammano, *Astron. and Astrophys.* 34, 181 (1974)
- M. Leibowitz, *Astron. and Astrophys.* 56, 265 (1977)

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2136

Konkoly Observatory
Budapest
1982 May 3
HU ISSN 0374-0676

ENERGY DISTRIBUTION IN THE SPECTRUM OF FU Ori

As known in 1936-1937 FU Ori increased its brightness from 16^m to 10^m during half a year. Since then it has been decreasing slowly, only $0^m.15$ in B, for ten years. However, more rapid fluctuations of brightness with an amplitude of about $0^m.1$ have been also observed. The flare of FU Ori appeared to be the first observable manifestation of a new type of variability of young stars. The investigations and characteristics of such stars were entirely described by Herbig (1966, 1977).

The observations were made in the range $\lambda\lambda$ 3110-8640 Å by the five-channel scanning spectrophotometer in the Cassegrain focus of the 0.7 m reflector AZT-8 at Crimean Astrophysical Observatory (Lagutin, 1979; Bukach, 1979). At λ 3750 Å the spectral width of exit slit was 23.4 Å and the step of scanning was 18 Å; in shortward spectral regions these parameters were two times less. Time integration for a counting was 4 sec, with a full-time record of one scan equal to 12 min.

ϕ_1 Ori was used as a standard star with the absolute energy distribution according to data from Charitonov et al. (1978) and Johnson and Mitchell (1975) corrected respectively for the absolute calibration of the primary standard α Lyr (Charitonov et al., 1980). The standard star was observed directly before or after scanning FU Ori so that the difference in the air mass was negligible. In order to reduce the contribution of noise to the final data every three serial countings of FU Ori at λ 3750 Å and five countings in shortward regions were smoothed. The absolute energy distribution of FU Ori was obtained on three nights: 27.I.80, 21.II.80, 26.III.80. The difference of the absolute energy distribution obtained on these nights was within the errors of observations. Figure 1 shows the dependence of the intrinsic spectral density E_λ ($\text{erg cm}^{-2} \text{sec}^{-1} \text{cm}^{-1}$) for these three dates.

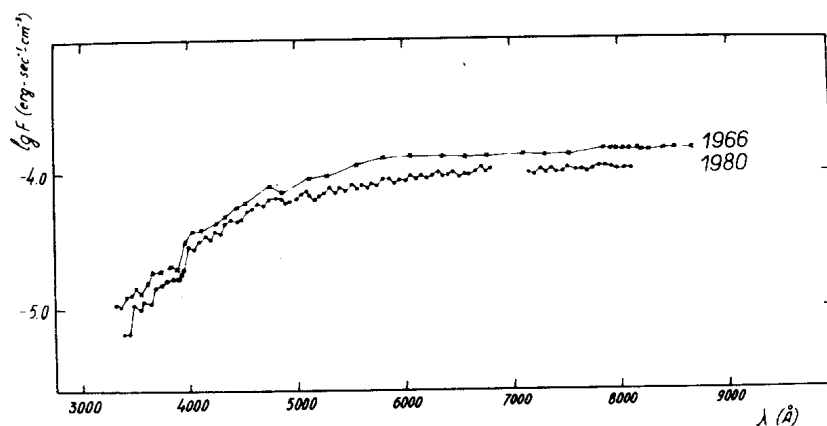


Figure 1

The r.m.s. error determined by the internal agreement does not exceed 12% in $\lambda < 3750 \text{ \AA}$, 3% in $\lambda \lambda 3750 - 6700 \text{ \AA}$ and 5% in more longward region. The same figure shows the run of the energy distribution in the spectrum of FU Ori obtained by Kuhi (1974) in 1966. According to Charitonov et al. (1980) the difference between our standards and the ones used by Kuhi (Hayes standards) does not exceed 3%. As it is seen in Figure 1 the brightness of FU Ori decreased approximately by 40% ($0.^m35$) as compared to 1966. This decrease of brightness agrees with the tendency that this star faded in B light (Herbig, 1977). Considering that the star is surrounded by a reflecting nebula, while comparing the observational data it is necessary to notice the difference of apertures: 17" in our observations and 10" - 14" in Kuhi's observations (Kuhi, 1974). Therefore, such difference cannot be the cause of the observed decrease of brightness.

Following the picture, the decrease of E_λ within the accuracy of the observations and calibration is the same for the whole spectral region $\lambda \lambda 3300 - 8000 \text{ \AA}$. Hence, the observed decrease of brightness in 1966-1980 (by $0.^m35$) was not accompanied by the noticeable energy distribution variation in the spectrum of the star.

So, the result obtained allows to reject the hypothesis that the cooling of the star is responsible for the decrease of its brightness. Really, a simple calculation by Planck's formulae shows that, if a star with initial temperature 7500° (temperature of F2 type stars; according to the spectrum

FU Ori belongs to this class), is cooling so that at $\lambda 5500 \text{ \AA}$ $E_{\lambda 5500}$ has decreased by 40%, then $E_{\lambda 8000}$ must decrease by 26% and $E_{\lambda 3600}$ by 66%, which is noticeably different from the observed energy distribution.

Herbig (1977) supposes that the decrease of brightness of FU Ori after the flare is connected with the decrease of brightness of the reflecting nebulae surrounding these stars that agrees with our observations. The same decrease of brightness in the reflecting nebula is also observed on direct photos of the star V 1057 Cyg (Herbig, 1977). In such a case the nebula flux must contribute a significant part of the total flux registered.

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References:

- Bukach, A.B., 1979, *Izv. Crimean Astrophysical Observatory*, 60, p.197
 Charitonov, A.B., Tereshenko, W.M., Knyazeva, L.N., 1978, "Svodny spectro-photometrichesky catalog zvezd" Nauka, Alma-Ata
 Charitonov, A.B., Tereshenko, B.M., Knyazeva, L.N., Boyko, P.P., 1980, *Astronomicheskyy Journal*, 57, p. 287-295
 Herbig, G.H., 1966, *Vistas in Astronomy*, vol. 8, ed. A. Beer and K. Aa. Strand (Oxford Pergamon), p. 109
 Herbig, G.H., 1977, *Astrophys. J.*, 217, p. 693-715
 Johnson, H.L. y Mitchell, R.I., 1975, *Revista de Mexicana Astronomia y astrofisica*, v. 1, n. 3, p. 299
 Kuhi, L.V., 1974, *Astr. and Ap. Suppl.*, 15, 47
 Lagutin, A.F., 1979, *Izv. Crimean Astrophysical Observatory*, 60, p. 197

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2137

Konkoly Observatory
Budapest
1982 May 4

HU ISSN 0374-0676

PHOTOELECTRIC MINIMA OF BW DRACONIS

The short period variable BW Dra (SAO 166035) was observed during 1980 and 1981. The observations were made using a two-beam, multi-mode, nebular-stellar photometer attached to the 48-inch Cassegrain reflector at Kryonerion Astronomical Station of the National Observatory of Athens.

The B and V filters used are in close accordance to the standard ones and reduction of the observations has been made in the usual way (Hardie, 1962).

From our observations seven primary and five secondary minima have been derived. From Yamasaki's (1979) and our epochs the following ephemeris formula was found :

$$\begin{aligned} \text{Min I (Hel. J.D.)} &= 2443187.23973 + 0.^d292279163.E & (1) \\ &\pm 0.0004 & \pm 0.00000010 \end{aligned}$$

In the following Table our minima times are represented. The successive columns of the Table give : the heliocentric J.D., the residuals $(O-C)_I$, $(O-C)_{II}$, $(O-C)_{III}$ and the type of minimum.

The times of minima have been calculated by Kwee and Van Woerden's method (1956) and are the mean values from B and V observations. The ephemeris formulae used are those of Kukarkin et al. (1969), Yamasaki (1979) and our as is given by the foregoing equation (1).

2
Table I

Hel. J.D.	(O-C) _I	(O-C) _{II}	(O-C) _{III}	Min
	days	days	days	Type
2440000.+				
4728.4258	+0.0802	-0.0041	-0.0020	p
4732.3734	+0.0817	-0.0007	-0.0002	s
4732.5195	+0.0817	-0.0007	-0.0002	p
4754.4417	+0.0795	-0.0090	-0.0011	p
4754.5859	+0.0796	+0.0071	-0.0008	s
4755.3187	+0.0817	+0.0095	+0.0013	p
4755.4650	+0.0819	+0.0097	+0.0014	s
4756.3415	+0.0815	+0.0097	+0.0011	s
4756.4876	+0.0814	+0.0098	+0.0010	p
4759.4094	+0.0801	+0.0099	+0.0001	p
4760.4319	+0.0797	+0.0098	-0.0004	s
4761.4551	+0.0798	+0.0104	-0.0002	p

References:

- Hardie, R. H. : 1962, Stars and Stellar Systems, Vol. II,
Astrophysical Techniques, ed. Hiltner, W.A., The
University of Chicago Press, Chicago. pp. 178-208
- Kukarkin, B. V. et al. : 1969, General Catalogue of Variable Stars,
Moscow.
- Kwee, K. K. and Van Woerden, H. : 1956, Bull. Astron. Inst. Neth. 12,
327.
- Yamasaki, A. : 1979, Astrophys. Space Sci. 60, 173.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2138

Konkoly Observatory
Budapest
1982 May 4
HU ISSN 0374-0676

1981 UBVR PHOTOMETRY OF CG Cyg

UBVR photometric observations of the eclipsing binary CG Cyg (BD +34°4217) were made during 1981 as part of our long-term photometry program of RS CVn systems. CG Cyg is a short period (0.63 day) system that has shown evidence of period variability (Milone and Ziebarth, 1974) and a migrating distortion wave in the light curve (Milone, et al., 1979). The observations were made with the University of New Mexico's 61-cm telescope at Capilla Peak Observatory and a single-channel, photon-counting system using an EMR 641A phototube cooled to -20°C. The star +34°4216 (SAO 70728) was used as the comparison star for all observations. The nights in which observations of CG Cyg were made are listed in Table I. Phases were calculated using $HJD=2439425.1221+0.631141E$ (Milone and Ziebarth, 1974).

Table I - Phase Log of CG Cyg

<u>Date (UT)</u>	<u>Phase</u>	<u>Date (UT)</u>	<u>Phase</u>
6/10	0.03±0.20	8/20	0.25±0.52
6/22	0.89±0.09	8/24	0.76±0.96
7/5	0.49±0.78	10/10	0.16±0.28

Figures 1-4 summarize our results which are given in the instrumental UBVR system. The data has been folded in order to show the primary and secondary eclipses more clearly. Statistical errors for the data points are typically ±0.02 magnitude.

2

CG CYG (U)

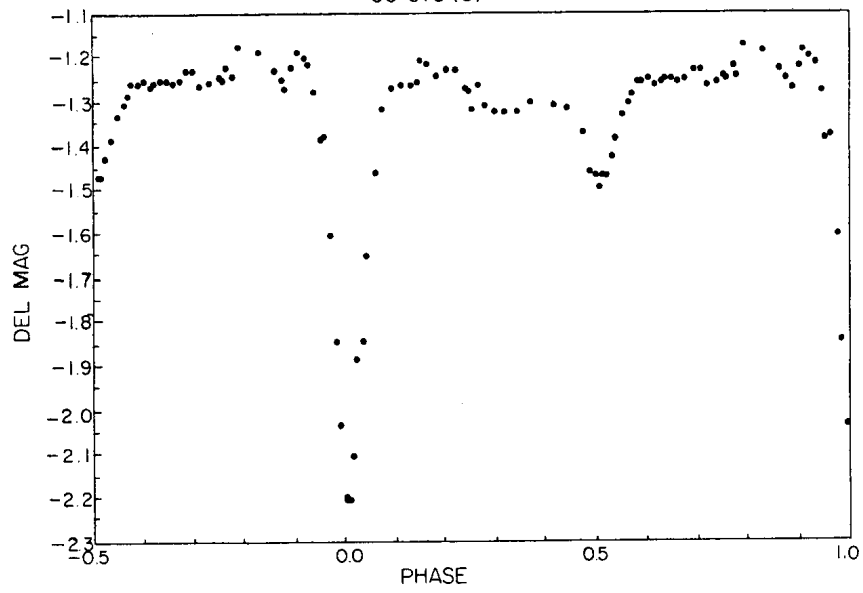


Figure 1

CG CYG (B)

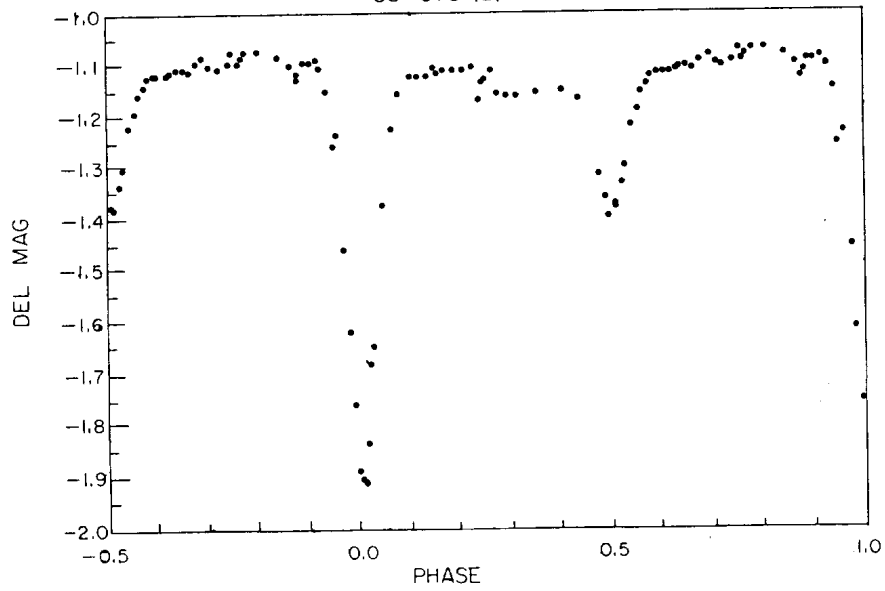


Figure 2

3

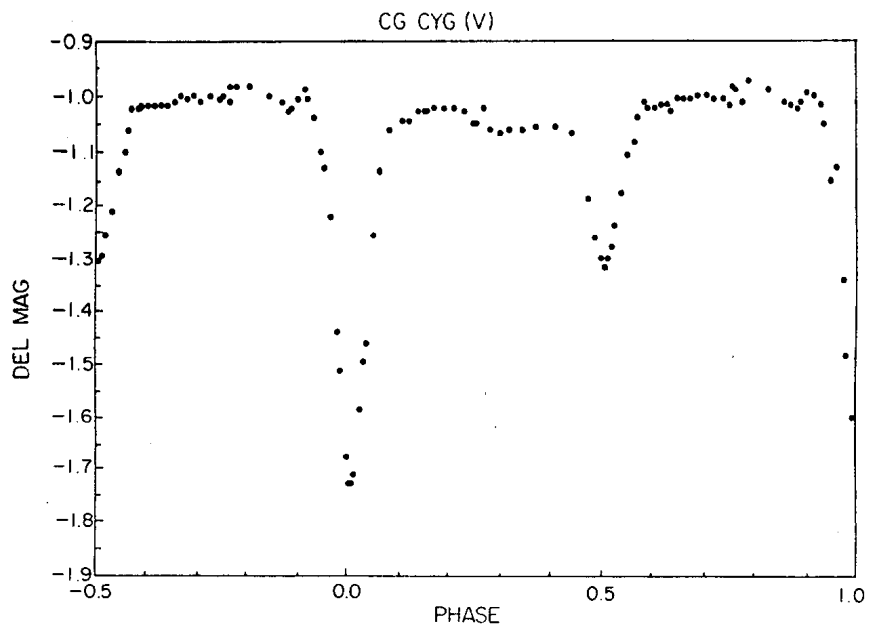


Figure 3

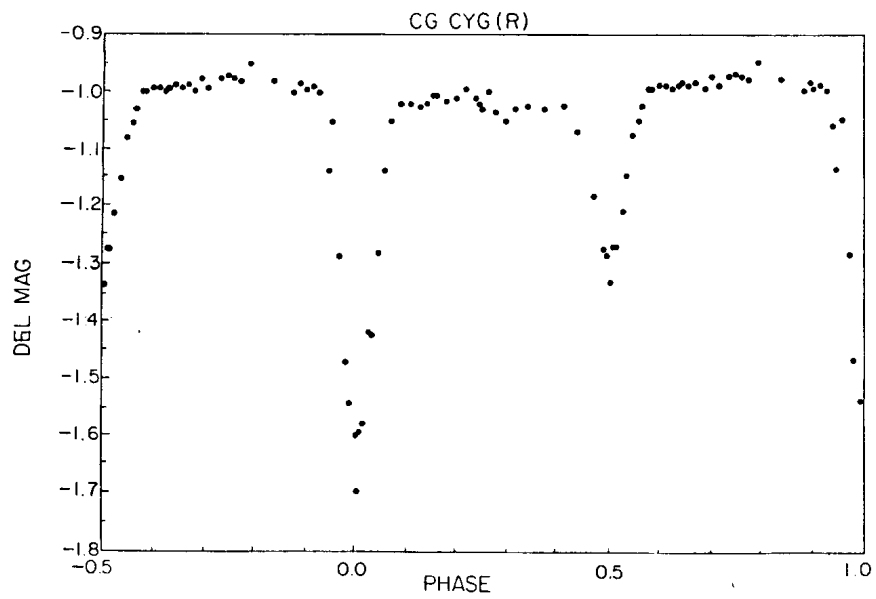


Figure 4

Milone et al. (1979) followed the behavior of CG Cyg from 1965 to 1977 and found that the distortion wave sweeps through the light curve at a rapid rate and that the mean V light level had risen 14% during this 12 year period. The V light curve presented here is similar to the Milone et al. V curve of 1967 in that the distortion wave reaches a maximum amplitude at about 0.8 phase. The same comparison star was used for both the 1967 and 1981 observations although differences between the photometric systems used (which should not be too significant) were not taken into account. We note these differences between our curve and the 1967 curve: (1) the distortion wave is not as pronounced now as in 1967 and (2) the system is markedly brighter in the 1981 curve. The secondary minimum is 0.2 magnitude brighter now than in 1967 with the portions of the curve outside of eclipse being about 0.1 magnitude brighter.

From our observations we find that the primary eclipse becomes shallower and the secondary eclipse more prominent relative to the primary as wavelength increases. The discontinuity in the light curve at 0.25 phase (best seen in Figure 2) is evidence of short-term variations (~ 2 month) in the light curve of CG Cyg.

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References:

- Jassur, D. M. Z., 1978, IBVS #1458.
 Milone, E. F. and Ziebarth, K. E., 1974, Pub. Astron. Soc. Pacific 86, 684.
 Milone, E. F., Castle, K. G., Robb, R. M., Swadron, D., Burke, E. W., Hall, D. S., Michlovic, J. E., and Zissell, R. E., 1979, Astron J. 84, 417.
 Naftilan, S. A. and Milone, E. F., 1979, Astron J. 84, 1218.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2139

Konkoly Observatory
Budapest
1982 May 7
HU ISSN 0374-0676

THE VARIABILITY OF BD+60°562

This star was chosen as a comparison star for photoelectric observations of LSI +61°303 together with two other stars, whose data are listed in Table I.

Table I. Data about the observed stars

	SP	V	B-V	U-B	Source
BD+60°562(Var)		10.02var	+0.43	+ .39	this paper
BD+60°493(A)	B 0.5Ia	8.44	+0.79	-0.30	Hiltner (1956)
BD+60°497(B)	07	8.80	+0.57	-0.48	Hiltner (1956)

The instrument used was the 60 cm telescope of Bologna Observatory equipped with the three channel UVB photometer described by Piccioni (1972).

Table II. UVB photometry of BD+60°562

JD- 2,440,000	Var - A			Var - B			Adopted mean values		
	V	B	U	V	B	U	V	B-V	U-B
4635.40	1.62	1.27	1.98	1.24	1.12	2.02	10.05	.45	.41
4638.38	1.62	1.27	1.97	1.24	1.10	1.99	10.05	.44	.40
4860.46	1.60	1.23	1.88	1.23	1.10	1.93	10.04	.43	.35
4863.43	1.57	1.21		1.22	1.08		10.01	.44	
4865.38	1.51	1.12	1.79	1.14	.96	1.87	9.95	.39	.40

In Table II we report the differences in magnitude corrected for differential extinction using mean seasonal coefficients, taking into account also the colour effects of the atmosphere. The differences in magnitude

have been transformed to the UBV international system by equations obtained from the photometry of some standard stars. On every night about 8 measurements were made; the standard error of the mean is of the order of $0^m.01$ in V and B, of $0^m.02$ in U, but in addition systematic calibration error of $0^m.03$ in V and B and $0^m.06$ in U could be produced by the transformation to UBV system.

Nothing can be guessed about the type of variability of BD +60°562; since its U-B index is positive, it is surely less reddened than the two comparison stars and it has a later spectral type.

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References:

- Hiltner, W.A.: 1956, *Astrophys. J. Suppl.* II, 389
Piccioni, A.: 1972, *Mem. Soc. Astr. It.*, 43, 159

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2140

Konkoly Observatory
Budapest
1982 May 7
HU ISSN 0374-0676

JOHNSON BVR MAGNITUDES FOR SELECTED COMPARISON STARS

In the period 1969 to 1973 a number of variables were observed photoelectrically at Stephanion Observatory in Greece with a 40 cm reflector. The filters used were sufficiently close to the Johnson BVR passbands that the measurements could be converted to Johnson magnitudes by suitable linear transformations. A description of the photometer and the reduction-method will be published by Heintze and Provoost (1983), together with a complete light curve for the eclipsing binary u Her and the comparison star magnitudes for this variable. An interpretation of the light curve of u Her has been published by Provoost (1980). For the eclipsing binaries U CrB, u Her and U Oph O-C values have been published by Van Gent et al. (1978). As a final spin-off from these observations the B, V and R magnitudes of the comparison stars used are presented, as they may be of use to future observers.

The Johnson magnitudes of the adopted reference stars will be fully documented by Heintze and Provoost (1983). For each night the instantaneous extinction coefficients (assumed to vary linear with respect to time) were determined from these reference stars, from which in turn the Johnson magnitudes of the comparison stars were calculated. Nights with significant spatial or non-linear temporal variations were excluded. The yearly means are given in Table I. Each star is identified by its HD, BD and SAO number; the mean epoch and the number of independent measurements (n) used in forming the yearly means are also given. Figures between brackets denote the inferred external standard deviations in units of 0.01 magnitude. For means determined from less than 5 observations no meaningful standard deviations can be inferred. The observations indicate that the internal standard deviation for one magnitude determination varied from 0.04 to 0.07 magnitude for 5th to 10th magnitude stars when measured in the B and V passbands. For the R passband the internal standard deviation of one observation varied from 0.03 to 0.10 magnitude. In the final column B, J and S denote refer-

Table I

	HD	BD	SAO	Epoch	n	V	B-V	V-R	
	92278	+47°1797	43423	1970.38	7	7.28(2)	0.19(3)	0.20(4)	
				1972.37	16-18	7.29(1)	0.20(2)	0.14(1)	
				mean	23-25	7.29(1)	0.20(1)	0.14(1)	B, J, S
γ Crv	106625	-16 3424	157176	1970.37	3	2.60	-0.10	-0.06	B, J, S
β Lib	135742	- 8 3935	140430	1970.38	4	2.61	-0.11	-0.04	B, J, S
	136654	+31 2724	64647	1969.39	3	6.85	0.56	0.33	
				1973.34	22	6.89(2)	0.55(3)	0.45(5)	
				mean	25	6.89(2)	0.55(3)	0.42(6)	J
	136954	+32 2575	64660	1969.39	2	8.16	1.35	0.95	
UU CrB	137050	+32 2577	64671	1969.39	14	8.63(1)	0.55(2)	0.41(2)	
				1973.34	17-20	8.64(2)	0.56(3)	0.49(3)	
				mean	31-34	8.63(1)	0.55(1)	0.43(4)	
	137147	+32 2578	64675	1969.39	7	8.05(1)	0.31(3)	0.24(3)	
				1970.38	12-13	8.07(1)	0.34(2)	0.25(2)	
				mean	19-20	8.06(1)	0.33(1)	0.25(2)	B, S
	156208	+ 2 3283	122224	1970.36	15-16	6.18(1)	0.23(1)	0.20(1)	B, S
	+39 3480	67207	1973.39	1	9.19	1.04	0.81		
	172692	+39 3485	47678	1973.39	2	7.79	0.94	0.68	
	174064	+33 3205	67382	1973.39	1	7.03	1.16	0.82	
	174296	+33 3209	67407	1973.39	2	7.05	1.37	1.02	
	174435	+23 3469	86471	1969.39	35-40	8.43(1)	0.55(1)	0.48(2)	
	174621	+43 3085	47831	1973.36	8-9	6.58(2)	0.81(3)	0.67(3)	
	174880	+43 3094	47847	1973.35	6-8	7.04(1)	1.16(2)	0.93(2)	
	+26 3479	86925	1973.39	1	8.61	1.16	1.04		
	+26 3485	86940	1973.39	2	8.10	0.99	0.78		
22 Aql	180482	+ 4 4045	124455	1970.39	10-12	5.59(1)	0.11(2)	0.08(1)	B, S
	184498	+46 2716	48573	1973.39	1	7.94	1.02	0.69	
	184938	+46 2727	48608	1973.39	1	7.17	1.06	0.71	
	+33 3625	68978	1973.39	1	7.38	1.07	1.04		
	188484	+33 3642	69052	1973.39	1	6.66	1.10	1.12	
	191998	+48 3066	49276	1973.39	1	6.60	1.14	0.84	
	192830	+47 3037	49367	1973.39	1	8.56	0.76	0.64	

ences to independent photoelectric measurements in the catalogues of Blanco et al. (1968), Jaschek et al. (1972) and the Sky Catalogue 2000.0 (Hirshfeld and Sinnott, 1982).

In general, the differences between the values given in Table I and those given in the catalogues quoted above are insignificant (less than 0.02 in V and 0.04 in B-V). The only exception is the star HD 137147 (a comparison star for U CrB) where $V = 7.95$ and $B-V = -0.29$ is quoted.

The original reference for these values (mean epoch 1957.6) is Wood (1958). The discrepancy in B-V has already been noticed by Heintze and Provoost (1983) who assume that this may either be a simple typographical error or may indicate variability. An independent determination of the colour index (c.i.) in the old Harvard Photometrical System (practically equivalent with B-V) by Wright (1937) results in $c.i. = +0.37$, presumably measured around 1935. The c.i. value from the Henry Draper Catalogue (Cannon and Pickering,

1921) is not based on independent measurements, but is derived from an assumed colour index - spectral type relation (Pickering, 1917). By comparing the B and V light curves with his quoted B-V values for U CrB it is evident that Wood (1958) intended a B-V value of +0.29 for HD 137147. Furthermore, this value, together with the observed V-R value, closely confirm to the values of $(B-V)_0$ and $(V-R)_0$ as given by Schmidt-Kaler (1965) and Johnson (1966) for the spectral type F0 of this star (Cannon and Pickering, 1921).

Small (irregular?) variations up to 0.05 magnitude have recently been noted by Olson (1980) for HD 137147. Our own data are not sufficiently precise to either confirm or negate Olson's conclusions, but the 0.1 magnitude loss in V between 1958 and 1970 seems to be real. Due to the paucity in data it is uncertain whether this decrease is secular or irregular. The photovisual magnitudes determined in the Harvard Photometrical System indicate $V = 7.9$ around 1900 and 1935, but these are of little value as the Harvard magnitudes, when reduced to the UBV system, have internal errors of 0.3 magnitude or more (Ochsenbein, 1974). It is clear that more photometrical data on HD 137147 is needed and that it should not be used anymore as a comparison star for U CrB.

For HD 137050 (another frequently used comparison star for U CrB) flare activity has been reported by Olson (1980). No flare activity was seen in our data which in total amounted to only 10.5 hours (1 night in 1969 and 3 nights in 1973). This star has recently received the designation UU CrB (Kholopov et al., 1981).

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References:

- Blanco, V.M., Demers, S., Douglass, G.G. and FitzGerald, M.P., 1968: Publ. U.S. Naval Obs. 2nd ser., 21.
- Cannon, A.J. and Pickering, E.C., 1921: Ann. Harvard Coll. Obs., 96, 52.
- Heintze, J.R.W. and Provoost, P., 1983: to be published
- Hirshfeld, A. and Sinnott, R.W., 1982: Sky Catalogue 2000.0, Sky Publ. Co. Cambridge Univ. Press, vol. 1.
- Jaschek, C., Hernandez, E., Sierra, A. and Gerhardt, A., 1972: Publ. Obs. Astron. Univ. Nacional de la Plata, ser. astron., 38.
- Johnson, H.L., 1966: Ann. Rev. Astron. Astrophys., 4, 193.
- Kholopov, P.N., Samus', N.N., Kukarkina, N.P., Medvedeva, G.I. and Perova, N.B., 1981: Inf. Bull. Var. Stars, No. 2042.
- Ochsenbein, F., 1974: Astron. Astrophys. Suppl. Ser., 15, 215.
- Olson, E.C., 1980: Inf. Bull. Var. Stars, No. 1825.
- Pickering, E.C., 1917: Ann. Harvard Coll. Obs., 80, 147.
- Provoost, P., 1980: Astron. Astrophys., 81, 17.
- Schmidt-Kaler, Th., 1965: Landolt-Börnstein Tables, Springer-Verlag, Berlin-Heidelberg-New York, Group VI, 1, p. 297.
- Van Gent, R.H., Heintze, J.R.W. and Provoost, P., 1978: Inf. Bull. Var. Stars, No. 1507.
- Wood, D.B., 1958: Astrophys. J., 127, 351.
- Wright, F.W., 1937: Ann. Harvard Coll. Obs., 89, 171.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2141

Konkoly Observatory
Budapest
1982 May 10
HU ISSN 0374-0676

CONFIRMATION OF FLARE ACTIVITY ON G9-8
BY PHOTOELECTRIC PHOTOMETRY

The nearby common proper motion stars G9-8 and G40-26 (Giclas et al. 1971) were discovered photographically to be M dwarf flare stars by Haro et al. (1975). They were subsequently named CU Cnc and CV Cnc. At least the brighter star CU Cnc shows the H α line in emission. The magnitude difference between these two stars is $\Delta V=1.39$, and the fainter component of the pair is slightly redder than the brighter one. At a separation of about 12 arc sec it was possible for us to isolate the brighter star for photoelectric high speed photometry, using a 14 arc sec diaphragm.

TABLE I

Photoelectric Flare Monitoring of G9-8

Date(UT)	Start(UT)	End(UT)	Obs. time (sec)
14 November 1981	11:04:31	11:12:46	495
14 November 1981	11:14:52	11:43:40	1728
14 November 1981	11:44:52	12:04:31	1179
14 November 1981	12:05:52	12:19:22	810
16 November 1981	09:47:13	11:13:01	5148
16 November 1981	11:14:22	11:52:28	2286

Total effective monitoring time = 11646 seconds
= 3.235 hours

We monitored CU Cnc = G9-8 on 14 and 16 November 1981 UT with the 2.1 m Struve reflector at McDonald Observatory. The detailed observing log is given in Table I. A high speed photometer controlled by a NOVA minicomputer (Nather 1973) was attached to the telescope, and one second integrations were taken successively through eight filters. In each filter the time resolution was nine seconds, due to the fixed time needed for filter changes by the stepping motor. The band-passes for which data are presented here were determined by the response function of the RCA C31034A photomultiplier and the transmission properties of the glass filters selected to approximate the UBV system. Typical measurement accuracies at the one standard deviation level for the time series in each of the filters were 0.07 (U), 0.014 (B), 0.008 (V), and 0.004 (R).

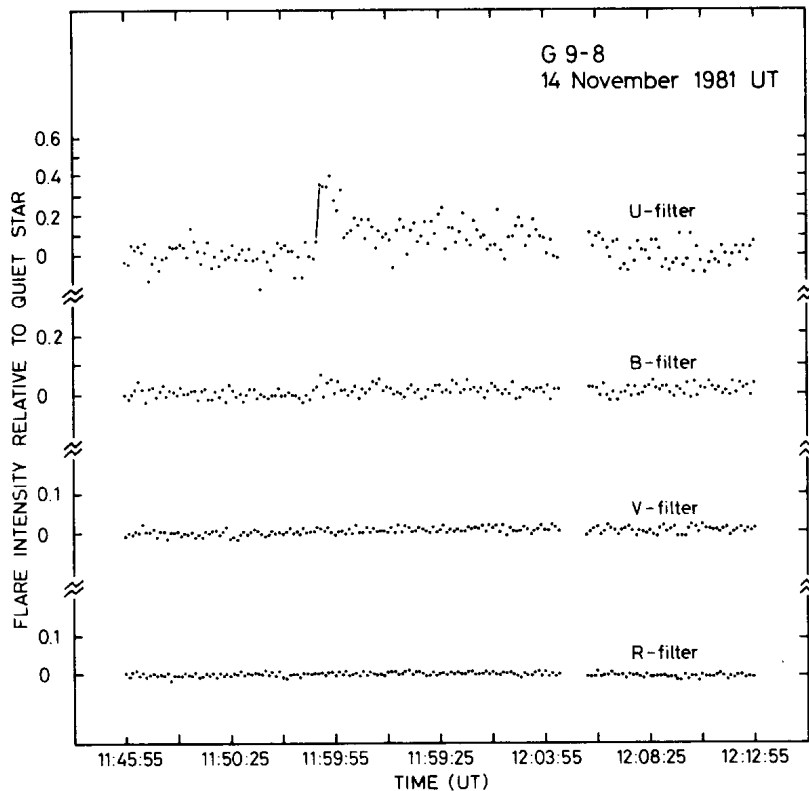


Figure 1

In 3.235 hours of effective monitoring time we detected one flare. It was distinctly recorded only in the U-filter at a peak amplitude of six standard deviations, but was marginally detected also in the B-filter. No flare was seen in V or R at an amplitude exceeding two standard deviations of the measurement

noise (Figure 1). The flare had a quick rise towards maximum and decayed back to the preflare level over 15 minutes. This observation confirms the conclusion by Haro et al. (1975) that CU Cnc is a flare star, and represents the first photoelectric light curve of a flare on this star.

It is a pleasure to thank the Director and Staff of McDonald Observatory for support and hospitality during my visit.

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References:

- Giclas, H. L., Burnham, R., Thomas, N. G., 1971, Lowell
Observatory Proper Motion Survey - The
G Numbered Stars.
Haro, G., Chavira, E., Gonzalez, G., 1975, IBVS 1031.
Nather, R. E., 1973, Vistas in Astr. 15, 91.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2142

Konkoly Observatory
Budapest
1982 May 11
HU ISSN 0374-0676

NEW MINIMUM TIMES OF THE W UMA STAR SW LACERTAE

SW Lac is well known to have a variable period (see e.g. Panchatsaram and Abhyankar, 1981 and the references therein). In 1977, a sudden period change was observed (Mikolajewska and Mikolajewski, 1981).

We made new photoelectric measurements of SW Lac in 1980 with the 75 cm telescope of the Wilhelm Foerster Observatory Berlin and in 1981 with the 106 cm and the 36 cm Cassegrain telescopes of the Observatorium Hoher List. The 75 cm telescope is equipped with a single channel, uncooled photometer with an 1P21 photomultiplier, standard UBV filters and an integrating amplifier. As integration time we used 10 seconds. The 106 cm telescope is equipped with a double beam, uncooled photometer with two 1P28B photomultipliers, standard UBV filters and integrating amplifiers. The 36 cm telescope has an uncooled, single beam photometer with an 1P21 photomultiplier, standard UBV filters and a usual DC amplifier.

From our B and V measurements, we determined five times of secondary minima by the Pogson method. They are listed in the table. The O-C values are calculated with the ephemeris of Kreiner and Frasinka (1977):

$$t_{\min,0} = 2442697^d.404 + 0^d.320724716 \cdot E \quad (1)$$

Table : New photoelectric minima times of SW Lac

Jul. Date _o	C	n	E	O-C	telescope
2444 444. ^d 5211	b	67			
			5447.5	- 0. ^d 0307	75 cm
444.5213	v	67			
816.5570	b	19	6607.5	- 0.0356	106 cm
852.4793	b	58			
			6719.5	- 0.0349	36 cm
852.4784	v	58			
853.4400	b	48			
			6722.5	- 0.0352	36 cm
853.4414	v	49			
854.4045	b	22			
			6725.5	- 0.0348	36 cm
854.4021	v	25			

C: colour, n: number of individual measurements, E: epoch according to (1). The error of each individual determination is about 0.^d0005, E and O-C are calculated for the unweighted mean values of the minima times in b and v.

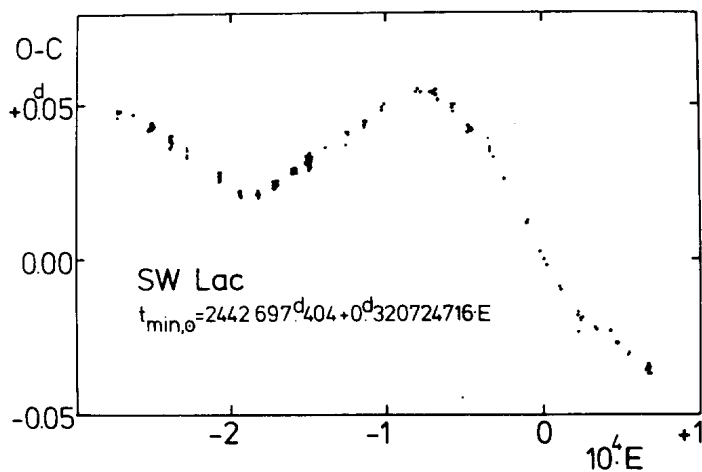


Figure 1

The figure shows the resulting O-C diagram of all (photo-electrical) minima which were collected from Panchatsaram and Abhyankar (1981), Aslan et.al. (1981), Pohl and Gülmen (1981), Margrave (1982) and the values of the table. Since the period jump in 1977, no further period change occurred. A discussion of the lightcurves will be given elsewhere.

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References:

- Aslan, Z., Asir, A., Engin, S., Tüfekcioglu, Z., Yilmaz, N.:
1981, Inf.Bull.Variable Stars No.1908
- Kreiner, J.M., Frasinke, Z.: 1977, Inf. Bull. Variable Stars
No.1285
- Margrave, T.E.: 1982, Inf. Bull. Variable Stars No.2086
- Mikolajewska, J., Mikolajewski, M.: 1981, Inf. Bull. Variable
Stars No.1953
- Panchatsaram, T., Abhyankar, K.D.: 1981, Bull. astr. Soc.
India 9.31
- Pohl, E., Gülmen, Ö.: 1981, Inf. Bull. Variable Stars No.1924

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2143

Konkoly Observatory
Budapest
1982 May 13
HU ISSN 0374-0676

PHOTOELECTRIC FLARE OBSERVATIONS OF GLIESE 867 B

The flare star Gliese 867 B was observed on 1 October 1981, as part of an international programme (Butler and Rodono 1981). The suggested interval for monitoring the star Gliese 867 B was from 17:30 to 20:00 UT. We were able to secure continuous observations of the star from 16:12 to 19:36 UT through the 104-cm Sampurnanand reflector equipped with thermo-electrically cooled EMI 6094S photomultiplier tube. The star was monitored through the U and B filters of Johnson and Morgan system. The monitoring interval through the U filter extended from 18:51 to 19:36 UT while through the B filter the intervals ranged from 16:12 to 16:31 UT and from 16:42 to 18:47 UT. Two flares were recorded during the observations through the U filter but no flare was present in the B filter observations. The stellar intensity was measured against sky background only without observing any comparison star.

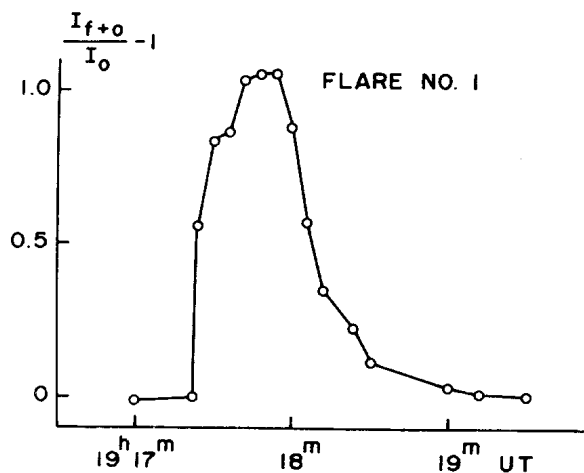


Figure 1

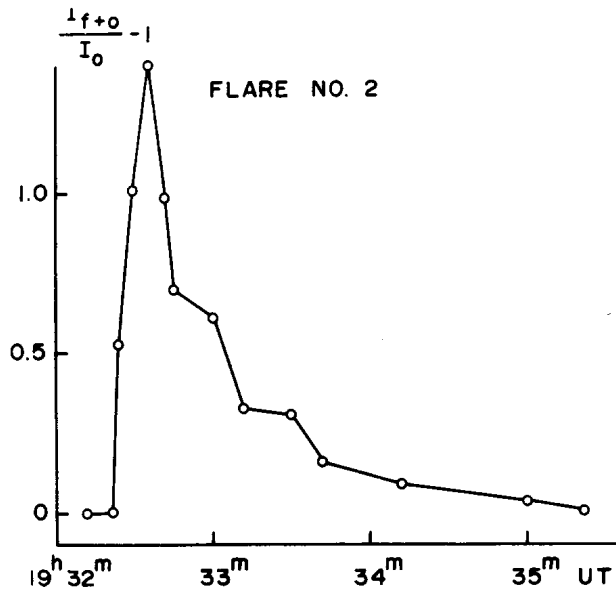


Figure 2

The light curves which represent the flow of excess radiation I_f radiated at a given moment expressed in units of flow I_0 from the star in normal non-excited state, with time, are given in Figures 1 and 2 (flare No. 1 and 2). These light curves show that they are Type I (Gurzadyan, 1980) flare events and no spikes are associated with them. Flare 1 is unusual at its maximum and the rate of development is also slow as compared to usual UV Ceti type flares. The light curve and the rate of development of flare 2 is normal of its kind.

Table I

Characteristics of the flares on Gliese 867 B (dM 4e: $V = 11^m.8$; $B-V = 1^m.61$
 $d = 8.3$ pc)

UT max	Flare duration (in minutes)		$\frac{I_{f+0}}{I_0}$	Δm_U	P (min)	F(z)	Energy released at flare max. 10^{29} ergs/s	Total emission during the event 10^{30} ergs/s
	Before max t_b	After max t_a						
19 ^h 17 ^m 9	0.50	1.6	2.05	0.78	0.82	2.22	0.45	1.08
19 ^h 32 ^m 6	0.25	2.8	2.40	0.95	0.89	2.40	0.52	1.17

Flare characteristics are given in Table I. The equivalent time of flare (P) was planimetered as the area under the light curve, to derive the total energy radiated by the flare event.

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References:

Butler, J. and Rodono, M. 1981, Private Communication.
Gurzadyan, G.A., 1980, p 9, Flare Stars, Pergamon Press.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2144

Konkoly Observatory
Budapest
1982 May 13
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF δ^2 Tau (HR 1412)

The Delta Scuti star δ^2 Tau was found to be variable by Horan (1977, 1979). This star is a member of Hyades cluster, and it is a spectroscopic binary with high eccentricity ($P = 140.7^d$, $e = 0.75$).

Photoelectric observations of δ^2 Tau were made during the period Sept. 15, 1981 - Jan. 31, 1982 at the 102 cm reflector of Merate Observatory, using a standard B filter, an ice refrigerated Lallemand photomultiplier with the integration time set at 15 s, and a semiautomatic device for setting alternatively the variable and the comparison star. The comparison and the check stars were HR 1422 and HR 1427, respectively. In order to guarantee the safety of our results, the check star was measured with the same frequency as the variable.

We have obtained a total of 1412 measurements distributed over twenty nights. The amplitude of the light curve of δ^2 Tau is variable, and the maximum amplitude observed is about 0.04 mag.

A preliminary data analysis has given the following results:

- 1) there are probably four frequencies: 13.2218, 12.3715, 16.0200 and 12.0372 c/d (in order of decreasing amplitude);
- 2) the profile of peaks of power spectrum is broad and seems to show a splitting in two components;
- 3) there is a light variation with an amplitude of about 0.015 mag on a time scale of several tens of days, which must be ascribed to the variable.

The results of the complete data analysis will be published elsewhere.

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References:

- Horan, S.: 1977, IBVS n. 1232.
Horan, S.: 1979, Astron. J. 84, 1770.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2145

Konkoly Observatory
Budapest
1982 May 17
HU ISSN 0374-0676

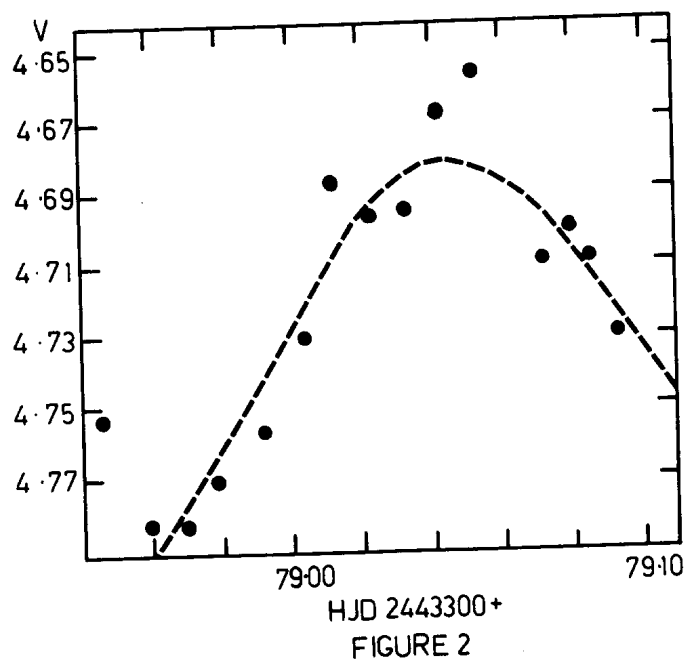
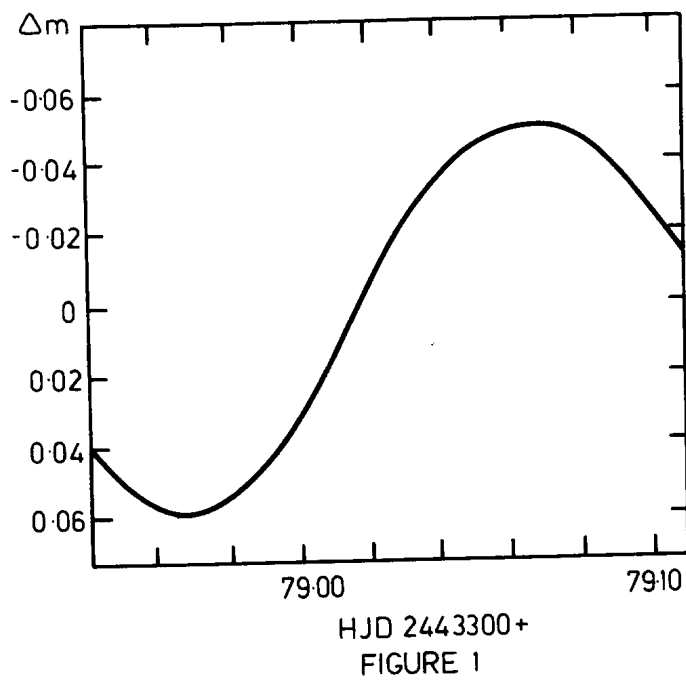
REFINEMENT OF THE FUNDAMENTAL FREQUENCY OF PULSATION
OF DELTA SCUTI

Previously unpublished photoelectric magnitudes for δ Scuti (= HR 7020 = HD 172748) are presented in Figures 2, 3 and 4. These results were taken at Mt. Arapiles in Victoria on 1977 August 23 using a 20 cm telescope, an uncooled IP21 photomultiplier tube and standard U,B,V filters. A number of standard stars were also observed; atmospheric extinction coefficients were derived ($k_V=0.17$ mag/air mass; $k_B=0.32$ mag/air mass; $k_U=0.61$ mag/air mass) and adequate transformations to the standard UB_V system established.

ϵ Scuti (= HR 7032 = HD 173009) was used as a comparison star; observed magnitude differences were corrected for differences in air mass between the variable and comparison stars then transformed to the standard UB_V system. Photoelectric V magnitude, B-V and U-B colour indices for ϵ Scuti are given by Cousins (1964); using these values and the corrected magnitude differences, the average magnitude and colour indices for δ Scuti were calculated to be $V = 4.73$, $B-V = 0.36$ and $U-B = 0.10$, in excellent agreement with average values given by Cousins and Stoy (1962). HR 7007 (= HD 172348) was used as a check star for V band measurements; the probable error in a single observation was determined to be ± 0.01 magnitude.

These data were not of sufficient precision or extent to justify analysis using Fourier techniques. However a maximum is clearly observed in all three bands at about HJD 2443379.05. Solutions for the light variation of δ Scuti are given by Fitch (1976). Using the frequencies determined by Fitch from analysis of b-magnitude measurements, we calculated the predicted light curve of δ Scuti at the time of our observations (see Figure 1). Dashed lines in Figures 2, 3 and 4 represent this predicted light curve shifted 0.02 day to the left (i.e. to earlier times). Despite the large scatter in our observations, this shifted curve is a good fit to results in all three bands.

Fitch (1976) compares the fundamental frequency of pulsation (f_0) for δ Scuti calculated from his b-magnitude measurements ($f_0=5.16070$ cycles/day)



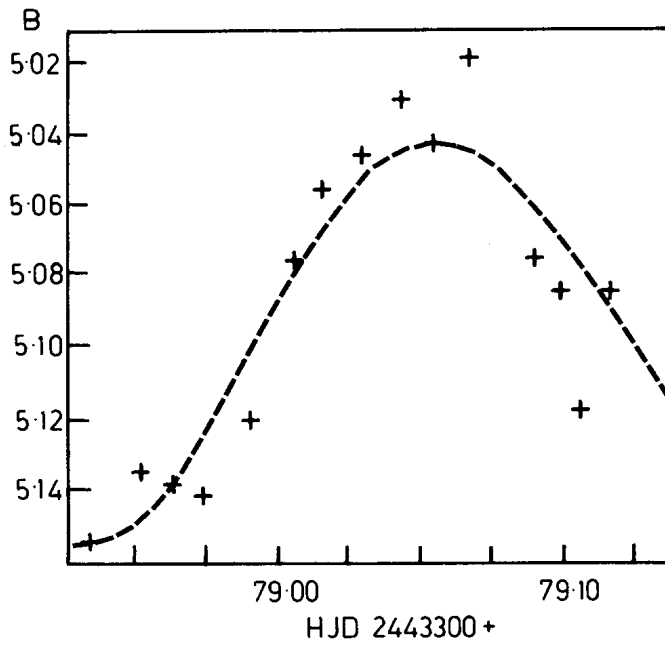


FIGURE 3

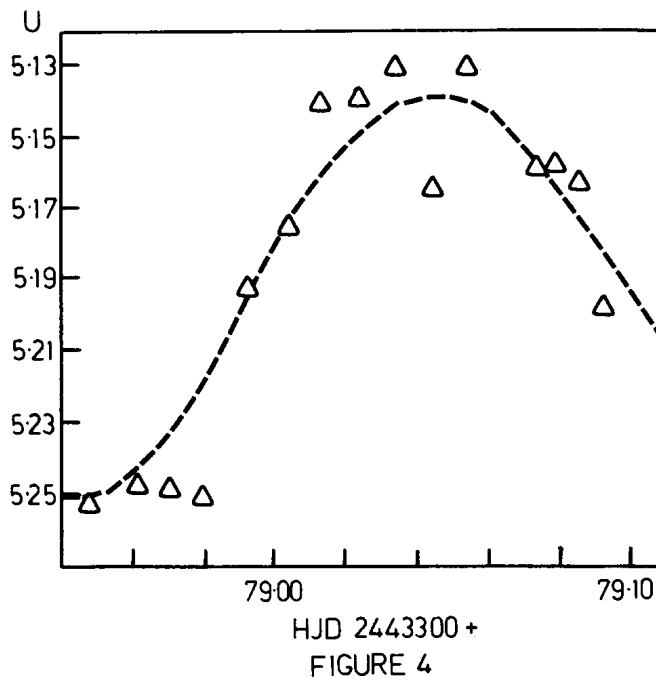


FIGURE 4

with that calculated using Fath's (1935, 1937, 1940) white light measurements ($f_0 = 5.16078$ cycles/day) and suggests that a secular change in f_0 of -0.000016 in 36 years may have occurred. He cautions that such a small difference can be explained in a number of ways including observational errors. Our observations of δ Scuti were taken 1542 days after Fitch's data for JD 2441837.

This corresponds to about 8000 cycles of the fundamental mode of pulsation of δ Scuti. Considering the extensive data collected by both Fath and Fitch and the excellent agreement in the fundamental frequency calculated from these separate sets of data, it is unlikely that our observed maximum could be shifted by one or more complete cycles from the predicted light curve. Hence agreement between the predicted light curve and Fitch's data for JD 2441837 (Fitch, 1976), and displacement of our observed maximum from the predicted maximum on JD 2443379 (0.02 ± 0.004 day) would indicate a secular change in f_0 of $+0.000013$ in $4\frac{1}{2}$ years. It appears unlikely that these apparent changes in f_0 are primarily a result of secular changes in the fundamental frequency, but can be largely attributed to observational errors.

If this is the case then we can refine the fundamental frequency of pulsation of δ Scuti using the difference in time between our predicted and observed maxima. Such a procedure yields a fundamental frequency for δ Scuti of 5.160767 ± 0.000013 cycles/day and provides a useful basis for further observations to measure secular changes in f_0 .

T. Moon is supported by a Commonwealth Government Postgraduate Research Award; M. Keay is a fourth year student in the department of Mechanical Engineering, Monash University. Thanks are extended to Professor J. A. Thomas, RAAF Physics, University of Melbourne for his supervision at the time these observations were made.

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References:

- Cousins, A.W.J.: 1964, Mon. Not. R. Astr. Soc. Sth. Africa, 23, 175
Cousins, A.W.J. and Stoy, R.H.: 1962, Roy. Obs. Bull. No. 64
Fath, E.A.: 1935, Lick Obs. Bull., 17, 175
Fath, E.A.: 1937, Lick Obs. Bull., 18, 77
Fath, E.A.: 1940, Lick Obs. Bull., 19, 77
Fitch, W.S.: 1976, IAU Colloq. No. 29, 167

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2146

Konkoly Observatory
Budapest
1982 May 17
HU ISSN 0374-0676

HD219634 - A MASSIVE NEW ECLIPSING BINARY

HD 219634 = HR8854 is a known spectroscopic binary (Pub. D.D.O. 1, 71, 1939) for which an orbital solution has not, as yet, been published. Extensive spectroscopic observations of the star have been made by Hube during the past 8 years using the 1.88m reflector and the Cassegrain spectrograph (reciprocal dispersion 15 \AA mm^{-1}) at the Dominion Astrophysical Observatory, Victoria. An orbital solution based on approximately 80 radial velocities gives a circular orbit of period 2.3912 days and, of particular relevance to the following discussion, a mass function of $0.16 \text{ } \odot$. The large value of the latter led us to suspect that the system might be eclipsing.

On August 21, 1980, Lowe observed the star using a photon-counting photometer equipped with an EMI9502S photomultiplier on the 0.5m telescope at the Devon Observatory. He detected a primary eclipse but relatively poor sky conditions and the brevity of the observing session necessitated confirmatory observations.

On 6 nights in November 1981, Gulliver obtained differential U,B,V photometry using the #3 0.4m telescope and a photon-counting system equipped with a cooled RCA 1P21 photomultiplier at the Kitt Peak National Observatory. Portions of two primary and two secondary eclipses, plus two out-of-eclipse phase intervals were observed. The Kitt Peak data are presented in Figure 1, where the magnitudes are taken differentially with respect to HD 220057, and the phases are measured from the time of nodal passage, $T_0 = \text{JD } 2443334.945$.

We note that there are significant night-to-night variations in the light curves. In particular, the two sets of data obtained during primary eclipses are displaced relative to one another by approximately $0^m.02$ in V and $0^m.01$ in B. We

believe that this represents an intrinsic variation in HD 219634 itself, but we cannot at this time completely rule out the possibility that it is due in part to a variable comparison star — HD 220057 has a spectral type B2IV and is, therefore, in or close to the β Cephei instability region.

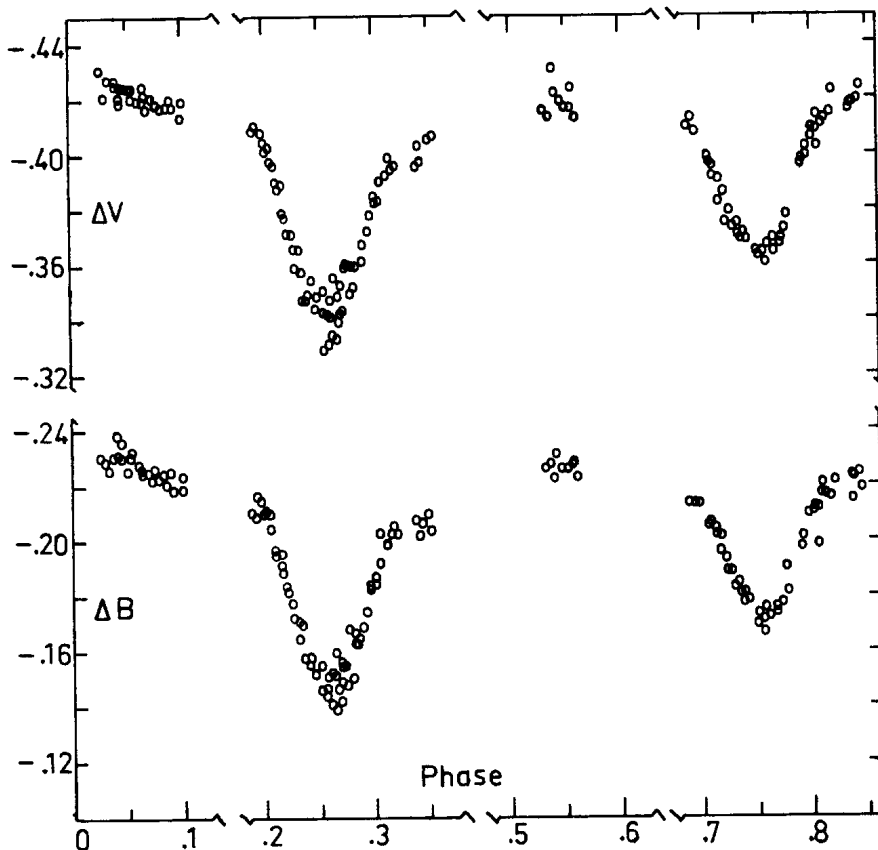


Figure 1

We classify HD219634 as B0Vn in agreement with Cowley (1972). The HD spectral type is B8. The difference in classification is due to the very strong interstellar CaII K-line. The interstellar reddening amounts to approximately $0^m.53$ in (B-V).

The secondary component has not been detected spectroscopically. The B0Vn primary should have a mass of approximately $17 \odot$ (Allen, 1972). Adopting $i \sim 90^\circ$ and $F(M) = 0.16$, we find a secondary mass of approximately $4 \odot$ which, for a normal dwarf, corresponds to a spectral type of approximately B8.

Finally, we note that HD219634 lies on the edge of the error box of the as-yet-unidentified X-ray source 4U2316+61 (Forman et al, 1978). The available spectroscopic and photometric data are suggestive of a strong interaction, including tidal distortions and mass exchange, between the two components and, perhaps, a possible source of X-radiation.

Details of the spectroscopic and photometric observations will be published elsewhere.

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References:

- Allen, C.W.: 1972, *Astrophysical Quantities* (The Athlone Press, London).
- Cowley, A.P.: 1972, *Astron. J.* 77, 750.
- Forman, W., Jones, C., Cominsky, L., Julien, P., Murray, S., Peters, G., Tananbaum, H. and Giacconi, R.: 1978, *Astrophys. J. Suppl.* 38, 357.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2147

Konkoly Observatory
Budapest
1982 May 17
HU ISSN 0374-0676

REDISCUSSION OF NOVA CrA 1981 DISTANCE

Caldwell (1981) estimated the distance to Nova CrA 1981 ($\ell = 358^\circ$, $b = -14.4^\circ$) but several developments have since indicated that a re-evaluation of its probable distance is called for. These are, firstly, that the author misconstrued how to apply the nova t_2 calibration to begin with, secondly, that Honda has revised his discovery m_V by half a magnitude (Kozai, private communication), thirdly, that Duerbeck (1981) has recalibrated the nova ($M_V : \log t_{3,V}$) relation, and fourthly, that Brosch (1981a-c) has also estimated the nova distance, using probably too large an intrinsic maximum brightness.

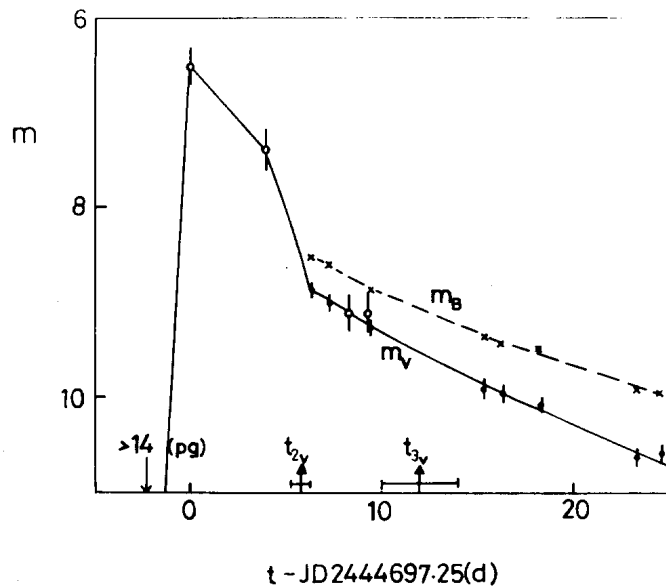


Figure 1
Light curve of Nova CrA 1981

Figure 1. gives the V (and partial B) light curve, with revised $m_{V,MAX}$ of 6.5, from the sources Gilmore (1981), Kozai and Kosai (1981, revised in private comm.), Cragg (1981, confirmed in private comm.), Mattei (1981), Vrba and Rydgren (1981), and Caldwell. The error bars shown are ± 0.2 for visual and ± 0.1 for photoelectric photometry; the latter arises principally from the system transformation uncertainty, while the former is intended to cover the scale uncertainty but not the transformation error, which may well be larger.

Brosch estimated the local Galactic extinction in the direction toward the nova as A_V (at 0.5 ± 0.12 kpc) = 0.32 ± 0.13 from Klare and Neckel's (1977) work. It may be noted that this extinction is slightly lower than that implied by the global absorption model used earlier by Caldwell, namely A_V (at 0.5 kpc) = 0.44. Rescaling that model to fit Brosch's information then yields A_V (at nova) = 0.45 ± 0.16 for the full path length through the disk towards the nova.

In the most recent treatments of the nova absolute magnitude calibration, three methods appear, namely the Duerbeck ($M_V : \log t_{3,V}$) plot, the Pfau (1976) ($M_B : \log t_{3,B}$) regression, and the Pfau $M_{15,B}$ standard magnitude. In Duerbeck's plot, Nova CrA, with $\log t_{3,V} = 1.08 \pm 0.08$ would fall securely into the Group I (very fast or fast novae), which is characterized by $\log t_{3,V} = 1.08 \pm 0.28$ (disp.) From his tables one further obtains that M_V (Group I)

= -9.2 ± 0.5 (disp.), excluding the two most extreme "outriders," or -9.2 ± 1.0 including them. The result follows that $m_V - M_V - A_V = 15.25 \pm 0.55$ (from $M_V : \log t_{3,V}$).

Pfau's work leads to two rather smaller modulus estimates, but not significantly so given the errors. His ($M_B : \log t_{3,B}$) regression, combined with Duerbeck's $B-V_{MAX} = 0.35 \pm 0.15$ and our derived $\log t_{3,B} = 1.36 \pm 0.07$, implies $m_B - M_B - A_B = 14.5 \pm 0.55$ (from $M_B : \log t_{3,B}$). His $M_{15,B}$ figure of -5.74 ± 0.60 , combined with our derived $m_{15,B} = 9.3 \pm 0.1$, implies $m_B - M_B - A_B = 14.45 \pm 0.65$ (from $M_{15,B}$). Combining the three results and using the dispersion as a conservative estimate of the uncertainty, one obtains $m - M - A = 14.8 \pm 0.5$, along with the further results for Nova CrA 1981 given in Table I.

TABLE I: PARAMETERS OF NOVA CrA 1981

t_0	JD2444697.25
$t_{2,V}$	5.8 ± 0.5 d
$t_{3,V}$	12 ± 2 d
$m_{V,MAX}$	6.5 ± 0.2
$M_{V,MAX}$	-8.75 ± 0.5
A_V	0.45 ± 0.16
r	9 ± 2 kpc

The almost exact agreement between this distance, 9 ± 2 kpc, and the Brosch result of 9.1 kpc (when $m_{V,MAX}$ is updated to 6.5), is deceptive because he has adopted estimates for the nova intrinsic brightness and for the total interstellar extinction which we think are large overestimates that happen to cancel. Brosch adopted a total A_V (at nova) of 1.7 magnitudes, as inferred from the H α :H β Balmer decrement, and attributed the extra 1.4 magnitudes (beyond the .3 in the local disk) to absorption by interstellar matter within the central bulge of the Galaxy ($z \sim -2.3$ kpc). High absorption arising in circumstellar dust was not favored (Kunkel and Rydgren). One may object to Brosch's high extinction figure, firstly, because the H α :H β decrement may well not yield a valid A_V for reasons discussed in Walker et al. (1979), Feast and Glass (1980), and Grinin (1980), and, secondly, because there is reason to believe the spheroidal population II to be nearly free from obscuring material.

On the other hand Brosch adopted an absolute magnitude for the nova at maximum of $M_V = -10$, on the basis of the spectral similarity of Nova CrA to Nova Cygni 1975; Duerbeck had obtained $M_V = -10.1$ for the latter. Nova Cygni 1975, by all accounts the most extreme example of its class (fast novae) yet observed in the Galaxy, had $t_{2,V}$ and $t_{3,V}$ of 2.5 and 3.6 ± 0.1 d, respectively. This is to be compared to $t_{2,V} = 5.8 \pm 0.5$ and $t_{3,V} = 12 \pm 2$ d for Nova CrA (Figure 1.), which suggests that Nova CrA is more plausibly an "average" Group I nova or about 1 fainter than Nova Cygni 1975 at maximum.

In summary, the similarity between our estimate and Brosch's, both placing Nova CrA in the central bulge of the Galaxy, comes down to the fortuitous circumstance that $\langle M_V + A_V \rangle_{\text{Cald}} = (-8.75 + .45) = (-10 + 1.7) = \langle M_V + A_V \rangle_{\text{Brosch}}$. We hope it has been useful to rediscuss the determination of a distance for Nova CrA 1981, firstly, to point out that it need not have been exceptionally luminous for its decay time, and, secondly, to give some indication of the uncertainties that can arise in a specific practical case of finding a nova distance.

I wish to thank Noah Brosch for a preprint, Patricia Whitelock and A W J Cousins for useful discussions, and anonymous referees for helpful criticisms.

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References:

- Brosch, N. 1981, I.A.U. Circ. 3601.
 Brosch, N. 1981, I.B.V.S. 2003.
 Brosch, N. 1981, "Spectrophotometry of Nova Coronae Austrinae 1981,"
 Astron. Astrophys. in press.
 Caldwell, J.A.R. 1981, I.B.V.S. 1981.
 Cragg, T. 1981, I.A.U. Circ. 3590.
 Duerbeck, H.W. 1981, P.A.S.P. 93, 165.
 Feast, M.W. and Glass, I.S. 1980, Obs. 100, 208.
 Gilmore, A.C. 1981, I.A.U. Circ. 3591.
 Grinin, V.P. 1980, Bull. Crimean Ap. Obs. 62, 42.
 Kozai, Y. and Kosai, H. 1981, I.A.U. Circ. 3590.
 Mattei, J. 1981, I.A.U. Circ. 3594.
 Pfau, W. 1976, Astron. Astrophys. 50, 113.
 Vrba, F.J. and Rydgren, A.E. 1981, I.A.U. Circ. 3604.
 Walker, G.A.H., Speers, G.E., Pritchett, C., and Glaspey, J.W.
 1979, P.A.S.P. 91, 446.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2148

Konkoly Observatory
Budapest
1982 May 19
HU ISSN 0374 - 0676

PHOTOMETRY OF THE SHELL STAR BU Tau (PLEIONE) 1980 - 1982

This note continues our report on the photometric behaviour of the shell star BU Tau (Hopp, Witzigmann, 1980). BV measurements were collected during 12 nights with the 75 cm telescope of the Wilhelm Foerster Sternwarte, Berlin in the same manner as described in our previous note. In addition, one of us (UH) made UBV photometry with the 36 Cassegrain telescope of the Observatorium Hoher List during 7 nights. This telescope is equipped with an uncooled 1P21 photomultiplier, a conventional DC amplifier, standard UBV filters, two small band interference filters centered on 403 nm and 419 nm, respectively, and one broad band filter combination centered on 470 nm (G of the RGU system). As comparison stars served some bright Pleiades stars, especially 21, 22, and 27 Tau were always used. Magnitudes and colours of the stars are taken from Johnson and Mitchell (1958).

Our new values are given in the table, n is the number of individual measurements per colour of BU Tau. The B lightcurve of Sharov and Lyuty (1976), updated by our own measurements and by new observations of these authors (1981) is shown in Figure 1.

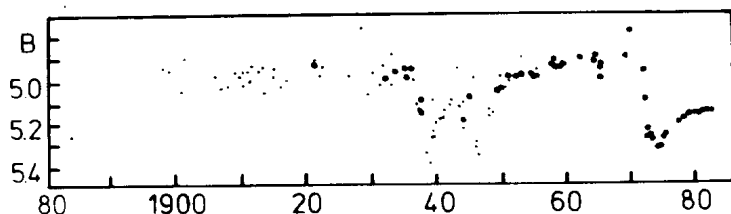


Fig. 1: The B lightcurve of BU Tau from 1980 to 1982. Small dots are photographic, large dots are photoelectric observations.

Table: UBV values of BU Tau 1980 - 1982

Jul. Date	V	B-V	U-B	n
244 4490 ^d	5. ^m 21	-0. ^m 03	-0. ^m 14	2
4489	5.21	-0.05	-0.16	3
4544	5.19	-0.02		2
4570	5.22	-0.05		3
4590	5.20	-0.07		2
4602	5.26:	-0.12:	-0.12	1
4644	5.20	-0.04		2
4647	5.20	-0.04		2
4662	5.21	-0.05		3
4852	5.19	-0.01	-0.14	2
4853	5.23	-0.04	-0.03	1
4872	5.16	-0.02	-0.14	2
4906	5.20	-0.01		3
4968	5.11	-0.05	-0.06:	5
5001	5.13	-0.04		5
5020	5.19	-0.04		1
5022	5.23	-0.03		3
5036	5.20	-0.03		4
5037	5.19	-0.04		4

Accuracy: $V \pm 0.^m01$, $B-V \pm 0.^m01$, $U-B \pm 0.^m02$

During September 1980 and 1981, we used also the additional three filters at the 36 cm telescope to make a multicolour photometry of BU Tau and some bright Pleiades members relative to the star 19 Tau. As example, we show in Figure 2 the measurements of Sept. 7, 1980. From these measurements, we conclude that BU Tau has an unusual great Balmer jump compared to stars of the same spectral type and luminosity class. If we use 16 or 18 Tau as standard, BU Tau has a deficit of about 0.27 in U. On Sept. 6, 1980, also a digital spectrogram was obtained with the grating spectrograph at the 106 cm Cassegrain telescope of the Observatorium Hoher List by means of a two dimensional SIT-vidicon detector system (EG & G-Instruments Optical Multichannel Analyzer OMA 2). For details of the OMA 2 system and the data reduction, see e.g. Geyer (1981).

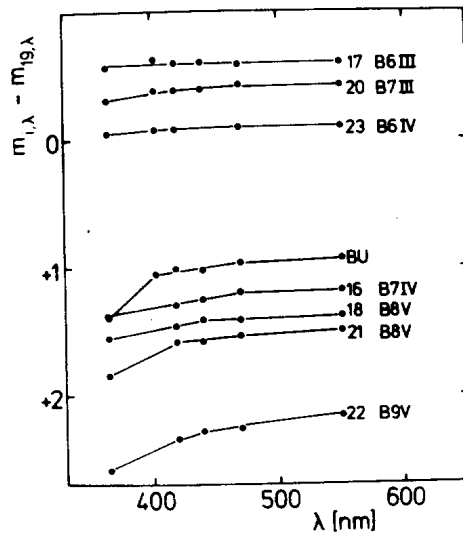


Fig. 2: Relative spectrophotometry of BU Tau and seven bright Pleiades members in comparison to 19 Tau. Star numbers, spectral types and luminosity classes are indicated. 19 Tau is of type B6V.

Figures 3a, b show the background but not flatfield corrected blue ($\lambda\lambda 376$ to 492 nm) and yellow-red ($\lambda\lambda 550$ to 660 nm) spectra of BU Tau with a total observing time of 14 sec in comparison to a 1.5 sec blue spectrum of α Lyrae taken with the same equipment under identical conditions but with nearly closed spectrograph slit. The spectral resolution of these spectra is roughly 0.3 nm.

Besides a number of absorption lines of HeI, NaI, CaII, FeII, SiIII, TiIII and CrII which can be identified, we see only H_α in emission ($\lambda_\lambda = 10.7 \text{ \AA}$), H_β in absorption with imbedded, redshifted emission feature and $H_\gamma - H_{10}$ in pure absorption. In Figure 4 enlarged portions of the H_3 to H_5 lines of BU Tau are shown.

From all the observations presented here, we conclude that the BU Tau shell episode which started in 1973 still goes on.

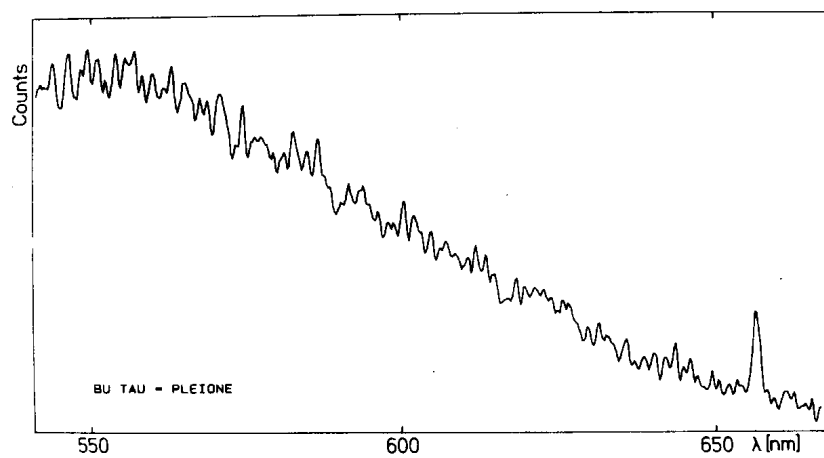
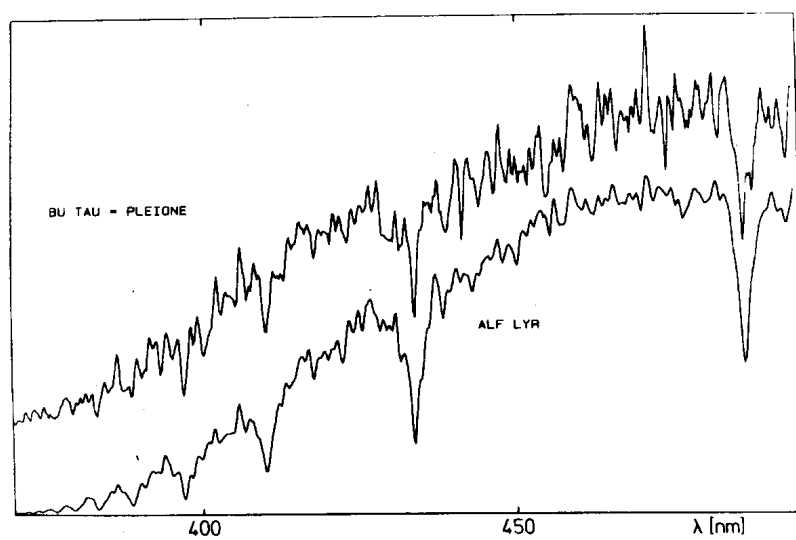


Fig. 3ap: Blue and yellow-red spectral features of BU Tau and α Lyrae.

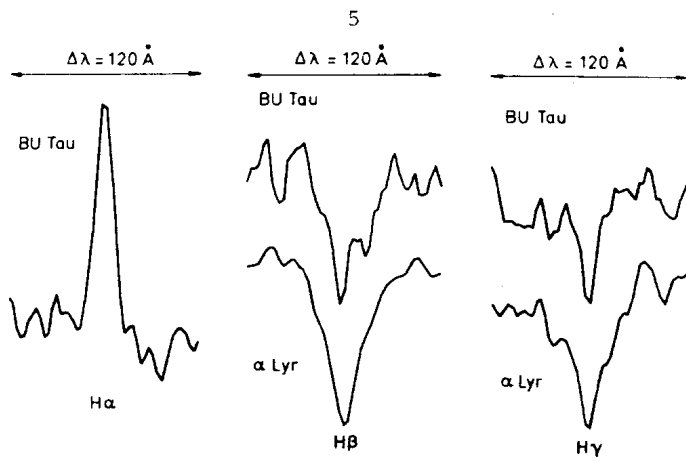


Fig. 4: Enlarged portions of the emission/absorption H_3 to H_5 - lines of BU Tau and α Lyrae.

Acknowledgement: E.H.Ge. acknowledges support for the OMA detector system by grant Ge 209/11-2 of the Deutsche Forschungsgemeinschaft.

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References:

- Geyer, E.H.: 1981, Mitt. A.G. 54, 228
Hopp, U., Witzigmann, S.: 1980, Inf.Bull.Variable Stars 1782
Johnson, H.L., Mitchell, R.I.: 1958, Astrophys. J. 128, 31
Sharow, A.S., Lyuty, V.M.: 1976, in IAU Symp. 70, 105, ed. A. Slet-
tebak, D. Reidel Publ. Co., Dordrecht
Sharow, A.S., Lyuty, V.M.: 1980, Astron. Tsirk 1119, 1

COMMISSION 27 OF THE I. A. U.
 INFORMATION BULLETIN ON VARIABLE STARS
 Number 2149

Konkoly Observatory
 Budapest
 1982 May 19
 HU ISSN 0374 - 0676

FLARE STARS IN THE PRAESEPE REGION

The re-examination of all the multiple exposure photographic material obtained during the years 1972 - 74 on the Praesepe region has been carried out. The observations were made with the 24" Schmidt telescope of Konkoly Observatory and with the 40" Schmidt telescope of Byurakan Observatory.

Seven flare-ups were discovered. The data of the discovered flare stars are presented in Table I: the first column give the number of flare, columns two and three gives the approximate coordinates for 1900.0, column four gives the minimum brightnesses in U - band, column five gives the observed amplitude of the flare-ups in U - band, column six the date of the flare-ups and column seven gives the remarks.

Table I

N.	R.A.	D.	M_u /min/	ΔU	Date	Remarks
1*	8 ^h 28 ^m 45 ^s	19° 36' 06"	16 ^m .5	1 ^m	21.01.72	103a0 + UG 1
2**	8 28 45	19 36 06	16.5	4 ^m .5	18.02.74	103a0 + UG 1
3**	8 28 47	19 35 51	14	2.5	09.12.72	ZU - 2 + UG 2
4**	8 32 31	19 49 04	14.5	3.5	24.03.74	ZU - 2 + UG 1
5*	8 32 36	20 34 44	>17	>2	23.03.73	103a0 + UG 1
6*	8 33 08	20 12 40	18	2.5	21.01.72	103a0 + UG 1
7*	8 40 05	20 12 33	>17	>2.5	23.03.73	103a0 + UG 1

* 24" at Konkoly Obs.

** 40" at Byurakan Obs.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2150

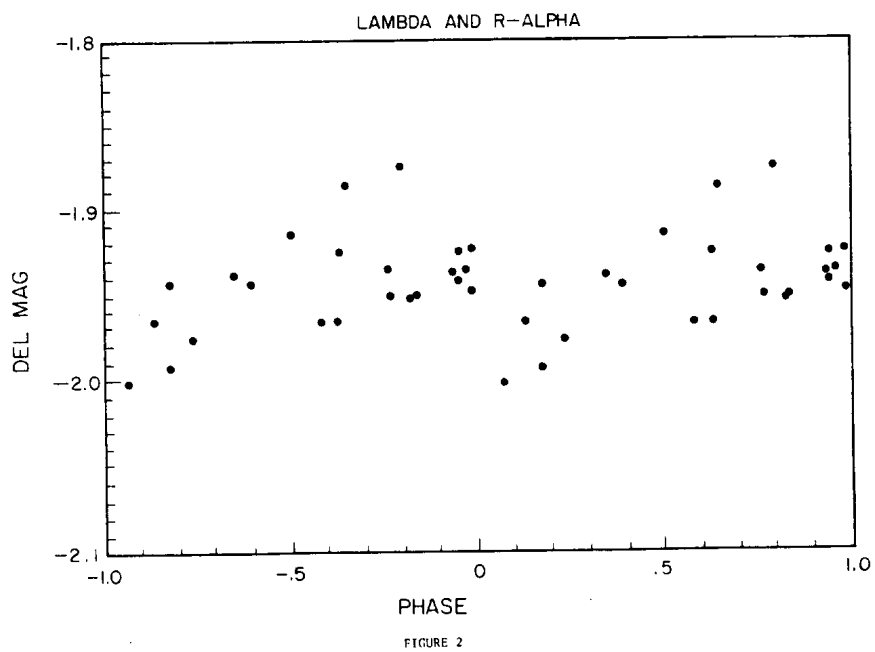
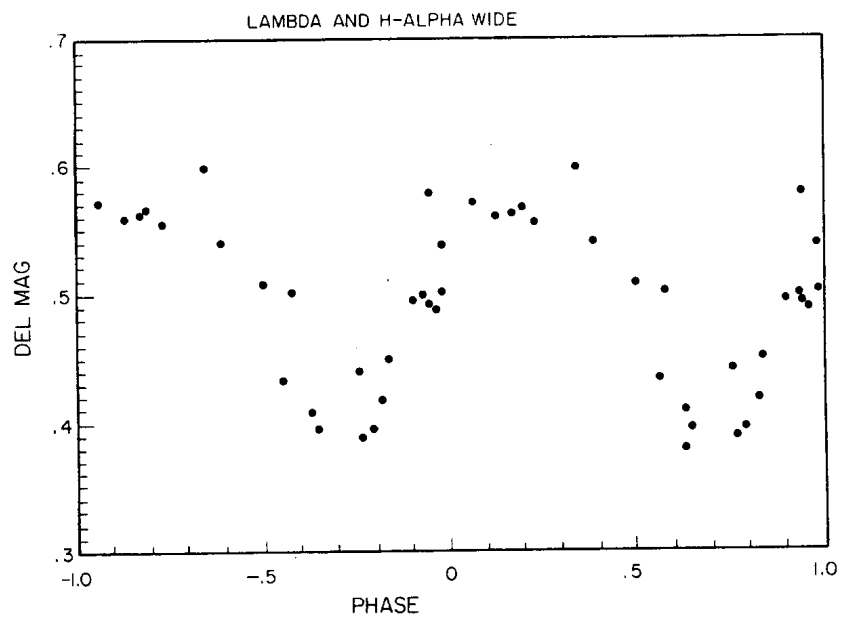
Konkoly Observatory
Budapest
1982 May 24
HU ISSN 0374-0676

H-ALPHA PHOTOMETRY OF LAMBDA ANDROMEDAE

As part of our program of photometric observations of RS CVn stars, we have observed the long-period (54.2 day) RS CVn star 2 And. The observations were made in the fall of 1981 using the University of New Mexico's 61-cm Capilla Peak Observatory. A computer-controlled, single-channel, photon-counting photometer with an EMR 641A phototube (cooled to -20°C) was used for all the observations. Photometric observations were made using a KPNO H-alpha filter set in a temperature-regulated filter slide. The KPNO filter set consists of a narrow band and intermediate band filter, both centered on the H-alpha line. The intermediate filter has a central wavelength at 6558\AA and a full-width at half maximum of 176\AA . The narrow band filter is centered at 6565\AA with a full width at half maximum of 32\AA . The star 7 And was used as the comparison for all observations.

Lambda And, 7 And, and the sky were each observed through both the narrow and intermediate band filters during the course of each observational cycle. Integrations were typically made so that an S/N of 100 was achieved, as checked in real time on the computer. The sky counts were subtracted and instrumental magnitudes were calculated. Figures 1 and 2 summarize the results of the observations. Figure 1 gives the intermediate band differential magnitude between Lambda And and 7 And. Figure 2 shows the R-alpha index of Lambda And. The R-alpha index is the difference between the narrow band and the wide band magnitudes of a single star. Phases for figures 1 and 2 were calculated using $\text{HJD}=2443126.5+54.2\text{ E}$ (Landis et al., 1978). The R-alpha index of 7 And was also monitored as a stability check for the filters and the photometer. The R-alpha index of 7 And was found not to vary in any systematic way over the course of the observations and had a mean value of -1.928 ± 0.007 .

Lambda And is a member of the long-period group of RS CVn binaries. It is a single-line binary with an orbital period of 20.5 days (Walker, 1944). The primary is classified as G7-G8 IV-III. Lambda And displays a photometric dis-



tortion wave with an amplitude of about 0.2 mag. The distortion wave is not periodic but successive maxima occur at intervals which range from between 48 and 57 days (Archer, 1960; Landis et al., 1978). Lambda And, like all RS CVn stars, shows strong CA II H and K emission. Eilek and Walker (1976) found that the H and K emission was highly variable. They also found that the H and K emission may have some correlation with the 56-day photometric period, with the maximum H and K intensity occurring at the minimum system intensity. Lambda And is also a radio source being first detected by Bath and Wallerstein (1976).

Our observations indicate the H-alpha emission of Lambda And is correlated with the continuum intensity of the system. The intermediate band differential magnitudes given in Figure 1 represents the continuum emission of the system. The R-alpha index shown in Figure 2 represents the H-alpha intensity of the system. These observations show that the maximum H-alpha emission occurs at the minimum light of the system. This type of correlation between H-alpha intensity and total system intensity can be explained very well by a model in which cool star spots cause the photometric distortion. In a situation analogous to sun spots, the star spots would have stronger H-alpha emission than the surrounding surface. As star spots cover more of the visible surface of the star the total visible light emitted would decrease but because the star spots have stronger H-alpha emission the H-alpha emission would increase.

H-alpha photometry provides a very sensitive probe of stellar surface temperatures. Also, it provided a probe for the detection of circumstellar matter. We hope to extend our program of H-alpha photometry to other RS CVn systems to find if the behavior of Lambda And is common among systems of this type.

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References:

- Archer, S., 1960, J. Brit. Astr. Assoc. 70, 95.
- Eilek, J. and Walker, G., 1976, PASP 88, 137.
- Bath, G. and Wallerstein, G., 1976, PASP 88, 259.
- Landis, H. et al., 1978, Astron. J. 83, 176.
- Walker, E. C., 1944, J. R. Astron. Can. 38, 249.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2151

Konkoly Observatory
Budapest
1982 May 25
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATION OF W UMa (BD+56°1400)

This well known eclipsing variable has been observed for the last four months. Here we present the latest light curve obtained on April 6, 1982 at the Ege University Observatory, Izmir. The 48 cm cassegrain telescope and a single channel unrefrigerated photometer was employed. In Figure 1, the light curves obtained in B and V colours respectively are presented. The phases were calculated according to the light elements:

JD Hel Min I 2444986.3624 + 0.33363808d.

The minimum times are,

JD Hel Min I 2445066.4356

JD Hel Min II 2445066.2689

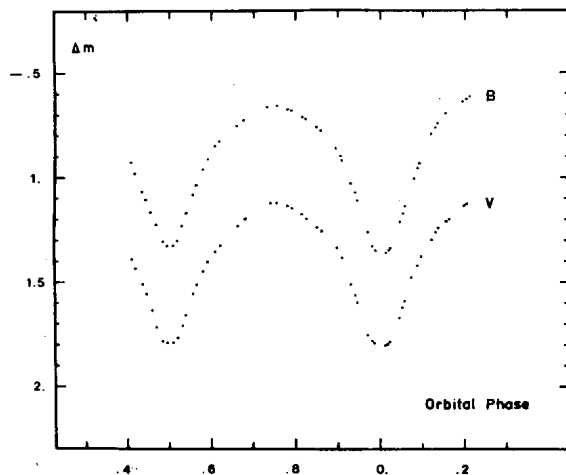


Figure 1

The light curves of W UMa in B and V colours, obtained on April 6, 1982

In this time of the observing season the primary minimum comes first and the secondary one appears later, therefore in order to present a continuous light curve the secondary minimum is drawn first.

Acknowledgement; E.H. is grateful to T.Ü.B.İ.T.A.K.

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COMMISSION 27 OF THE I. A. U. INFORMATION BULLETIN ON VARIABLE STARS

Number 2152

Konkoly Observatory
 Budapest
 1982 May 28
 HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF 20 Leo (HR 3889)

20 Leo is a spectroscopic - visual triple system in which a component is a δ Scuti variable star; the photometric variability was discovered by Danziger and Dickens (1967) and Elliott (1974). Fekel and Bopp (1977) have shown that component A is a spectroscopic binary ($P = 4.15$ d) consisting of two nearly equal, perhaps marginal Am stars, and the visual companion B ($P \sim 200$ y) is the δ Scuti star. The three stars have nearly like mass, rotational velocity and evolutionary state.

Elliott (1974) has found photometric variability with a period of about 0.082 d; he reports that little evidence was found for beats, and the amplitude ΔV of the light curve is ~ 0.02 mag.

Table I

J.D.Hel.	ΔV	σ	n	J.D.Hel.	ΔV	σ	n
2445031.371	1.286	.002	4	2445031.484	1.292	.002	3
.392	1.294	.001	6	.496	1.291	.004	6
.403	1.284	.003	6	.507	1.291	.003	6
.415	1.286	.003	5	.518	1.288	.004	5
.426	1.290	.002	4	.528	1.291	.001	4
.437	1.296	.002	5	.537	1.291	.005	6
.449	1.296	.004	6	.548	1.300	.004	6
.458	1.295	.001	4	.559	1.290	.006	6
.466	1.294	.001	4	.570	1.285	.005	6
.476	1.290	.002	6	.579	1.291	.006	4

We have observed 20 Leo during the night of March 2, 1982 at the 102 cm reflector of the Merate Observatory; we have used a standard V filter, a Lallemand photomultiplier and a Weitbrecht-Gardiner amplifier. The comparison (CF) and the check (CK) stars were HD 84739 and 84497, respectively. The results of the observations are reported in Table I and Figure 1. One can see that the variability of 20 Leo is small during the whole observing time; the amplitude is of order 0.01 mag and the curve does not seem to be regular. If we compare our results to Elliott's ones, we can conclude

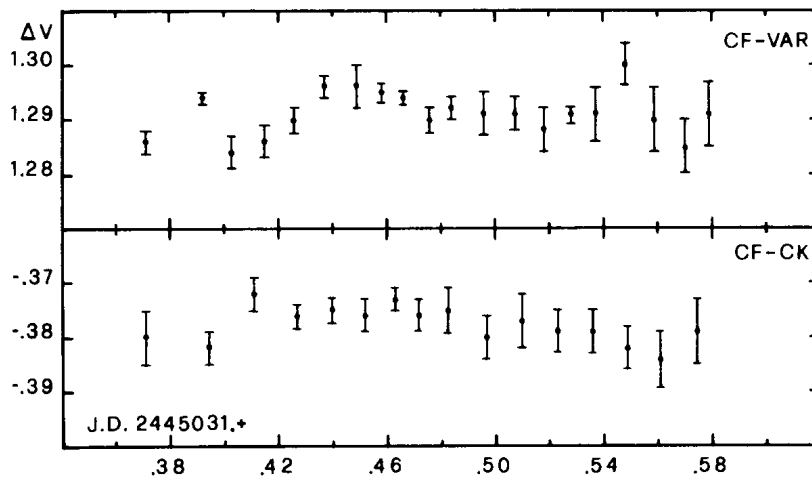


Figure 1

that there are amplitude changes and there exists probably more than one pulsation mode.

Since the δ Scuti component cannot be separated photometrically from its companions, the intrinsic amplitude is larger than that observed. If we use the ΔV -L-P relation (Antonello et al., 1981) to predict the intrinsic probable maximum amplitude, and, following Fekel and Bopp, assume three equal luminosities for the three components, we obtain a probable observed maximum amplitude $\Delta V \lesssim 0.03$ mag.

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References:

- Antonello, E., Fracassini, M. and Pastori, L.: 1981, *Astrophys. Space Sci.* 78, 435.
Danziger, I. and Dickens, R.: 1967, *Astrophys. J.* 149, 55.
Elliott, J.: 1974, *Astron. J.* 79, 1082.
Fekel, F.C. and Bopp, B.W.: 1977, *Publ. Astron. Soc. Pacific* 89, 216.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2153

Konkoly Observatory
Budapest
1982 May 28
HU ISSN 0374-0676

NEW PHOTOELECTRIC LIGHT CURVES OF VW CEPHEI

VW Cep (BD + 75°752) is one of the peculiar eclipsing binaries of W UMa type. Kwee (1966) noted that this star has both variable period and variable light curves. He found periodic displacements of minimum times which were connected with clearly visible variations in the light curve and were generally interpreted due to an inhomogeneous cloud of circumstellar absorbing material revolving at a very small distance around the system with a period slightly different from the eclipsing period.

Van't Veer (1973) attributed the changes in the period of VW Cephei to the presence of local temporary emissions. A detailed interpretation of the disturbances of VW Cep by a hot spot and a shell is presented by Pustyl'nik and Sorgsepp (1976).

Due to the peculiarities of VW Cep, it has attracted the attention of many investigators. So, many photoelectric observations have been taken for the star and consequently many light curves are obtained and hence several ephemerides are deduced for the star.

In an attempt to define the long-term variations in both the period and the shape of the light-curve, extensive photoelectric observations of VW Cep were made in two colours B and V by the 74 in. reflector at Kottamia Observatory, Egypt, on the first week of August 1981.

The observations were carried out by a one beam photoelectric photometer which was attached at the f/18 cassegrain focus. Standard B and V filters with EMI 9558 B tube cooled by propeller fan, were used throughout all the observations. The amplified output of the tube was fed into a Brown recorder. The time of observations was estimated from the starting point and the mean moving speed of the strip chart recorder.

During the observations many standard stars of known standard magnitudes from B. Iriarte et al. 's catalogues, were frequently observed to determine

the extinction coefficients, scale factors and zero point of the equipment. These parameters were used to deduce the magnitudes of the variable and comparison stars. The comparison star was BD +75°765 which has been used before by many investigators. The variable VW Cep was observed more or less continuously through B and V filters, with only occasional measurements of the comparison star BD +75°765. During the observations, the nights were of good photometric quality.

Our individual observations of VW Cep will be deposited in the Archives of Comm. 27.

From the individual observations five light curves for primary and secondary eclipses were obtained. Epochs of minimum light were determined by the methods of "bisecting chords", connecting points of equal magnitude on the opposing branches near the minima to find temporal mean of epochs at minimum light. These are listed in Table I together with their O-C residuals.

Table I
Epochs of Minimum Light

H.J.D. 244 4820 +	Min.	Filter	O-C	E
1.4851	I	V	-0.0002	4934
1.4848	I	B	-0.0005	4934
2.4588	II	V	-0.0006	4937.5
2.4588	II	B	-0.0005	4937.5
3.4322	I	V	-0.0014	4941
3.4327	I	B	-0.0009	4941
4.4064	II	V	-0.0013	4944.5
4.4068	II	B	-0.0009	4944.5
6.4940	I	V	-0.0010	4952
6.4941	I	B	-0.0009	4952

The O-Cs were computed from the following ephemerides given by Cristescu (1978):

$$\text{Min I} = \text{J.D.Hel. } 244\ 3448.2663 + 0.2783176\ \text{E}$$

These ephemerides were also used for the reductions of the observations to give mean light curves for the B and V measurements.

Three primary and two secondary eclipse curves were obtained from the individual B and V observations for VW Cep which are presented in this investigation.

Table II contains informations about these light curves; Min I and Min II refer to the primary and secondary minima, respectively; Max I and Max II refer to the maxima following the primary and secondary minima, respectively, B and V are the observed magnitude differences, in the sense variable minus comparison star.

Table II
Comparison of Successive Light Curves

	B			V		
	Min I	Max I	MinI-MaxI	Min I	Max I	MinI-MaxI
Curve 1	0.785	0.370	0.415	0.986	0.505	0.481
Curve 3	0.770	0.380	0.390	0.985	0.505	0.480
Curve 5	0.780	0.320	0.460	0.986	0.510	0.476
	Min II	Max II	MinII-MaxII	Min II	Max II	MinII-MaxII
Curve 2	0.655	0.346	0.309	0.870	0.490	0.380
Curve 4	0.660	0.325	0.355	0.865	0.475	0.390

Table II shows that Max I is always higher than Max II, this indicates that outside the eclipse the VW Cep system is somewhat brighter, when the larger and hotter component is advancing while the smaller and cooler component is receding, than in the case of converse position. Also it can be noticed from Table II that the successive light curves shown here have different depths. This reflects the fact that VW Cep has a variable light curve. At the same time, the differences in O-C values for the estimated epochs of minima show that the star VW Cep has a variable period.

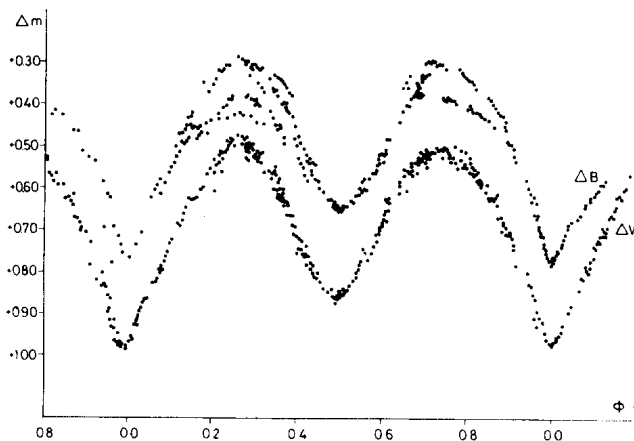


Figure 1 Light curve of VW Cep

So it is important to stress that the period behaviour of VW Cep must be followed and more light curves must be observed in order to give the comparison between the earlier and newer observations of this star more and more significance.

From the individual observations of this work a complete light curve has been obtained and it is shown in Figure 1. Ephemerides of Cristescu (1978) have been used to estimate the phase of each point on the light curve.

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References:

- Cristescu, C., 1978: I.B.V.S. No.1383.
Kwee, K.K., 1966: Bull. Astron. Inst. Neth. 18, 448.
Pustynnik, I. and Sorgsepp, L., 1976: Acta Astron. 26, 319.
van't Veer, F., 1973: Astron. and Astrophys. 26, 357.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2154

Konkoly Observatory
Budapest
1982 May 28
HU ISSN 0374-0676

PHOTOELECTRIC MINIMA AND NEW LIGHT CURVE OF V566 OPHIUCHI

The W Ursae Majoris-type eclipsing variable V566 Ophiuchi (BD +5°3547= HD 163611) is a contact binary system, which undergoes complete eclipses. Its secondary eclipse is total. The variability of the star was discovered by Hoffmeister (1935) in 1935. Fresa (1954) was the first who took photoelectric observations for this star without filter. Binnendijk (1959) took photoelectric observations for V566 Oph using B and V filters. He noted that the period of its light variations had remained constant for 14 years.

Purgathofer and Widorn (1959), took series of photoelectric observations for this star. They noted that the primary minimum in yellow light showed an interval of constant light. Lucy (1967) constructed a model for the V566 Oph system. He found that there was a convective transportation of energy from the primary component through a narrow region in the common envelope surrounding the inner Lagrangian point of the secondary component of the system.

Bookmyer (1969, 1976) took 2000 photoelectric observations through B and V filters. He also investigated all the available times of minimum light for the star. He found that the period of light variation of V566 Oph had increased after a period of constancy for at least eleven years. He noticed also that there were little variations in the shape of the light curve and deduced new ephemerides for the star. Berthier (1975) developed an accurate automatic numerical method for the analysis of W UMa system in order to determine the parameters of eclipsing systems from their observed light curves. He applied this method to V566 Oph and AB And. His results for V566 Oph were very close to those obtained before by Mochnacki and Doughty (1972).

Bahaev studied the changes in the spectrophotometric gradient and temperature of V566 Oph over its period of light variations in 1968-1970. His studies showed the existence of gaseous streams between the two components of the system.

Recently, V566 Oph attracted the attention of several investigators (Popovici, 1971; Kizilirmak and Pohl, 1974; Ebersberger et al., 1978; Maddox and Bookmyer, 1978; Niarchos, 1979; Dawson and Narayanasamy, 1977). They made series of photoelectric observations and deduced many times of minimum light for the star. These previous observations confirm the fact that the star V566 Oph is well known now to have a variable period and a slight variations in the shape of its light curve. So, it is important to follow the period behaviour of the star and obtain additional light curves.

The present photoelectric observations for V566 Oph were carried out through B and V filters during 10 nights in the time interval between 25 May and 10 August 1981. The observations have been carried out using a one beam photoelectric photometer attached to 74 in. reflector of Kottamia Observatory Egypt. The photometer has an EMI 9558B tube with S-20 photocathode, refrigerated by a propeller fan. The B and V filters are close to the standard system of Johnson and Morgan.

The amplified output of the tube was fed into a Brown recorder. The times of observations were estimated from the starting point and the mean moving speed of the strip chart recorder. A careful checking of the constancy of the chart speed was made every night by referring to the dome's main reference sidereal clock and the maximum error was found to be less than 6.7 sh^{-1} .

Every two groups of observations for V566 Oph were separated by an observation for one of some standard stars with known magnitudes chosen from B. Iriarte et al.'s catalogue, with the aim of the determinations of the extinction coefficients, scale factors and zero points of the equipment. These parameters were used to calculate the magnitudes of the variable and comparison star (BD $+4^{\circ}3553$) which was used before as a comparison by many investigators. During all the nights of observations the seeing conditions were at good photometric quality. Magnitude differences between the variable and comparison stars were measured and yielded 203 observations with B filter and the same number with V filter.

The individual observations of the present work will be deposited in the Archives of Comm. 27. Phases of each set of observations were computed from the ephemerides given by Dawson and Narayanasamy (1977):

$$M I = 244.04184931 + 0.40964431 E$$

Our observations yielded two light curves for primary eclipse and three light curves for secondary eclipse of V566 Oph. So five heliocentric times of minimum light were determined by the method of bisecting chords which connect the points of equal magnitudes on the opposing branches near the minimum. The obtained heliocentric times of minimum light for V566 Oph are tabulated in Table I with their O-C residuals. The O-C residuals were calculated from the ephemerides given by Dawson and Narayanasamy. A comparison between the present O-C residuals and the other previously published values shows an increase in the period of V566 Oph.

Table I

Min.hel. 244 4000+	E	O-C ^d	Filter	Rem
750.4902	10575.0	+0.0085	B	Min I
750.4901	10575.0	+0.0084	V	Min I
751.5173	10577.5	+0.0115	B	Min II
751.5162	10577.5	+0.0104	V	Min II
825.2512	10757.5	+0.0094	B	Min II
825.2510	10757.5	+0.0092	V	Min II
826.2742	10760.0	+0.0083	B	Min I
826.2739	10760.0	+0.0080	V	Min I
827.3005	10762.5	+0.0105	B	Min II
827.2992	10762.5	+0.0092	V	Min II

Also from the individual observations a complete light curve for each colour is constructed and both are illustrated in the Figure 1.

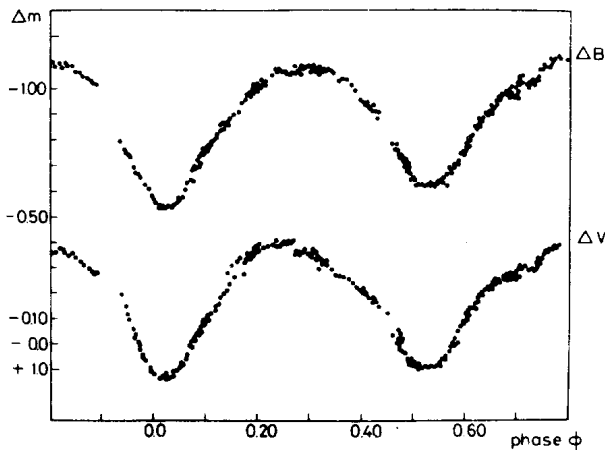


Figure 1 Light curve of V566 Ophiuchi

It can be easily seen that the secondary eclipse of the eclipsing binary V566 Oph is total and there is slight asymmetry in the shape of the light curve. This is in good agreement with the remark noted before by Bookmyer (1976). This means that the present photoelectric observations for the eclipsing binary V566 Oph are in accordance with those published before.

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References:

- Berthier, E., 1975, Astr. and Ap. 40, 237
 Binnendijk, L., 1959, A.J. 64, 65
 Bookmyer, B.B., 1969, A.J. 74, 1197
 Bookmyer, B.B., 1976, P.A.S.P. 88, 473
 Dawson, D.W. and Narayanasamy, J., 1977, P.A.S.P. 89, 47
 Ebersberger, J., Pohl, E. and Kizilirmak, A., 1978, I.B.V.S. No. 1449
 Fresa, A., 1954 Mem. Soc. Astr. Italia, 25, 127
 Hoffmeister, C., 1935, A.N. 255, 401
 Kizilirmak, A. and Pohl, E., 1974, I.B.V.S. No. 937
 Lucy, L.B. 1967, Zs.f.Ap.65, 89
 Maddox, W.C. and Bookmyer, B.B., 1978, I.B.V.S. No. 1457
 Mochnacki, S.W. and Doughty, M.A., 1972, M.N.R.A.S. 156, 243
 Niarchos, P.G., 1979, I.B.V.S. No. 1576
 Popovici, C., 1971, I.B.V.S. No. 508
 Purgathofer, A. and Widorn, Th., 1959, Mitt.Wien 10. 119

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2155

Konkoly Observatory
Budapest
1982 June 3
HU ISSN 0374-0676

RECENT INFRARED PHOTOMETRY OF V1057 CYGNI

V1057 Cygni is a member of the select group of FU Orionis variable stars (Herbig 1977). Beginning in late 1969, the visual brightness of V1057 Cyg rose by nearly 5^m (Welin 1971). Maximum light was reached in late 1970, after which the brightness has declined very slowly. Infrared photometry from 1.25 μ m to 22 μ m was obtained shortly after maximum light by Cohen and Woolf (1971) and Rieke et al. (1972). Simon et al. (1972), Simon (1975), and Simon and Dyck (1977) extended these light curves from 1971 March through 1975 September. During this time, the infrared fluxes at 10 μ m and 20 μ m decreased along with the visual brightness of the star, while the 5 μ m brightness remained virtually unchanged. Following the most recent report of JHK photometry (Mould et al. 1978), no other IR data have been published, although optical photographs show a continued fading of V1057 Cyg and its surrounding reflection nebula (Duncan et al. 1981). In order to learn whether the IR brightness has undergone any recent changes, we have obtained new 1.25-20 μ m photometry of this star.

The observations were made on the 3.8-m UKIRT telescope on Mauna Kea, Hawaii, on the nights of 1981 September 7-10, and on the 1.3-m telescope of the Kitt Peak National Observatory on 1981 November 14. These magnitudes are summarized in Table I below:

TABLE I
Infrared Magnitudes

J.D. = 2444855				
K (2.2)	L' (3.8)	M (4.7)	N (10.2)	Q (20)
5.42	3.85	3.33	1.35	-1.0
J.D. = 2444922				
J (1.23)	H (1.66)	K (2.22)	L (3.45)	M' (4.63)
7.10	6.14	5.45	4.30	3.65

The effective wavelengths (in μm) of the filters are listed in parentheses. Photometric uncertainties are of the order of $0^{\text{m}}.05$ except at Q where the uncertainty is $0^{\text{m}}.1$. Since 1971 March (Rieke et al. 1972), J and H have faded by $1^{\text{m}}.0$, there has been a $0^{\text{m}}.7$ drop in brightness at K, while the flux at both L and M has remained unchanged to within the observational uncertainties. The 10-20 μm emission continues to

drop, falling by a factor of 2 since 1975 (Simon and Dyck 1977) and by nearly a factor of 10 since 1971 March. The average rate of decline decreased from $0^{\text{m}}.4 \text{ yr}^{-1}$ during the first five years after maximum to $0^{\text{m}}.1 \text{ yr}^{-1}$ in the second half of the decade.

No completely satisfactory explanation exists for the IR emission of V1057 Cyg (Simon et al. 1972, Rieke et al. 1972, Simon 1975), although thermal emission from circumstellar dust very likely contributes to the 10-20 μm emission. The origin of the near-IR flux may be circumstellar (Simon et al. 1972) or photospheric (Mould et al. 1978). Speckle interferometry of V1057 Cyg, obtained by one of us (H.M.D.) in the fall of 1981, places an upper limit of 0.1 seconds of arc on resolvable angular structure at 2.2 μm and 3.8 μm . At a distance of 600 pc, this angular size corresponds to a linear diameter of 1×10^{15} cm. If the 5 μm flux is circumstellar, possibly from material ejected during the 1969-70 flare-up, then the speed of expansion can be no greater than 13 km/s. A high

velocity shell spectrum is observed (Herbig 1977; Mundt 1981), with absorption components blueshifted in radial velocity 90-180 km/s. For shell expansion velocities of this size, material thrown off from the star a decade ago would produce resolvable structure on the scale of 0.7-1.4 seconds of arc.

The alternative is that most of the 5 μ m flux is photospheric and unresolved by the interferometric observations. A very large change in the photospheric temperature ($\Delta T = 1000$ K) would be required to account for the observed $\Delta V \approx 2^m$ and $\Delta K \approx 0.7^m$ if these changes are solely the result of a decline in photospheric surface brightness; a large drop at 5 μ m should then have been observed. The relative changes in visual and near-IR light curves cannot be reconciled with a time-dependent increase in extinction due to the formation of circumstellar grains unless these grains are significantly grayer than normal interstellar dust.

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References:

- Cohen, M., and Woolf, N. J. 1971, Ap. J. 169, 543.
- Duncan, D. K., Harlan, E. A., and Herbig, G. H. 1981, A.J. 86, 1520.
- Herbig, G. H. 1977, Ap. J. 217, 693.
- Mould, J. R., Hall, D. N. B., Ridgway, S. T., and Hintzen, P. 1978, Ap. J. Lett. 222, L123.
- Mundt, R. 1981, presented at the Second Cambridge (MA) Workshop on Cool Stars.
- Rieke, G., Lee, T., and Coyne, G. 1972, Pub.A.S.P. 84, 37.
- Simon, T. 1975, Pub.A.S.P. 87, 317.
- Simon, T., and Dyck, H. M. 1977, A.J. 82, 725.
- Simon, T., Morrison, N.D., Wolff, S. C., and Morrison, D. 1972, Astr. Ap. 20, 99.
- Welin, G. 1971, Astr. Ap. 12, 312.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2156

Konkoly Observatory
Budapest
1982 June 3
HU ISSN 0374-0676

NEW PHOTOELECTRIC TIMES OF MINIMA OF W URSAE MAJORIS

Using the 75 cm telescope of the Wilhelm Foerster Observatory Berlin, we observed W UMa during 12 nights between 1976 and 1982. The telescope is equipped with a single channel, uncooled photometer with an IP21 photomultiplier, usual UBV filters and a conventional DC amplifier. As comparison stars, we used $AK_3 + 55^\circ 696$ and $+56^\circ 764$. We determined 9 times of minima from our measurements by the Pogson method, they are given in Table I, n is the

Table I
Heliocentric Times of Minima of W UMa

Jul. Date	m.e.	n	O - C	Colour	Remarks
24 42816. ^d 5501 \pm 0. ^d 0014		54	} - 0. ^d 0036	V	Min. II
42816.5494	.0014	49		B	"
42840.5708	.0008	147	.0045	V	"
43559.3948	.0009	136	.0034	V	
43604.4370	.0008	102	.0023	V	
43608.4378	.0007	101	} .0046	V	
43608.4390	.0013	77		B	
43930.4012	.0005	93	.0024	V	
44691.4269	.0010	65	} .0049	V	
44691.4267	.0006	62		B	
45020.3929	.0021	13	} .0061	V	
45020.3922	.0014	13		B	
45061.4291	.0007	88	} .0060	V	
45061.4311	.0010	88		B	

number of individual measurements. The O-C values are calculated with Righerink's elements (1972).

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Reference:

Righerink, P.V.:1972, Astron. J. 77.230

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2157

Konkoly Observatory
Budapest
1982 June 7
HU ISSN 0374-0676

NEW VARIABLE STARS IN CYGNUS

Since 1967 I have observed 32 fields in the Milky Way for variable stars. The following is a presentation of a survey of an area of $20^{\circ} \times 15^{\circ}$ centered at $20^{\text{h}}50^{\text{m}}$, $+45^{\circ}$ in Cygnus. This area has been followed photographically in two colours during the period 1967 to 1981. As a rule one observation per summer was obtained.

Twenty one exposures with 9 x 12 cm photographic plates were taken simultaneously with two cameras connected to the equatorial telescope at my private observatory in Montlaux, South of France. A Perkin-Elmer lens 6.5/30 cm with Schott GG 11 filter and Kodak 103a-D plates was used for photographic photometry close to the Johnson V system. An Aerostigmat 5.5/30 cm with Kodak 103-0 plates without filter was used for photographic photometry close to the Johnson B System. The limiting magnitudes at zenith distance are $V = 15.2$ and $B = 14.7$. The colour correction is small for both the V and B plates. A Maksutov 15/225 cm with a 1 P 21 photomultiplier connected to an inverter change of the frequency of the synchronous motor provided automatic guiding.

The plates were examined with a blink comparator and six stereo comparators standing on a circle with a turnable chair at the center. In this way it was easy to detect variable stars showing a magnitude difference of 0.3 magnitudes and to check their appearance on several plates at the same time.

The magnitudes were estimated by using a step scale in the eye-piece of the blink comparator. The star α Lyr was photographed on fine grain film with exposures in steps of $\sqrt{2}$. The scale is calibrated from the magnitudes obtained for 3 clusters by Hoag et al. (1961). These clusters were photographed with the same techniques as described above on the same plate with the clusters at different positions from the plate center. On the same plate comparison stars were selected and measured.

Table I New variables in Cygnus
Plate centre $20^h50^m45^s$

No	R.A. (1950)	Decl. (1950)	m_V max min	B-V color	notes	No	R.A. (1950)	Decl. (1950)	m_V max min	B-V color	notes
LD 8	19 ^h 49 ^m 17 ^s	50°36'	12.8-14.2	1.4		LD 37	21 ^h 02 ^m 25 ^s	37°38'	12.4-14.5	2	
LD 9	19 51 40	46 14	12.6-14.3	1.4		LD 38	21 04 40	37 20	12.4-15.0	1.6	1
LD 10	19 52 20	47 04	11.8-15.0	1.6	1	LD 39	21 05 35	36 57	12.5-14.5	1.2	
LD 11	19 56 50	46 58	11.6-14.8	1.4	1	LD 40	21 05 45	40 28	12.9-15.0	1.6	
LD 12	19 57 44	48 36	11.6-15.0	1.5		LD 41	21 06 15	37 15	13.5-15.0	>1	
LD 13	19 58 20	40 53	13.6-14.0	0.3	1	LD 42	21 07 50	37 38	11.8-13.0	1.7	
LD 14	20 02 05	47 35	13.6-15.0	1.4		LD 43	21 12 55	44 05	12.4-14.0	2.0	1
LD 15	20 07 56	47 48	11.9-15.0	2.4		LD 44	21 13 15	44 28	12.6-13.5	1.7	
LD 16	20 08 27	38 03	14.0-14.7	>0.5		LD 45	21 15 35	50 32	13.1-14.3	1.3	
LD 17	20 09 04	40 49	13.8-14.8	0		LD 46	21 17 00	39 41	13.6-14.8	>0.8	
LD 18	20 09 32	36 52	13.8-14.5	>0.7	1	LD 47	21 17 55	50 28	13.1-15.0	>1.2	
LD 19	20 10 15	39 28	12.2-15.0	>2.5	2	LD 48	21 18 00	49 30	12.0-13.2	1.7	
LD 20	20 15 30	45 26	14.0-14.6	0		LD 49	21 19 00	38 01	12.4-14.8	2.1	
LD 21	20 16 20	43 36	13.3-15.0	>1.2	2	LD 50	21 21 55	47 59	13.7-14.2	>1	
LD 22	20 18 58	49 33	12.2-15.0	>2		LD 51	21 25 30	39 04	12.0-14.8	2	
LD 23	20 19 27	50 18	12.6-15.0	0	3	LD 52	21 26 45	37 47	13.5-14.5	1	1
LD 24	20 32 32	49 13	13.6-15.0	>1.9		LD 53	21 28 50	43 19	13.4-14.5	0.5	
LD 25	20 34 05	42 49	13.6-15.0	0.7		LD 54	21 29 00	43 17	13.8-14.5	-0.2	
LD 26	20 35 00	37 42	13.4-15.0	>1		LD 55	21 29 15	38 32	11.5-14.7	1.0	
LD 27	20 38 30	49 47	13.0-15.0	1.5		LD 56	21 29 30	40 44	11.8-14.8	2.0	
LD 28	20 40 40	42 07	13.2-14.6	1.3	1	LD 57	21 30 30	38 44	11.8-14.5	-0.4	
LD 29	20 46 08	45 31	12.8-14.5	1.7		LD 58	21 30 50	39 04	11.6-14.5	2.2	
LD 30	20 46 32	46 22	14.0-15.0	0.2		LD 59	21 31 15	37 49	10.4-14.0	0.5	1
LD 31	20 48 14	37 19	12.4-14.8	2.2		LD 60	21 34 20	38 10	11.8-14.3	2.0	
LD 32	20 50 45	46 14	12.0-14.7	2.3		LD 61	21 36 40	45 29	11.6-14.2	>2.2	
LD 33	20 53 12	38 25	14.5-15.0	>0		LD 62	21 37 45	43 05	13.8-14.5	0.7	
LD 34	20 56 00	42 35	12.6-15.0	>2		LD 63	21 40 45	44 42	11.4-12.4	>2.4	
LD 35	20 58 45	38 25	12.8-13.6	1.0	1	LD 64	21 41 30	50 25	12.0-14.5	>2	
LD 36	21 01 10	37 35	10.8-13.2	0.9	1	LD 65	21 41 45	48 55	13.0-14.5	>1.2	

This procedure provides magnitudes with an accuracy of ± 0.2 magnitudes.

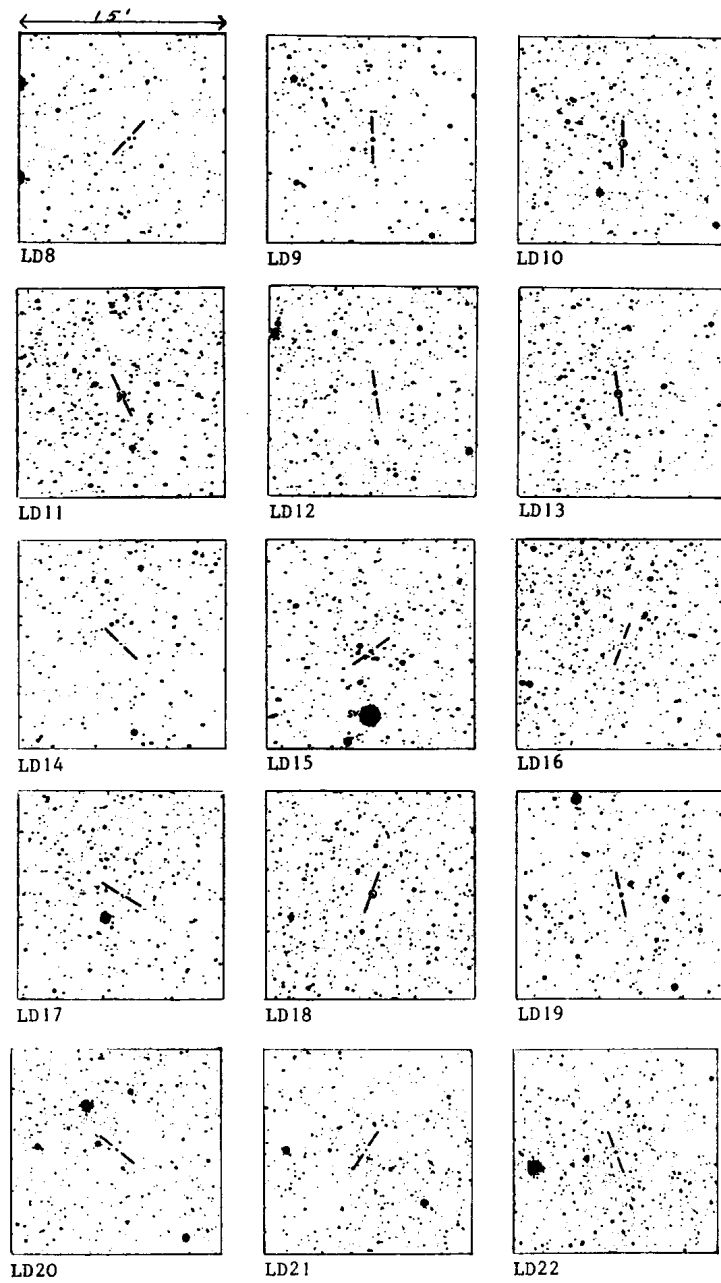


Figure 1

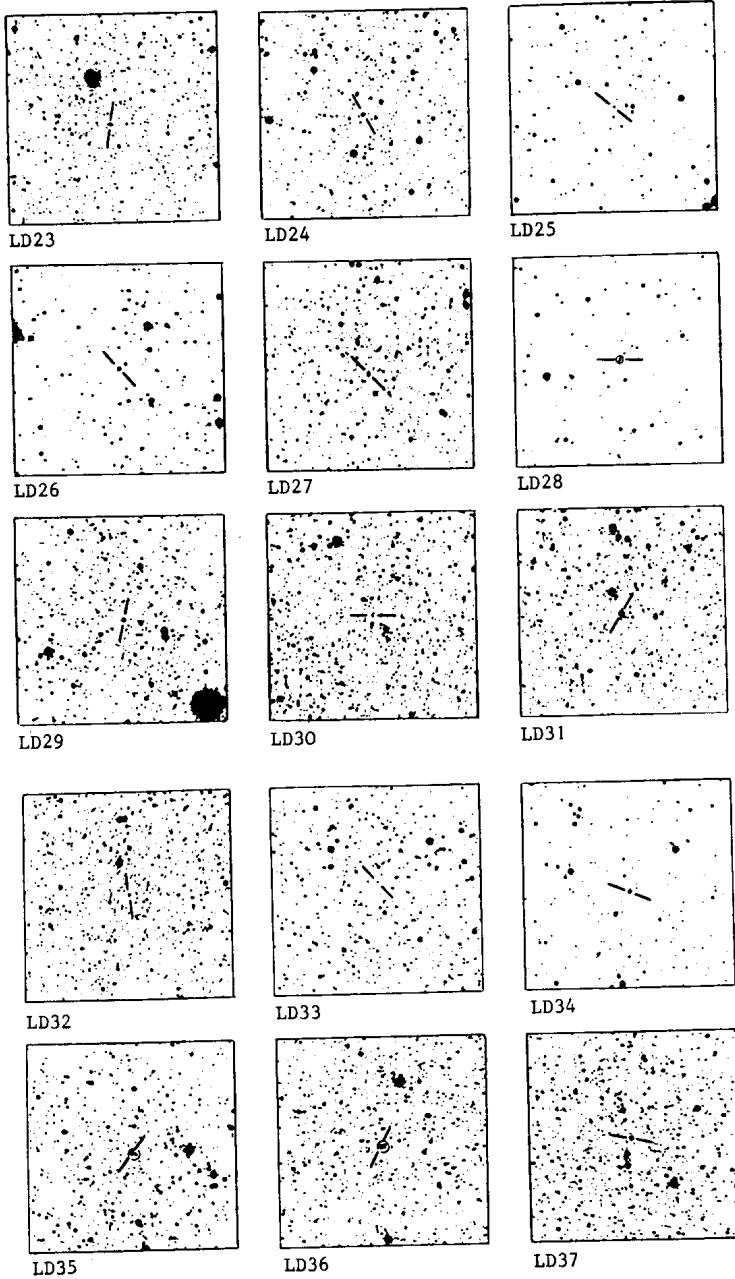


Figure 1 (cont.)

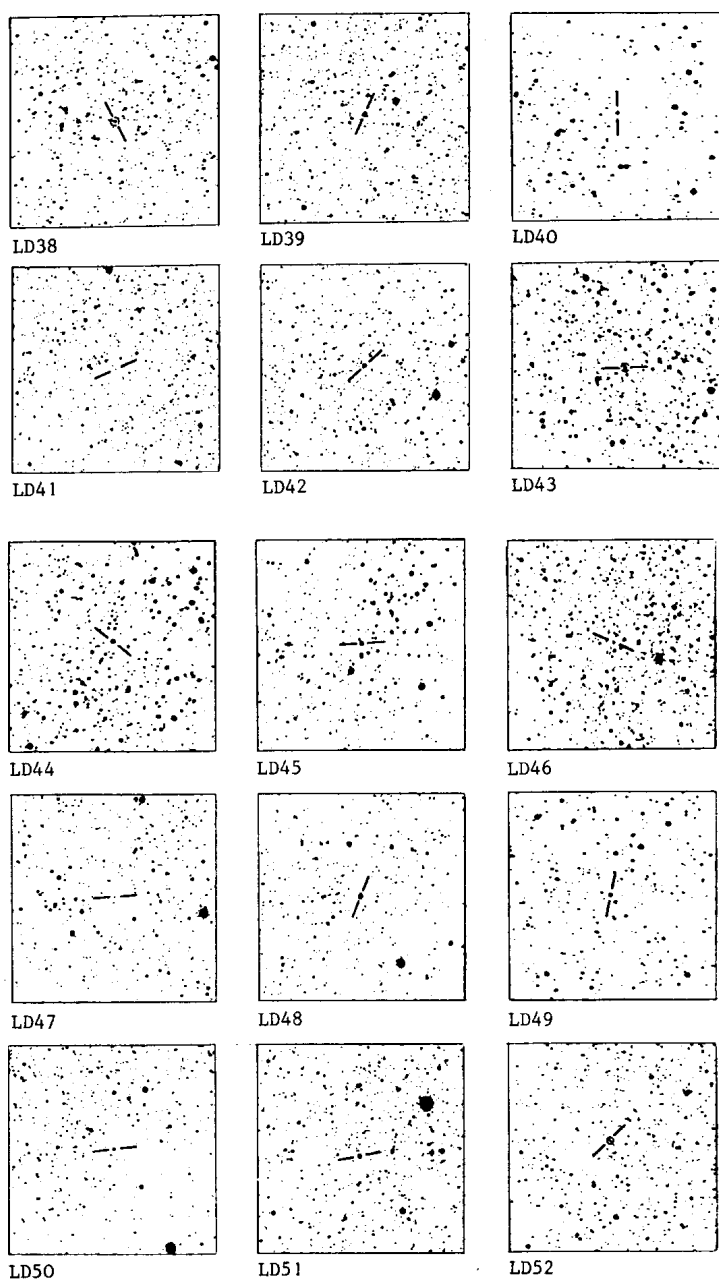


Figure 1 (cont.)

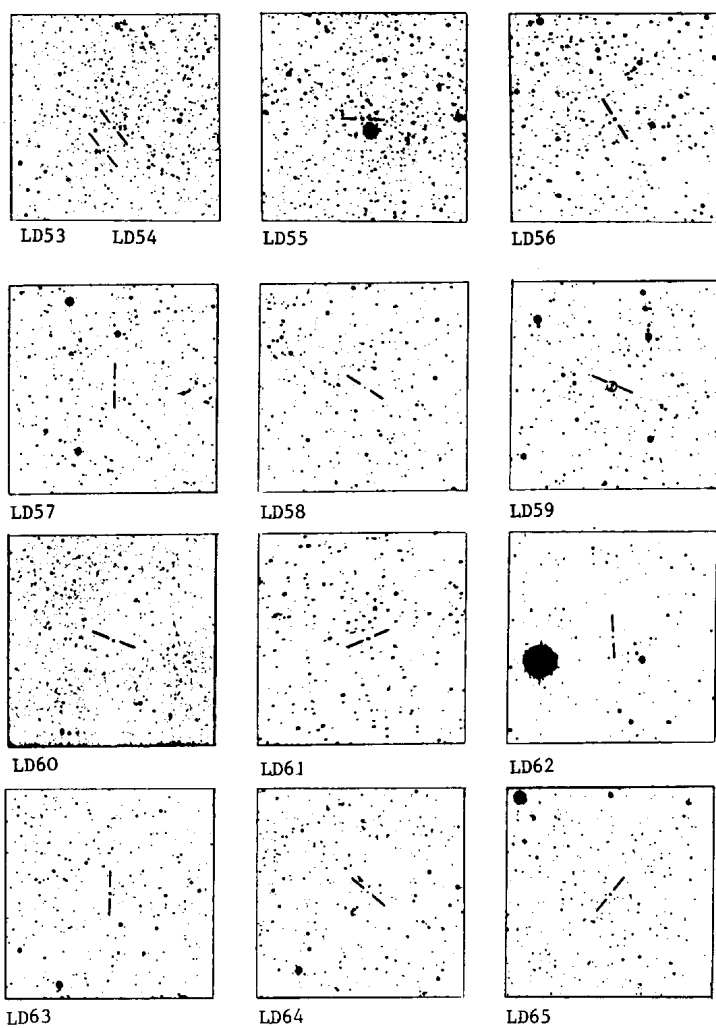


Figure 1 (cont.)

Co-ordinates were determined through a grid of epoche 1950.0 co-ordinates based on the SAO catalogue. The accuracy of the co-ordinates is of the order of 1 minute of arc. With help of this grid 450 known variables in the field could be localized. Co-ordinates for new variables were determined from this grid.

In this survey 58 new variable stars were found. In most stars 20 individual magnitude estimates exist for this period. All stars are fainter than $V = 11.0$ at maximum brightness. 30 stars are fainter than $V = 13.0$. 17 stars could not be traced on the B plates. Most stars are red.

The new variables are listed in Table I, where the first column gives the provisional designation of the star, columns 2 and 3 the position and column 4 the range in visual magnitude. Column 5 gives the approximate colour. The notes in the last column refers to: 1. Two close stars, the magnitude refers to both stars; 2. Flare star? Only one maximum; 3. Eclipsing binary, the period is 27.001 days or fraction of this at epoch 2439710.439. Minimum lasts for more than 60 minutes; 4. Very slow dwarf nova?

The finding charts were obtained with a Newton 21/166 cm reflector and an intensifier camera of type Electrophysics Corporation, model 350, including an image intensifier type Varo S-20. Individual magnitude estimates and large-field finding charts can be delivered upon request.

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Reference:

Hoag, A.A., Johnson, H.L., Iriarte, B., Mitchell, R.I., Hallam, K.L.
and Sharpless, S., 1961, Publ. U.S. Naval Obs. 17, 1.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2158

Konkoly Observatory
Budapest
1982 June 10
HU ISSN 0374-0676

A NEW β CEPHEI STAR IN HARVARD STANDARD REGION E4

The star Q.81 in Harvard Standard Region E4 (HD78616), frequently used as a "standard star", was found to be variable by T Lloyd Evans in 1980. This had been suspected (Cousins & Stoy 1962) but had not previously been confirmed. The spectral type is B2 II/III (Houk, 1978). The following observations indicate that the star is β Cephei type variable.

The star was intensively observed in 1981 by Laing (at Sutherland) and Cousins (at Cape Town) using E region standards as comparison stars. The individual light curves pointed to a period of about 5 hours, but as the amplitude is small (0.05 mag) and the light curve seemed to vary in shape it was difficult to define the period precisely.

A periodogram of the 1981 observations gave 4.636 d^{-1} as the most probable reciprocal period, with an uncertainty of $\pm 0.001 \text{ d}^{-1}$. By including more recent observations (1981 Nov and 1982 Mar, Apr) this could be refined to $4.6361 \pm 0.0001 \text{ d}^{-1}$ ($P = 0.21570 \text{ d}$). The aliases, ± 1 cycle per day and ± 1 per year can be eliminated because they produce phase shifts as functions of U.T. or J.D. After whitening this material, by removing the fundamental period and its harmonics, the periodogram shows no evidence of a secondary period.

A mean light curve has been derived from the 1981 and 1982 V observations by Fourier analysis and these are shown together in Figure 1.

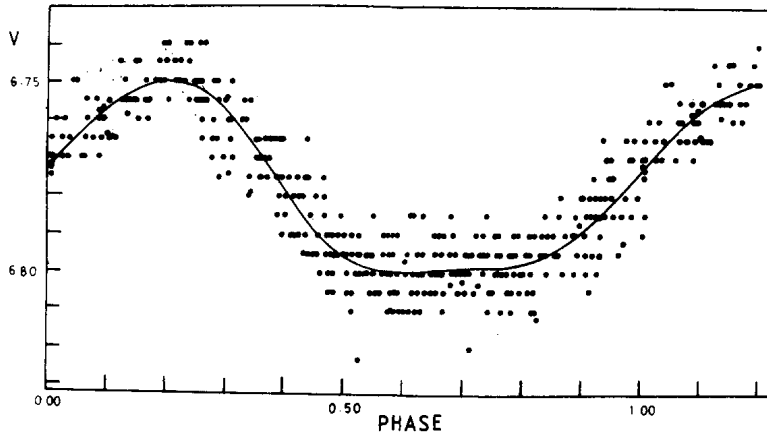


Figure 1. V magnitudes and light curve of E4-81 plotted against phase = 4.63611 (JD -2440000). The light curve is a third order Fourier fit to the observations.

There is a large phase error when the above period is extended back to 1980, but the 1980 and 1981 observations can be reconciled by adopting $p^{-1} = 4.6351 \pm 0.0002$. This is compatible with the 1981 period but is not acceptable for later observations, and the period is evidently variable. A quadratic ephemeris (with the period increasing at a rate of about 0.0004 d per year) would describe the phase changes from 1978 to 1982 but is not acceptable for earlier observations.

There is no significant change in the colour of this star accompanying the light changes, the mean values being $B-V = -0.^m002$, $U-B = -0.^m752$ (1981 observations), $V-R_c = 0.024$, $V-I_c = 0.023$ (Cousins 1980). The star is a close visual binary with nearly equal components so the true range of variation will be about twice the observed value. The colours imply that these stars are somewhat reddened.

One of the comparison stars used in 1981, E4-40 (= HD79416, B8V(pSi)) was found to be a micro-variable with night-to-night changes of one or two hundredths of a magnitude, necessitating a re-reduction of the observations of E4-81. This star will be discussed in a separate note.

The author wishes to thank L.A. Balona for the use of his computer programs, and J.D. Laing and T Lloyd Evans for observations.

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References:

- Cousins, A.W.J., 1980. S.A.A.O. Circ., 1, 234.
Cousins, A.W.J. & Stoy, R.H., 1962. R.Obs.Bull. No.49.
Houk, N., 1978. Michigan Catalogue of Two-Dimensional Spectral
Types of HD stars, vol. 2, Ann Arbor, Michigan, U.S.A.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2159

Konkoly Observatory
Budapest
1982 June 14
HU ISSN 0374-0676

TIMES OF MINIMA FOR EIGHT ECLIPSING BINARIES

Thirteen times of minima for eight eclipsing variables have been determined photoelectrically with the 30 cm Maksutov telescope of the University of Ankara, using an uncooled EMI 6256S photomultiplier tube and a dc chart recorder.

Binary	HJD	m.e.
ST Aqr	2444845.3898 ± 0.0004	
RZ Com	694.3712 ± 0.0006	
	695.3868 ± 0.0003	
RW CrB	780.4044 ± 0.0002	
	783.3109 ± 0.0010	
V836 Cyg	840.4236 ± 0.0003	
	842.3839 ± 0.0002	
V1073 Cyg	783.4139 ± 0.0005	
	790.4899 ± 0.0005	
TZ Lyr	784.4082 ± 0.0005	
BB Peg	812.5022 ± 0.0003	
DI Peg	843.4272 ± 0.0002	
	848.4102 ± 0.0002	

Each minimum time given in the table is the mean of two determinations through b and v filters. The timings were made by the method of Kwee and van Woerden (1956).

Supports by TUBITAK (Scientific and Technical Research Council

of Turkey) and US National Science Foundation through a grant to Prof. T.J. Herczeg of the University of Oklahoma are gratefully acknowledged.

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Reference:

K.K.Kwee and H. Van Woerden, Bull. Astron. Neth. 12, 327, 1956

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2160

Konkoly Observatory
Budapest
1982 June 15
HU ISSN 0374-0676

o And: POLARIZATION OBSERVATIONS OF 1982 APRIL EVINCE THE RECENT SHELL
EPISODE

Wide-band linear polarization observations of the recurrent shell star o Andromedae (HD 217675, B6pe) have recently been carried out. This study was prompted by photometric and spectroscopic indications of a recent shell episode in this star [vide Bossi et al. (1982) and Baade et al. (1982)]. Another motivating factor was that direct comparison could be made with a series of measurements carried out by the author over the epoch 1978-1979.

All the observations were made at the Cassegrain focus of the 61 cm telescope at Columbia University's Harriman Observatory. Essentially the same wide-band (B) filter, polarimeter, ancillary equipment and observing procedures were used as in the previous survey of this star carried out by Hayes and Terrance (1980). The complete journal of the seven polarization measurements made in 1982 April appear in Table I, with P denoting the amount (expressed as a percentage), and θ denoting the direction (expressed in the equatorial coordinate system). Each observation had a Poisson photon-count standard deviation of 0.02% for P as well as for the two Stokes parameters, Q and U. The standard deviation of θ is given by $28.7 (\sigma_P/P)$.

The means of the observations being reported here are: $\bar{P} = 0.40\%$ and $\bar{\theta} = 92.6^\circ$. Hayes and Terrance (ibid) reported means of $\bar{P} = 0.18\%$ and $\bar{\theta} = 81.3^\circ$ from thirty-two observations carried out over 1978 December - 1979 September. (The latter observations were shown to be consistent with the expected interstellar contribution.) Comparison of these means offers convincing evidence that a statistically significant polarization change occurred between 1979 September and 1982 April.

A one-sided χ -test was carried out to quantitatively gauge whether the observations had a variability in excess of that expected from photon counts. [The interested reader may consult Hayes and Terrance (ibid) for a description of this statistical test.] This test showed variability at the 93%

Table I
Journal of Polarization Amount and Position
Angle of α Andromedae

Date (UT)	P (%)	θ (deg.)
1982 April 19	0.42	93.3
1982 April 22	0.37	92.3
1982 April 23	0.41	90.6
1982 April 24	0.42	92.3
1982 April 25	0.38	96.4
1982 April 29	0.43	91.6
1982 April 30	0.37	92.0

confidence level, which is considered to be a marginal indicator of variability. The 1978-1979 measurements showed statistically insignificant variability - as would be expected if there was an overwhelming interstellar contribution. Omicron Andromedae will continue to be observed. An impetus to continued monitoring are the fragmentary reports of short-term (approximately 0.8 and 1.6 days) quasi-periodic spectroscopic and photometric variations in this star. Efforts will be made to determine whether the polarization displays any such short-term variations.

The results of this linear polarization survey of α And may be summarized as follows. The wide-band (B) filter measurements being reported here differ significantly from those obtained in epoch 1978-1979. The consolidated observations offer convincing evidence for this star's recent shell episode. At present there is only marginal evidence that the 1982 observations have statistically significant variations.

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References:

- Baade, D., Pollok, H., Schumann, J., and Duerbeck, H. 1982, Inf. Bull. Variable Stars, No. 2125.
Bossi, M., Guerrero, G., Mantegazza, L., and Scardia, M. 1982, Inf. Bull. Variable Stars, No. 2082.
Hayes, D. and Terrance, T. 1980, Pub. A.S.P. 92, 89.

COMMISSION 27 OF THE I. A. U. INFORMATION BULLETIN ON VARIABLE STARS

Number 2161

Konkoly Observatory
Budapest
1982 June 15

HU ISSN 0374-0676

OBSERVATIONS OF SOME VARIABLE STARS

During the period June 1965 - August 1970 56 blue plates (Zenith Astronomical and Scientia 67 A 50) have been taken with the 135 mm astrograph on the field centered at RA = $20^{\text{h}}13^{\text{m}}$; D = $+47^{\circ}$ (1950). The results of observations of some variable stars in this field are given in this paper.

XX Cyg - Four maxima of this RRs star were observed on:

JD	m	O - C
24...		
38939.421	11.2	+0. ^d 007
961.396	11.1	- .001
40124.346	11.3	+ .007
152.247	11.4	- .008

The phases have been obtained with the elements of the General Catalogue. The star varied between 11.3 and 12.5 magn.

BW Cyg - Semiregular variable. During the period of observation this star varied between 13.0 and 14.2 magn. The observations are satisfied by the following elements: max = 2438941 + 173^d.

The epochs of maximum are:

JD	m	O - C
24...		
38941	13.0	0 ^d
39296	13.0	+ 9
40124	13.7	-28
40504	13.4	+ 6

BX Cyg - Probably an irregular variable star (12.8-14.1 magn. in our plates).

The epochs of maximum are:

JD	m	JD	m
2438940	13.1	2439680	13.0
39023	12.9	40415	13.0
39350	13.0		

CN Cyg - Mira star. Only two maxima have been observed on: JD 2439026 (8.4) and 2440955 (8.6) in accord with the elements of the General Catalogue.

V 786 Cyg - Irregular variable star with a marked red colour. This star had nearly constant brightness most of the time and showed some rapid variations of $0^m.5$ - $0^m.6$ with a cycle length of two to five days.

UU Cep - No maxima of this semiregular variable have been observed. The fitting of the light curves suggests the following new improved elements:

$$\max = 2440768 + 372^d.7.$$

HI Cep - Eclipsing variable with unknown elements. The observations near the minima give:

JD	m
24...	
38935.415	13.7
40150.249	13.0
40504.273	13.5

The star varies between 12.0 and 13.7 mpg.

GR 306 - This new suspected variable star has been discovered on 63 films (Tri X + GG 14) taken with two Schmidt telescopes 25/30/75 cm in Pegasus.

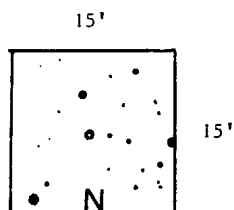


Figure 1

Its position is $RA = 22^h 07^m 26^s$; $D = +32^\circ 20' 5''$ (1950.0). Very likely this star belongs to the RR Lyrae type. The photovisual range is 13.6 - 14.1. No elements have been derived. The finding chart is shown in Figure 1.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2162

Konkoly Observatory
Budapest
1982 June 15
HU ISSN 0374-0676

IMPORTANCE OF UBV OBSERVATIONS OF AU Mon DURING JANUARY-FEBRUARY
1983

The mathematical analysis of the photometric peculiarities of AU Mon (Lorenzi, 1980a,b) has allowed to separate the variable light curve into two overlapped periodic phenomena, one of the variations due to eclipses, the other to intrinsic variation, with the ephemerides:

$$M(E) : 2442801.3752 + 11.1130371 E \quad (1)$$

51 68

$$Max(E) : 2443105 + 411 E \quad (2).$$

4

In order to describe univocally the previous brightness behaviour of AU Mon, the light surface device (Lorenzi, 1980b) has been introduced.

At present we would emphasize the importance of future UBV observations of AU Mon during January-February 1983. In fact the ephemeris (2) involves the occurring of a brightness minimum of the intrinsic variation just in the middle of this period, which, besides, is the best epoch for observing AU Mon. A photometric snapshot of the eclipsing variation relating to such period should allow a geometrical solution of the system to compare both with the average one already computed (Lorenzi, 1982) and with another solution referring to the maximum of the intrinsic variation.

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References:

- Lorenzi, L.: 1980a, Astron. Astrophys. Suppl. Ser. 40, 271
Lorenzi, L.: 1980b, Astron. Astrophys. 85, 342
Lorenzi, L.: 1982, Acta Astron. (in press)

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2163

Konkoly Observatory
Budapest
1982 June 16
HU ISSN 0374-0676

VARIABILITY OF KAPPA CASSIOPEIAE

Following the communication by Elst (1979) on the variability in κ Cas with a period of $\sim 0.09^d$, we followed the star during fall 1980. Using the 36 cm reflector of the U.P. State Observatory (UPSO), Nainital, we observed κ Cas (HR 130, B1 Ia, $V = 4.15$) for four nights in October and December, 1980. The UPSO telescope was equipped with a single channel photometer, with one RCA 1P21 water cooled to -20°C . The observations were made through a B filter. The magnitudes were corrected for extinction using nightly extinction coefficients. However, the magnitudes have not been transformed to the standard UBV system.

We used HD 2011 (HR93, B8, $V = 5.36$) as a comparison star and HD 144 (HR7, B8, $V = 5.44$) as a check star, but the latter being more than 4° away from the comparison star was not used often. However, at the same time, no other suitable star was available to be used as a check star according to the criterion given by Baglin et al. (1972). Percy (1981) also observed the star during November 1980. He used HD 3283 (HR146, A2n, $V = 5.82$) as a comparison star and HD5015 (HR244, F8, $V = 4.86$) as a check star.

We have plotted the differential instrumental magnitudes i.e. the magnitudes of the variable minus that of the comparison star vs time in JD, in Figure 1. The complexity of the light curves of κ Cas shows the variations of non-periodic character and suggest a beat phenomenon. The light amplitude varies from cycle to cycle. Therefore, the light curves cannot be represented by a single period. A periodogram analysis (Gupta, 1971) and a least squares analysis have been carried out to determine the frequencies present in the light variations of κ Cas. The periodogram analysis gave two periods. The largest peaks were found to correspond to a primary period of $P_0 \sim 0.072^d$ and to a secondary period of $P_1 \sim 0.058^d$. The values of the periods were found to be the same as those determined by the method of least

squares where we have also incorporated the observations by Elst (1979). The latter method also shows that the light variations are repeated at an interval of $\sim 0.16^d$ which should be the beat period between P_0 and P_1 . The semi-amplitude of the light curves is $\sim 0.015^m$. Interestingly, the ratio P_1/P_0 comes out to be ~ 0.8 . Further analysis, in progress, shows that the ratio P_1/P_0 is nearer to 0.77.

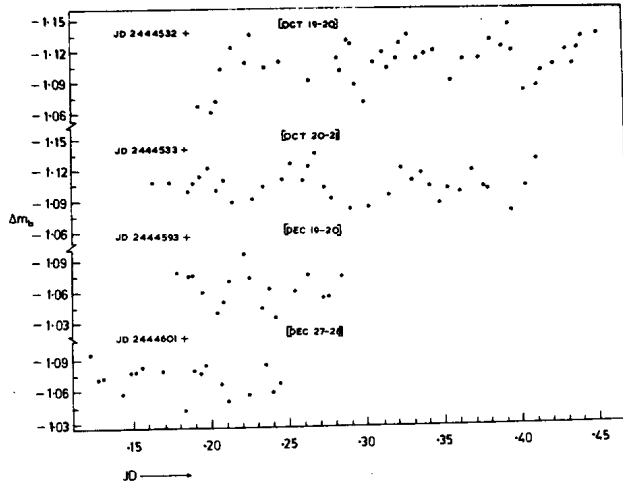


Figure 1

Our observations do not agree with those of Percy (1981) who does not find hour to hour variability in κ Cas, whereas they agree with Elst's observations as far as the short term variability is concerned, although our calculated periods are different from those of Elst's. κ Cas being a supergiant, its short-term variability raises some interesting questions about the theoretical implications, such as the cause of variability, the implied Q_0 value for a possible pulsation mechanism at work, the ratio P_1/P_0 (~ 0.77) implying radial pulsations, etc.

The star needs further extensive observations both photometric and spectroscopic, as the present situation is for most of the supergiants.

Acknowledgements:

The authors are grateful to the Director, U.P. State Observatory, Nainital, for the observing time and for the use of their facilities. We are thankful to Drs. S.C. Joshi, S.K. Gupta and Vijay Mohan for discussions and help during the observations.

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References:

- Baglin, A., Breger, M., Chevalier, C., Hauch, B., le Contel, J.M., Sareyan J.P. and Valtier, J.C., 1973, *Astron. and Astrophys.* 23, 221.
 Breger, M., 1979, *Publ. Astr. Soc. Pacif.*, 91, 5.
 Elst, E.W., 1979, *IBVS* No. 1698.
 Gupta, S.K., 1979, *Bull. Ast. Soc. Ind.*, 7, 72.
 Percy, J.R., 1981, *IBVS* No. 1946.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2164

Konkoly Observatory
Budapest
1982 June 17
HU ISSN 0374-0676

UBV PHOTOMETRY OF THE ECLIPSING BINARY SYSTEM SV TAURI

The variability of SV Tauri was discovered in 1908. The system has proven to be an Algol-type eclipsing binary with a period of $2^d.1669$. Between 1930 and 1936 Lassoovsky (1938) obtained 1260 visual observations of this system. His analysis of these observations is the most extensive discussion of SV Tauri thus far published. Using the Russell model orbital elements were obtained for both limb-darkened and undarkened cases. He found the primary eclipse to be an occultation. The eclipses are partial, and the secondary is observed to show a slight phase shift from 0.50 indicating a small amount of orbital eccentricity. The depth of the primary was found to be $1^m.09$ and that of secondary $0^m.15$. Another investigation of SV Tauri was made by Koshkina (1961), who based her study on 316 photographic estimates. The depths reported in this paper were $1^m.15$ for primary and $0^m.16$ for secondary.

Thus far no photoelectric investigation of SV Tauri has been carried out. This fact was noted by Koch et al. (1979), who listed eclipsing binaries for which little or no photoelectric data were available.

This investigator observed SV Tauri on three nights in December, 1981, with the 0.4 meter telescope no. 4 of Kitt Peak National Observatory. An RCA 1P21 photomultiplier, refrigerated with dry ice, was used. Each observation is the mean of at least two 10-second integrations on the pulse counting photometer. The comparison star used was BD +28°920. The colors and magnitudes obtained for this star were $V = 8.99$, $B-V = -0.03$, and $U-B = -0.01$.

A total of 351 observations of SV Tauri was obtained. These observations, corrected for light time and differential extinction, have been placed in the archives of the Royal Astronomical

Society. The magnitude differences are in the sense SV Tauri - BD +28°920. They range from +0.69 to +1.79 in V, +0.84 to +2.02 in B, and +0.71 to +1.96 in U. In Figure 1 on which they are plotted each marking on the vertical scale represents 0.20 mag. Unfortunately, only about one-third of the light curve was covered in this session. Additional observations are planned for the following season.

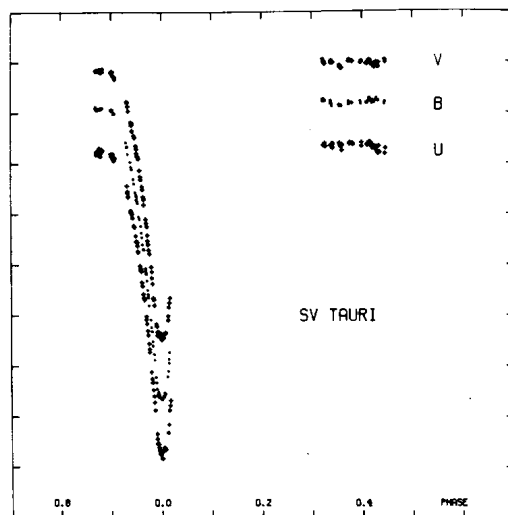


Figure 1

The magnitudes and colors obtained for SV Tauri, whose spectral type is given as B9, are as follows:

at maximum	V = 9.68	B-V = +0.10	U-B = -0.13
at primary	10.78	+0.21	-0.08

Thus the primary eclipse has depths of $1^m.10$ in V, $1^m.19$ in B, and $1^m.24$ in U. The previous finding that the eclipses are partial is also confirmed by this investigation. The duration of the primary eclipse was found by this investigator to be $0^d.421$ or 10^h06^m . This value is significantly less than that reported by Lassovszky and by Koshkina.

One time of minimum light was found in this investigation, JD Hel. 2444967.9092. Thus far it is the only photoelectric time of minimum light which has been published for this system. Visual and photographic times of minimum light for SV Tauri have been listed by Koshkina, Szafraniec (1976), and Kreiner and Winiarski (1977). Koshkina listed 103 times of minimum light observed between 1898 and 1956. Szafraniec listed an additional 11 times of minimum light observed between 1957 and 1975. Using these observations, together with his own, this investigator obtains the following ephemeris for SV Tauri:

$$\text{JD Hel. } 2434423.7491 + 2^{\text{d}}.1669051 \text{ E.} \\ \pm 13 \quad \pm 3 \text{ p.e.}$$

In the least-squares analysis the photoelectric time of minimum light was given 20 times the weight of the others. The period obtained is slightly longer than those quoted by Lassovszky ($2^{\text{d}}.1669028$) or by Koshkina ($2^{\text{d}}.1669036$). This does not necessarily indicate that the period has increased, however, as many of the earlier times of minimum light are imprecise. Kreiner (1971) gives an O-C diagram for this system. It does not show any systematic change in period.

The author hopes to obtain additional photoelectric observations of SV Tauri and to publish a detailed analysis of this system in the coming year. The system is of interest since it apparently displays a small amount of orbital eccentricity. It is typical of a large number of 10th and 11th magnitude eclipsing binaries for which few, if any, photoelectric data are available.

This investigator wishes to acknowledge the support which he has received from a Small Research Grant awarded by the American Astronomical Society.

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References:

- Koch, R. H., Wood, F. B., Florkowski, D. R., and Oliver, J. P.
1979, I.B.V.S. No. 1709
Koshkina, L. N. 1961, *Perem. Zvezdy*, 13, 412
Kreiner, J. M. 1971, *Acta Astron.*, 21, 365
Kreiner, J. M. and Winiarski, M. 1977, I.B.V.S. No. 1255
Lassovszky, K. 1938, *Abh. Astrophys. Obs. Budapest-Svábhegy* No. 6.
Szafraniec, R. 1976, *Acta Astron.*, 26, 25

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2165

Konkoly Observatory
Budapest
1982 June 17

HU ISSN 0374-0676

THE PRIMARY ECLIPSE OF RW MONOCEROTIS IN FIVE COLORS

RW Monocerotis has long been recognized as an Algol-type eclipsing binary with a deep primary minimum due to a complete occultation. Szczpanowska (1951) discusses the extensive series of visual observations made at the Cracow Observatory between 1924 and 1949. Batten (1956, 1957) obtained orbital elements for this system using visual observations made by Dugan and Pierce and photoelectric observations made by Lenouvel. Brukalska et al. (1969) obtained an extensive series of photoelectric observations of this system in the red ($\lambda_{\text{eff}} = \text{ca. } 6800 \text{ \AA}$) and in the infrared ($\lambda_{\text{eff}} = \text{ca. } 8000 \text{ \AA}$). Orbital elements were obtained by Rucinski (1970) using these observations. These data have been subsequently analyzed by Mezzetti et al. (1980) using the Wood method.

In this investigation the primary eclipse of RW Mon was observed in five colors on two nights in January, 1982, with the 1.0 meter Ritchey-Chretien telescope of the Flagstaff Station of the U.S. Naval Observatory. The photomultiplier used was an EMI 9658R (S-20 surface) refrigerated by means of a thermoelectric cooler. The photometric system used closely resembles the UBVR system developed by Cousins (1973, 1976). The effective wavelengths of the bandpasses are as follows:

U	3550 \AA
B	4350
V	5450
R	6150
I	8100

The star BD +08° 1400 was used as a comparison. The colors and magnitudes obtained for this star were $V = 9.53$, $B - V = +0.02$, $U - B = -0.07$, $V - R = +0.02$ and $V - I = +0.04$.

A total of 355 observations of RW Mon was obtained. These observations, corrected for light time and differential extinction, have been transformed to the UBVRI system of Cousins. They have been placed in the archives of the Royal Astronomical Society. The magnitude differences listed are in the sense RW Mon-BD +08⁰ 1400. The ranges of the magnitudes and depths of the primary minimum of RW Mon are as follows:

U	max. = -0.42	min. = +3.05	depth (I) = 3. ^m 47
B	-0.24	+2.68	2.92
V	-0.24	+1.98	2.22
R	-0.27	+1.55	1.82
I	-0.31	+1.20	1.51

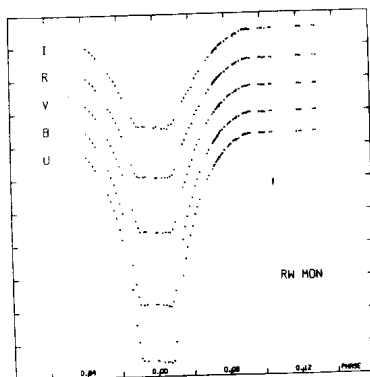


Figure 1

In Figure 1 in which the observations are plotted, each marking on the vertical scale represents 0.50 mag. The I passband used in this investigation closely resembles the one (series I) used by Brukalska et al., but their passband in the red (series II) has a much longer effective wavelength than the R band used here.

The magnitudes and colors obtained for RW Mon (HDE 259986), whose spectral type is given as A0, are as follows:

V	at maximum = 9.29	at primary = 11.51
B - V	+0.02	+0.72
U - B	-0.26	+0.30
V - R	+0.01	+0.42
V - I	+0.11	+0.75

At maximum light the colors of this system are most similar to those of a B9 star, while at minimum they closely resemble those of a G5 star. RW Mon does not appear to be significantly reddened. Thus we can regard RW Mon as consisting of components whose spectral types are B9 V and G5 IV.

The duration of the total phase portion of the eclipse was found by this investigator to be $0^d.051$ or 1^h13^m . This corresponds to a phase angle of internal tangency of $4^{\circ}.82$, a value which is somewhat larger than that reported by previous investigators. For the phase angle of external tangency, however, he found a value of $27^{\circ}.4$, which is significantly less than that reported by previous observers of RW Mon.

One time of minimum light was found in this investigation, JD Hel. 2444979.7733. When this is combined with the other photoelectric times of minimum light the following data are obtained:

JD 2433680.4491	E = 0	O-C = $+0^d.0010$	Batten
8443.77695	2499	-0.0004	Brakalska et al.
8445.68318	2500	-0.0002	"
9455.91152	3030	-0.0018	"
2443864.7101	5343	+0.0011	Olson
3883.7710	5353	+0.0011	"
4979.7733	5928	-0.0008	Chambliss

Using a least-squares solution in which each of these times is given unit weight the following ephemeris is obtained:

$$\text{JD Hel. } 2433680.4481 + 1^d.90609412 \text{ E.}$$

$$\pm \quad 6 \quad \pm \quad 16 \text{ p. e.}$$

The residuals listed above are those obtained using this ephemeris. The period of RW Mon appears to have remained constant for the past 30 years. It should be noted, however, that this period is $0^s.6$ shorter than that reported by Szczpanowska for observations made up to 1949.

This investigator wishes to acknowledge the support which he has received from a Small Research Grant awarded by the American Astronomical Society.

He also wishes to express his thanks to Drs. Harold D. Ables and Frederick J. Vrba of the U. S. Naval Observatory, Flagstaff, Arizona, for making facilities available to him at that institution.

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References:

- Batten, A. H. 1956, M.N.R.A.S., 116, 552
 Batten, A. H. 1957, Ann. d'Ap., 20, 103
 Brukalska, R., Rucinski, S. M., Smak, J., and Stepien, K. 1969,
 Acta Astron., 19, 257
 Cousins, A. W. J. 1973, Mem R. A. S., 77, 223
 Cousins, A. W. J. 1976, Mem.R. A. S., 81, 25
 Mezzetti, M., Cester, B., Giuricin, G., and Mardirossian, F.
 1980, Astron. Astrophys. Suppl. Ser., 39, 273
 Olson, E. C. 1980, I.B.V.S. No. 1840
 Rucinski, S. M. 1970, Acta Astron., 20, 351
 Szczpanowska, A. 1951, Acta Astron., Series C, 4, 137

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2166

Konkoly Observatory
Budapest
1982 June 21
HU ISSN 0374-0676

uvby PHOTOMETRY OF THE ALGOL VARIABLE HD 224113

The Algol nature of HD 224113 = HR 9049 (B5V, $V=6.08$, $B-V=-.09$) was discovered by Haefner (1981). From uvby photometry obtained in 1970 he derived a value for the orbital period of $2^d.445088$. The incomplete lightcurve reveals reflection or ellipticity effects, and evidence of gas streams may be present.

We here present in tabular form a sequence of 4-colour measurements obtained at the Danish 50cm telescope on La Silla in October 1981. The measurements have been obtained in a differential way, using two comparison stars:

C_1	HD 224112	$V=6.84$	$B-V=-.09$	A
C_2	HD 223352	$V=4.57$	$B-V=.01$	A0V

The star was measured repeatedly during 8 nights between Oct. 9 and Oct. 18 1981.

Table I gives heliocentric Julian dates, and differences between HD 224113 and HD 224112 ($V=6.84$, $b-y=-.032$, $m_1=.116$, $c_1=.670$) in the standard system of Crawford et al. (1970). The mean error on one single differential measurement in ΔV , $\Delta(b-y)$, Δm_1 and Δc_1 are resp. .0027, .0028, .0039 and .0040 magnitudes. The steep decline visible in V on JD2444896 (.1 magnitude in about 80 minutes) represents part of the descending branch of the primary minimum. The dispersion of the ΔV -values outside eclipse exceeds two times the statistical mean error on one measurement as deduced from the differences between the comparison star measurements. This scatter is due to proximity effects.

Table 1

JD 2444800	ΔV	$\Delta(b-y)$	Δm_1	Δc_1	JD 2444800	ΔV	$\Delta(b-y)$	Δm_1	Δc_1
87.6190	-.749	-.007	-.008	-.116	92.5474	-.746	-.003	-.014	-.109
87.6429	-.751	-.008	-.005	-.115	92.5628	-.747	-.004	-.011	-.112
88.5648	-.750	-.007	-.005	-.117	92.5790	-.746	-.007	-.007	-.110
88.5862	-.752	-.004	-.012	-.115	92.5893	-.744	-.008	-.007	-.110
88.6137	-.751	-.008	-.004	-.119	92.5982	-.746	-.006	-.008	-.111
88.6273	-.749	-.007	-.009	-.117	95.5363	-.744	-.004	-.014	-.113
88.6443	-.748	-.008	-.006	-.121	95.5514	-.745	-.007	-.008	-.116
89.5439	-.741	-.002	-.014	-.113	95.5662	-.751	-.003	-.013	-.111
89.5685	-.745	-.002	-.011	-.113	95.5804	-.743	-.008	-.006	-.112
89.5818	-.742	-.006	-.009	-.107	95.5945	-.745	-.009	-.004	-.112
89.5912	-.742	-.004	-.011	-.115	95.6394	-.748	-.008	-.003	-.118
90.5430	-.738	-.006	-.009	-.106	95.6589	-.748	-.007	-.006	-.117
90.5567	-.742	-.006	-.008	-.107	95.6750	-.747	-.006	-.010	-.112
90.5721	-.743	-.007	-.011	-.104	95.6898	-.750	-.005	-.010	-.116
90.5870	-.744	-.003	-.013	-.107	95.7075	-.749	-.003	-.013	-.116
90.5993	-.742	-.008	-.007	-.109	96.5404	-.629	-.003	-.011	-.110
91.5467	-.735	+.000	-.017	-.109	96.5540	-.598	-.003	-.005	-.113
91.5642	-.735	-.004	-.007	-.116	96.5702	-.562	-.008	-.000	-.112
91.5754	-.734	-.004	-.011	-.110	96.5863	-.544	-.000	-.010	-.115
91.5851	-.736	-.003	-.007	-.112	96.5969	-.533	-.004	-.005	-.112
91.5980	-.729	-.005	-.006	-.114					

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References:

- Crawford, D.L., Barnes, J.V., Gollson, J.C. 1970, *Astron.J.* **75**, 624
- Haefner, R. 1981, *Comm.* 27, *IAU Inf. Bull. Var. Stars* No. 1996.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2167

Konkoly Observatory
Budapest
1982 June 22
HU ISSN 0374-0676

"CEPHEID" EY Sgr NONVARIABLE?

The G.C.V.S. lists EY Sgr as a classical Cepheid with $m_p = 13^m.1-14^m.2$ as given by Cannon (1925). No period is quoted. The coordinates given ($19^h 31^m 51^s$, $-12^\circ 21' 9''$ (1900)) are occupied by a pair of stars separated by about $15''$. Figure 1 shows the two components (A = southeast, B = northwest) in a tracing from the Palomar Sky Survey print (epoch 1950). The

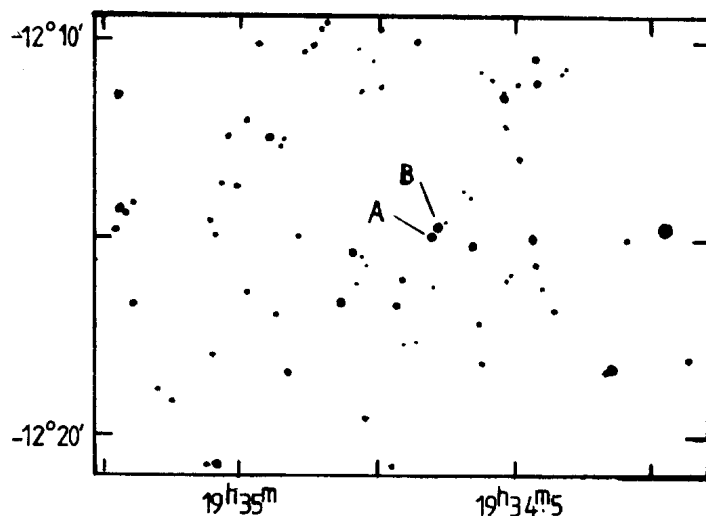


Figure 1

nearest comparably bright object is about 1'1 away and is very unlikely to be confused in position with EY Sgr. Each component of the double was measured on numerous occasions in 1979-81 and proved constant to approximately the percent level. Table I gives the final mean magnitudes and colors, the standard deviation per observation, and the number of observations.

TABLE I

	EY Sgr-SE		EY Sgr-NW	
V	12.604	0.012(13)	12.770	0.016(13)
B-V	0.918	0.011(13)	0.852	0.010(13)
V-R _C	0.543	0.011(10)	0.497	0.009(10)
V-I _C	1.060	0.017(9)	0.981	0.020(9)

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Reference:

Cannon, A.J., 1925, Harvard Bulletin 825.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2168

Konkoly Observatory
Budapest
1982 June 23
HU ISSN 0374-0676

1981 PHOTOMETRY OF UX ARIETIS

As part of our long-term project of photometry of RS CVn stars, we observed the non-eclipsing system UX Ari (= HD 21242) in fall-winter 1981. All observations were made with UNM's 61-cm telescope at Capilla Peak Observatory. The photon-counting photometer uses a cooled (-20°C) EMR 641A phototube. The comparison star was 62 Ari ($V = +5.54$, G5). Integration times were chosen so that the statistical error in each observation was ± 0.01 mag. or better.

Figures 1-4 show the magnitude differences (comparison-source) in the UBVR instrumental bands. The phases were calculated from $\text{HJD} = 2440133.75 + 6.43791 E$ (Landis et al., 1978). The distortion wave in the light curve is clearly visible: it peaks at about phase 0.59, and bottoms out at phase 0.97. The amplitude of the wave (peak to peak) in the instrumental magnitude system is: 0.15 mag at U, 0.17 mag at B, 0.21 at V, and 0.22 at R, with the system being reddest at the distortion wave minimum.

The phase and amplitude of the distortion wave in UX Ari has undergone erratic behavior in the past 10 years (see Guinan et al., 1981, and the references cited there). In particular the phase of the minimum of the distortion wave moved toward decreasing orbital phase in 1972-77; but between early and late 1980, it moved toward increasing phase. For 1981.0, Guinan et al. (1981)

2

UX ARI (B)

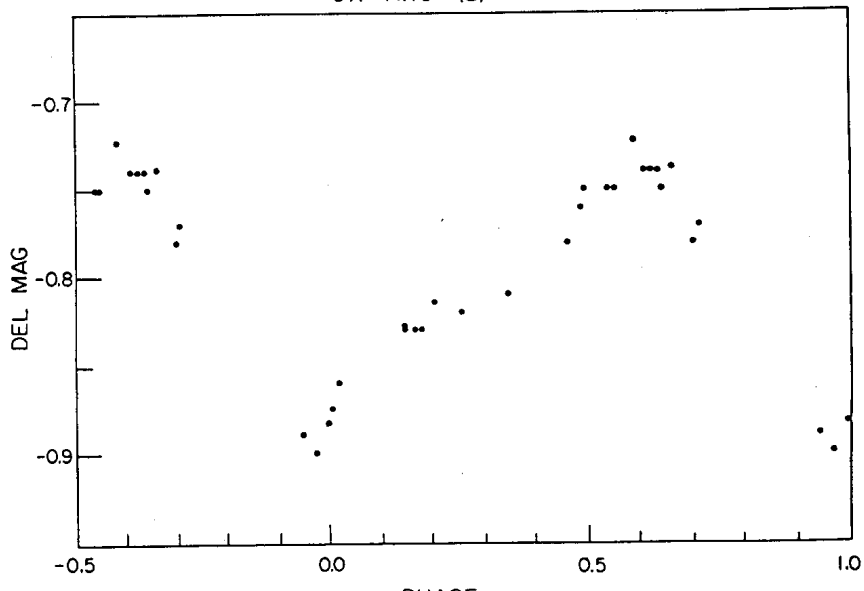


FIGURE 1

UX ARI (U)

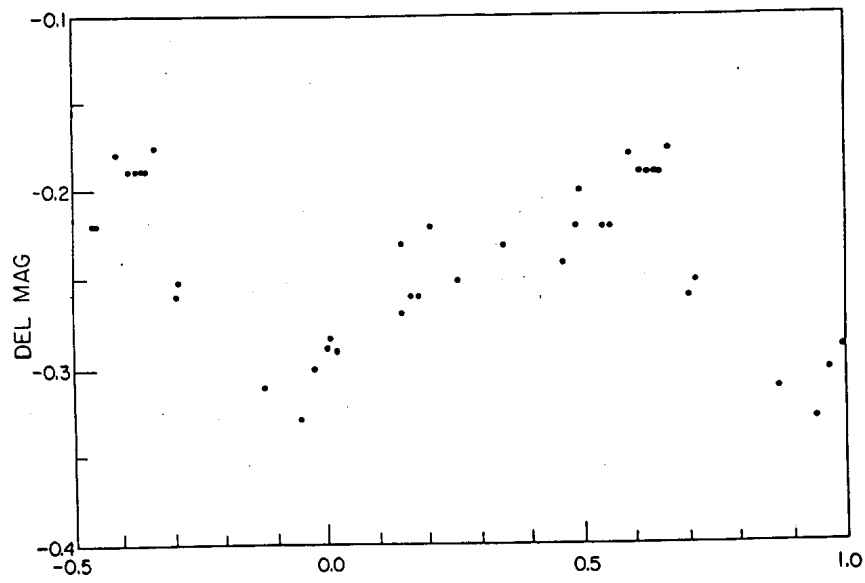
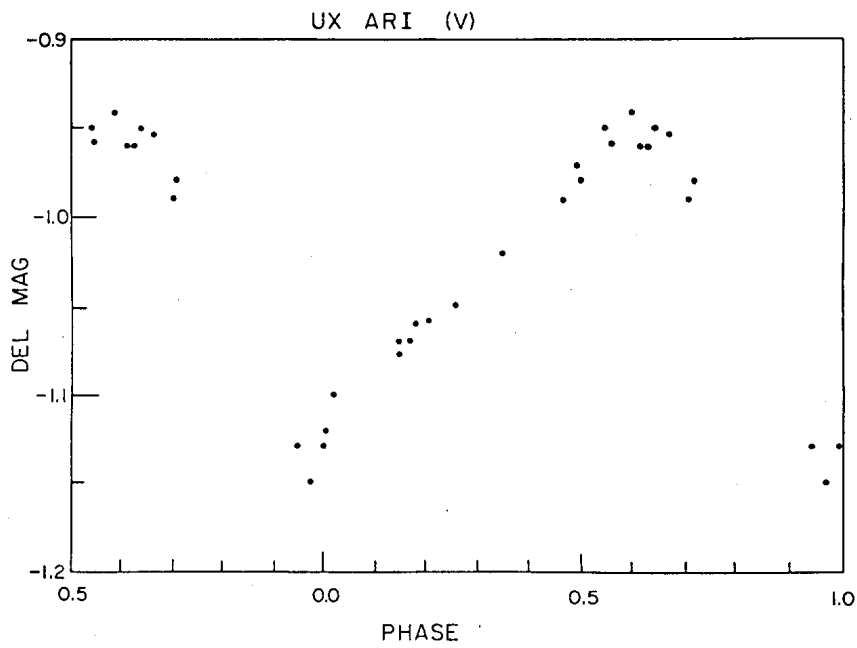


FIGURE 2

3



cite a phase 0.97 for minimum, the same as our late 1981 result. So the distortion wave's phase has remained steady for a year and perhaps will move retrograde again.

From 1977 to 1981, the amplitude of the wave at V has varied from 0.04 to 0.17, with Guinan et al. (1981) giving 0.16 for 1981.0. Our results indicate that the amplitude has increased since then.

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References:

- Guinan, E.F., McCook, G.P., Fragola, J.L., O'Donnell, W.C., Weisenbergen, A.G., 1981, Pub.Astr.Soc.Pac., 93, 495.
Landis, H.J., Lovell, L.P., Hall, D.S., Henry, G.W., Renner, T.R., 1978, A.J., 83, 176.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2169

Konkoly Observatory
Budapest
1982 June 23
HU ISSN 0374-0676

1982 UBVR PHOTOMETRIC OBSERVATIONS OF XY UMa

As part of our program of photometric observations of RS CVn stars, we have observed the short-period (0.48 day) system XY UMa (SAO 27143). The primary star is G2-G5; the secondary K5 (Geyer, quoted by Lorenzi and Scaltriti, 1977). The observations were made in the UBVR instrumental bands on two nights in January and February of 1982. UNM's Capilla Peak Observatory's 61-cm telescope employing a computer-controlled, single-channel, photon-counting photometer with an EMR 641A phototube (cooled to -20°C) was used for all observations.

The results of our observations are shown in Figures 1-4. The error in any data point is ± 0.01 magnitude. SAO 27139 ($+54^{\circ}1278$) was used as the comparison star, and the phases were calculated using $\text{HJD}=2435216.5086 + 0.478995E$ (Wood, Oliver, Florkowski, Koch, 1980). Table I gives a phase log for the observations.

XY UMa has been found to exhibit large and long-term changes in its light curve and system brightness. Geyer (1977) and Geyer and Metz (1977) attribute the variability to starspot activity of the hotter component. Geyer's light curves show strong asymmetries, even the disappearance of the secondary eclipse

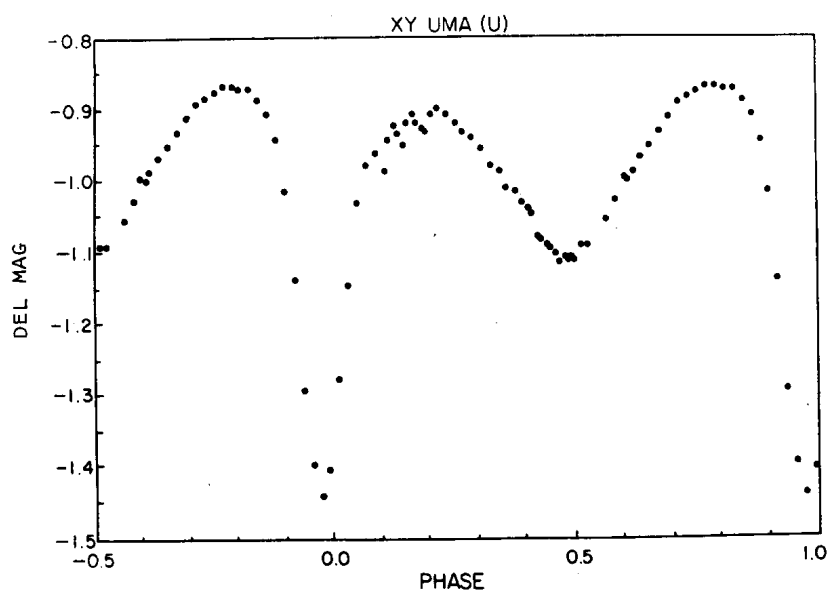


FIGURE 1

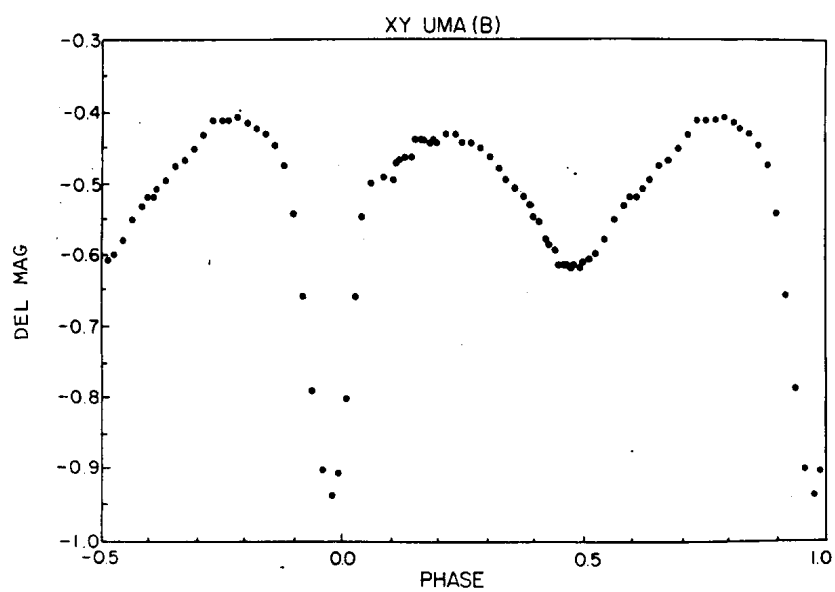


FIGURE 2

3

XY UMA (V)

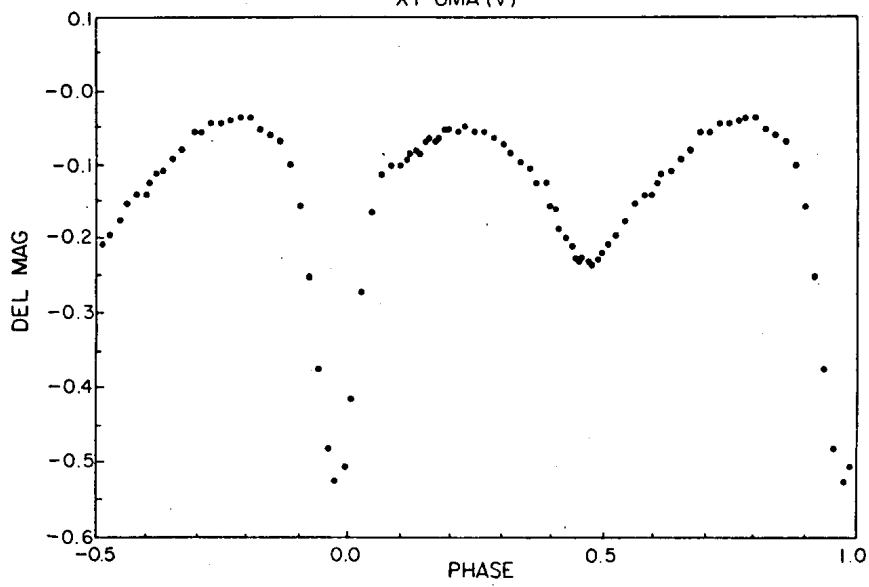


FIGURE 3

XY UMA (R)

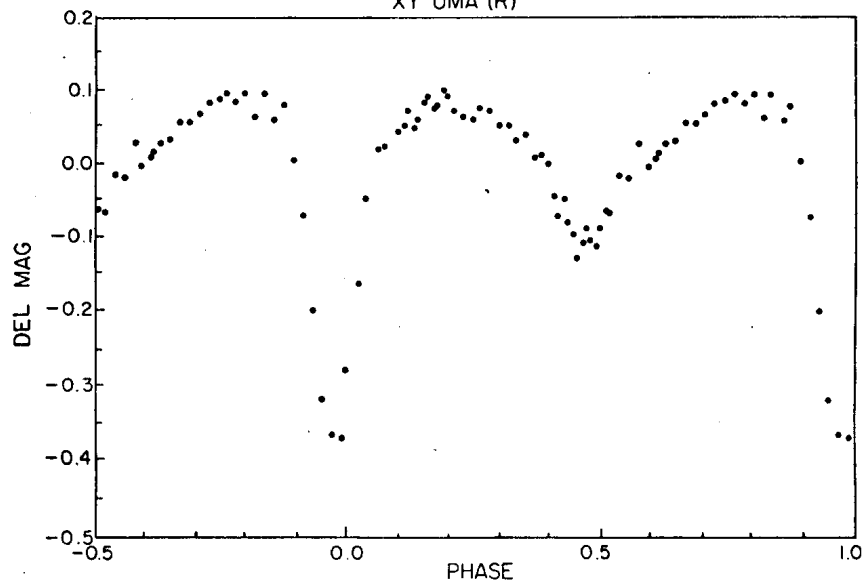


FIGURE 4

in 1975. Our light curves are similar to the observations made by Geyer in 1976. Both primary and secondary eclipses are asymmetric with the secondary becoming more pointed at longer wavelengths. Also, the light curve is depressed around phase 0.25 relative to phase 0.75 by 0.04 magnitude at U, 0.03 at B, 0.02 at V, and 0.01 at R. This would indicate a distortion wave of small amplitude with a minima at about phase 0.25.

Table 1

XY UMa 1982 Phase Log

<u>Date</u>	<u>Phase</u>
1-31	0.04 → 0.20
2-20	0.12 → 0.62

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References:

- Geyer, E.H., 1977, *Astrophys. and Space Sci.*, Vol. 48, 137.
 Geyer, E.H. and Metz, K., 1977, *Astrophys. and Space Sci.*, Vol. 52, 351.
 Lorenzi, L. and Scaltriti, F., 1977, *Acta Astron.*, Vol. 27, 273.
 Wood, F., Oliver, J., Florkowski, D., Koch, R., 1980, *Pub. of the University of Pennsylvania Astronomical Series*, Vol. XII.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2170

Konkoly Observatory
Budapest
1982 June 23
HU ISSN 0374-0676

SUPPLEMENTARY STRÖMGREN PHOTOMETRY OF THE Ap STARS HD 30849
AND HD 53116

Both Ap stars HD 30849 and HD 53116 have been observed earlier for photometric variability. The results were published by Hensberge et al. (1981). The stars were selected from the Vogt-Faúndez paper (1979) because of indication of pronounced variability. The observations of Hensberge et al. confirmed variability up to 0^m.1 in Strömgren v for HD 30849, and up to 0^m.1 in Strömgren u for HD 53116. The measurements were used together with the Vogt-Faúndez data to derive the period of variability, but no unique solution could be given. In the case of HD 30849, several rotation periods between 15.6 and 16 days could represent the data. In the case of HD 53116 two possibilities remained open: nearly 12 days or about 18.1 days. Both stars have been reobserved in 1981 in order to remove these ambiguities. The observations were obtained at the ESO 50 cm telescope, by Catalano (HD 30849) and Weiss (HD 53116) respectively, during observing time obtained by the European Ap Workgroup. The comparison stars of Hensberge et al. (1981) were used again, and differential magnitudes were calculated in the same way.

The new observations, given in Table I, are compatible only with

$$P = 15.865 \pm 0.005 \quad \text{for HD 30849}$$

$$P = 11.978 \pm 0.005 \quad \text{for HD 53116}$$

as the reader can check in the corresponding Figures 1 and 2.

Table I

JD 2 444 000+	HD 30849 - HD 31640				Δa	ϕ for ($\phi=0$) = HJD 2 444197.621+			
	Δu_{instr}	Δv_{instr}	Δb_{instr}	Δy_{instr}		15.865E ± 0.005	15.600E	15.731E	15.99E
614.736	0.966	0.945	0.824	0.768	-	0.292 $\pm .009$	0.738	0.516	0.071
619.611	0.959	0.895	0.814	0.801	0.021	0.599 $\pm .009$	0.051	0.825	0.376
625.560	1.008	1.005	0.836	0.800	0.032	0.974 $\pm .009$	0.432	0.204	0.748
	HD 53116 - HD 53238					ϕ for ($\phi=0$) = HJD 2 444230.732+			
	Δu_{instr}	Δv_{instr}	Δb_{instr}	Δy_{instr}		11.978 \pm 0.005		18.105 \pm 0.007	
666.561	0.038	0.334	-	-	-	0.386 \pm 0.015		0.072 \pm 0.01	
668.538	0.103	0.294	0.382	0.512	0.040	0.551 \pm 0.015		0.181 \pm 0.01	
670.531	0.102	0.301	-	-	-	0.717 \pm 0.015		0.292 \pm 0.01	
672.535	0.088	0.289	0.381	0.528	0.046	0.885 \pm 0.015		0.402 \pm 0.01	

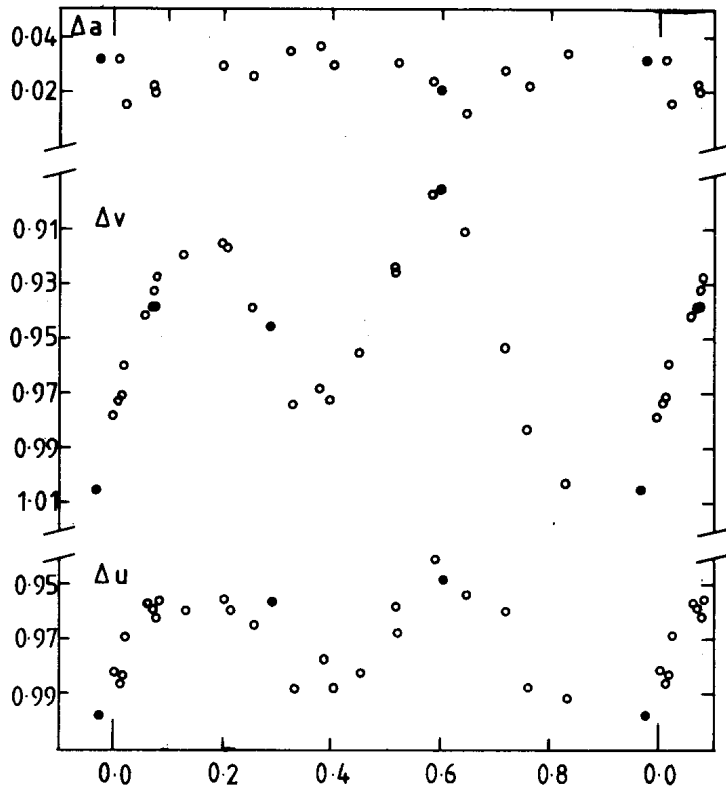


Fig. 1 Differential observations Δv and Δu in the sense HD 30849 - HD 31640, and the variation of the peculiarity index Δa (Maitzen, 1976) according to the ephemeris ($\phi=0$) = HJD 2 444 197.621 + 15.865 E. The new observations are indicated by filled circles.

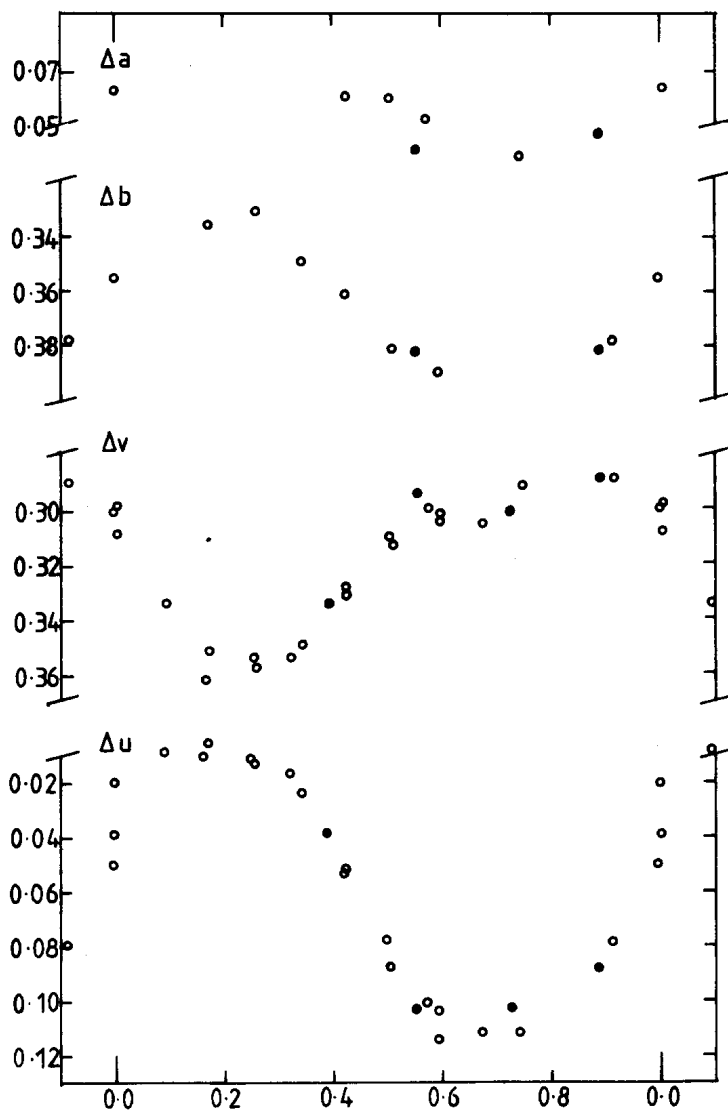


Fig. 2 Differential observations Δb , Δv and Δu in the sense HD 53116 - HD 53238, and the variation of the peculiarity index Δa (Maitzen, 1976) according to the ephemeris ($\phi=0$) = HJD 2 444 230.732 + 11.978 E. Symbols have the same meaning as in Figure 1.

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References :

- Hensberge, H., Maitzen, H.M., Deridder, G., Gerbaldi, M.,
Delmas, F., Renson, P., Doom, C., Weiss, W.W., Morguleff, N.:
1981, Astron.Astrophys.Suppl. 46, 151.
- Maitzen, H.M. : 1976, Astron.Astrophys. 51, 223.
- Vogt, N., Faúndez, M. : 1979, Astron.Astrophys.Suppl. 36, 477.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2171

Konkoly Observatory
Budapest
1982 June 25
HU ISSN 0374-0676

VARIABLE STARS IN THE GLOBULAR CLUSTER MESSIER 28 (NGC 6626)

The investigation of variables in this cluster (Cl821-249) has continued at the David Dunlap Observatory since the paper by Sawyer (1949, A.J. 54, 193) and during the past decade in collaboration with researchers at the University of Western Ontario. Otherwise the variables in this cluster have received little attention except in the work of Dr. Dorrit Hoffleit in the field, summarized in IBVS 660, 1972 and some recent work by Dr. T. Lloyd Evans (1980, private communication).

Because of the cluster's southern declination, observations from our latitudes have proved somewhat inconclusive in determination of periods, and we await further plates from the University of Toronto 0.6 m telescope at Las Campanas, Chile. About six new or suspected cluster variables have been found by Vicki Watt at the DDO as well as five new long period field variables. Two additional new variables have been found by the authors of this paper.

Accordingly it seems useful now to upgrade the list of variables in this cluster in the Third Catalogue of Sawyer Hogg in 1973 (Pub. D.D.O. 3, 6). The new list is given in Table I, but does not include the new field variables. Periods are based on magnitude measures by the two of us as well as those of Roslyn Moorhead of the University of Western Ontario. At the time of writing we have periods for 10 RR Lyrae stars and for V 4, the known W Vir type. In addition, a new variable, V 21, appears to have a long W Vir period of about 29 days and V 17 seems to be RV Tau type. Four variables are red and irregular. V 7 is not visible on most of our plates and is probably a field variable.

The full paper, with observations and light curves of the variables, will be completed in 1983. The standard sequence used for our measures may be revised from comparison with the work of G. Alcaïno (1981, Astron. Astrophys. Suppl. 44, 191). Our sequences are in general agreement down to the 15th magnitude but then begin to diverge. Therefore in Table I the magnitudes listed for the RR Lyrae stars, especially at minimum, are probably too bright.

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Table I

Variable Stars in Messier 28

No	x"	y"	Max	Min	Epoch	Period	Remarks
1	+174.0	+ 88.5	15.25	16.1	42590.853	0.491753	
2	- 47.3	+ 63.1	14.3	14.9			irr, red
3	- 32.9	+111.0	14.5	15.2			irr, red
4	- 34.5	+ 33.6	13.7	14.7	44371.894	13.457	
5	- 44.8	+ 16.4	14.8	15.8	36040.674	0.644360	
6	+ 34.1	+ 50.4	14.3	15.1			irr, red
7	+172.2	+102.7	14.8	17.0			f
8	+227.3	-222.3	15.1	16.2	44428.860	0.565995	
9	-158.6	-252.4	14.75	15.7	35696.652	0.661544	
10	+ 96	- 79	14.0	14.7			irr, red
11	- 14	+ 35	15.1	16.3	44429.835	0.542782	
12	+148	- 49	15.0	16.1	35335.633	0.578242	
13	- 92	- 24	15.5	15.9	42225.798	0.33599	
14	-131	-100	15.6	16.2	42589.850	0.418274	
15	-472	-186	15.5	16.6	42229.732	0.448331	
16	+432	-372	15.8	16.5			RR
17	+ 42	- 68	12.9	14.5			RV Tau
18*	+ 55	+ 20	15.3	16.4			new var, Watt, RR
19	+ 66	+ 15	15.3	15.9			new var, AW, RRC
20	+ 7	+ 29	14.6	15.7			new var, Watt
21	+ 7	+ 11	14.1	15.8	44429.835	27.6or29.9	new var, Watt
22	+ 6	+ 2	15.2	16.4	44432.666	0.498828	new var, HSH
23	+ 26	- 53	15.5	16.1			new var, Watt, RRC
24	-452	+109	15.7	16.1			new var, Watt, RRC

* V18 in 3rd Catalogue is same as V12.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2172

Konkoly Observatory
Budapest
1982 June 28

HU ISSN 0374-0676

SOME REMARKS ON THE T TAURI STAR DR Tau

In supplementing and completing the known light curves (Götz, 1980) the star was inspected on 26 blue-sensitive and on 33 photovisual sky patrol plates of Sonneberg Observatory covering the time interval between 1980 January 12 and 1982 February 21. The used sequence of comparison stars in B is given in the finding chart in Figure 1. The apparent magnitudes m_B of these stars obtained by linking to the UB_V-sequence of the open cluster NGC 1647 (Hoag et al., 1961) are listed in Table I. The comparison stars g, h, i and k are identical with the stars a, b, c and d given by Kholopov (1951).

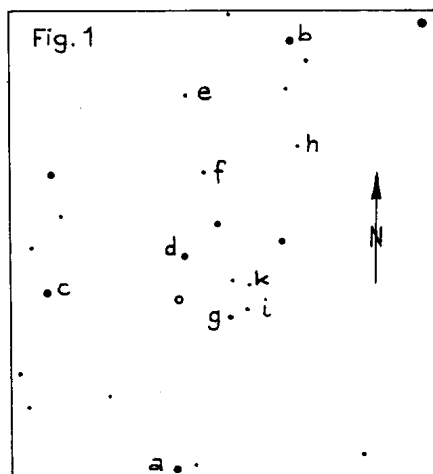


Figure 1

Table I

Comp. star	m_B	Comp. star	m_B
a	10.95	f	13.30
b	11.37	g	13.72
c	11.87	h	14.20
d	12.33	i	14.65
e	12.83	k	15.08

The extended light curve of DR Tau in B is shown in Figure 2.

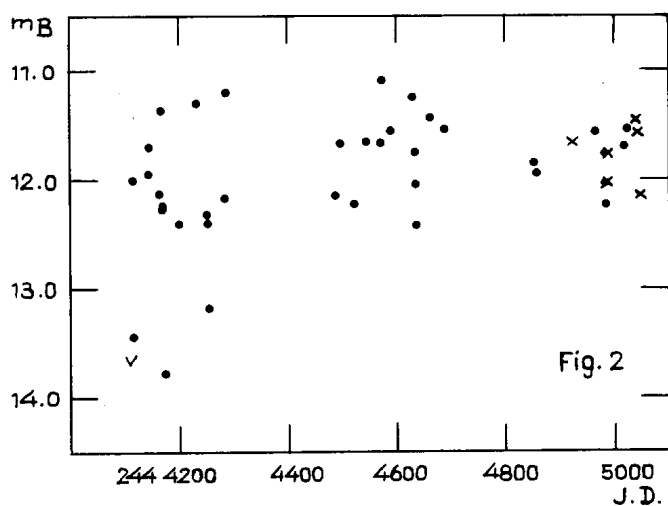


Figure 2

The star has retained its **mean brightness** obviously. But it is remarkable that the **strong light depressions** which were starting from the bright normal **light and** which were still observed in the season 1979/80 did **probable** not appear in the seasons 1980/81 and 1981/82.

The crosses drawn in **Figure 2** represent magnitudes estimated on 6 objective prism plates **obtained** with the 50/70/172 cm Schmidt camera of Sonneberg **Observatory**.

More details about the behaviour of DR Tau in the past years will be published in MVS.

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References:

- Götz, W., 1980, MVS 8, 143
Hoag, A.A., Johnson, H.L., Iriarte, B., Mitchell, R.I., Hallam,
K.L., Sharpless, S., 1961, Publ. US Naval Obs., 2nd Ser,
Vol. 17., No. VII
Kholopov, P.N., 1951, VS 8, 83

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2173

Konkoly Observatory
Budapest
1982 July 2
HU ISSN 0374-0676

VBLUW MEASUREMENTS OF THE SHELL STAR PLEIONE

Measurements in the Walraven VBLUW system were performed of Pleione, the well known shell star in the Pleiades cluster (HD23862, $m_v = 5.20$. Sp. type B8Vn + shell according to Abt and Levato (1978)). The measures were made in the periods 1977 November and December, 1979 November, 1980 November and 1981 October and November, with the Walraven VBLUW photometer on the Dutch 91cm telescope at the ESO site on La Silla, Chile (see Lub (1979) for further references). The observations of 1977 were performed before the telescope and photometer were moved from the Leiden Southern Station on the SAAO annex near the Hartbeespoortdam in South Africa to the ESO site.

Golay and Mauron (1982) presented data for Pleione on the Geneva system, obtained between 1962 and 1979 December. The data presented here can be seen as an extension to these measurements up to 1981 November and are therefore presented in a similar way. Table I gives the data and their estimated mean errors (in units of 0.001 magn) as differences in magnitudes between Pleione and Maia (HD 23408, $m_v = 3.88$ Sp.type B8 IV sn). The 1981 measurements are split into three groups. All data are shown in Fig. 1.

Table I

Date	ΔV m.e.	ΔB m.e.	ΔL m.e.	ΔU m.e.	ΔW m.e.	n
1977 Nov.-Dec.	1.343 2	1.390 3	1.438 4	1.593 6	1.686 10	2
1979 Nov.	1.348 1	1.375 1	1.440 2	1.770 3	2.055 5	3
1980 Nov.	1.350 1	1.380 1	1.470 2	1.873 3	2.185 4	1
1981 Oct. 18-23	1.340 0	1.378 0	1.463 1	1.900 1	2.273 2	11
1981 Oct. Nov. 6	1.340 0	1.378 0	1.465 1	1.898 1	2.265 2	19
1981 Nov. 17	1.340 1	1.375 1	1.460 2	1.910 3	2.250 4	2

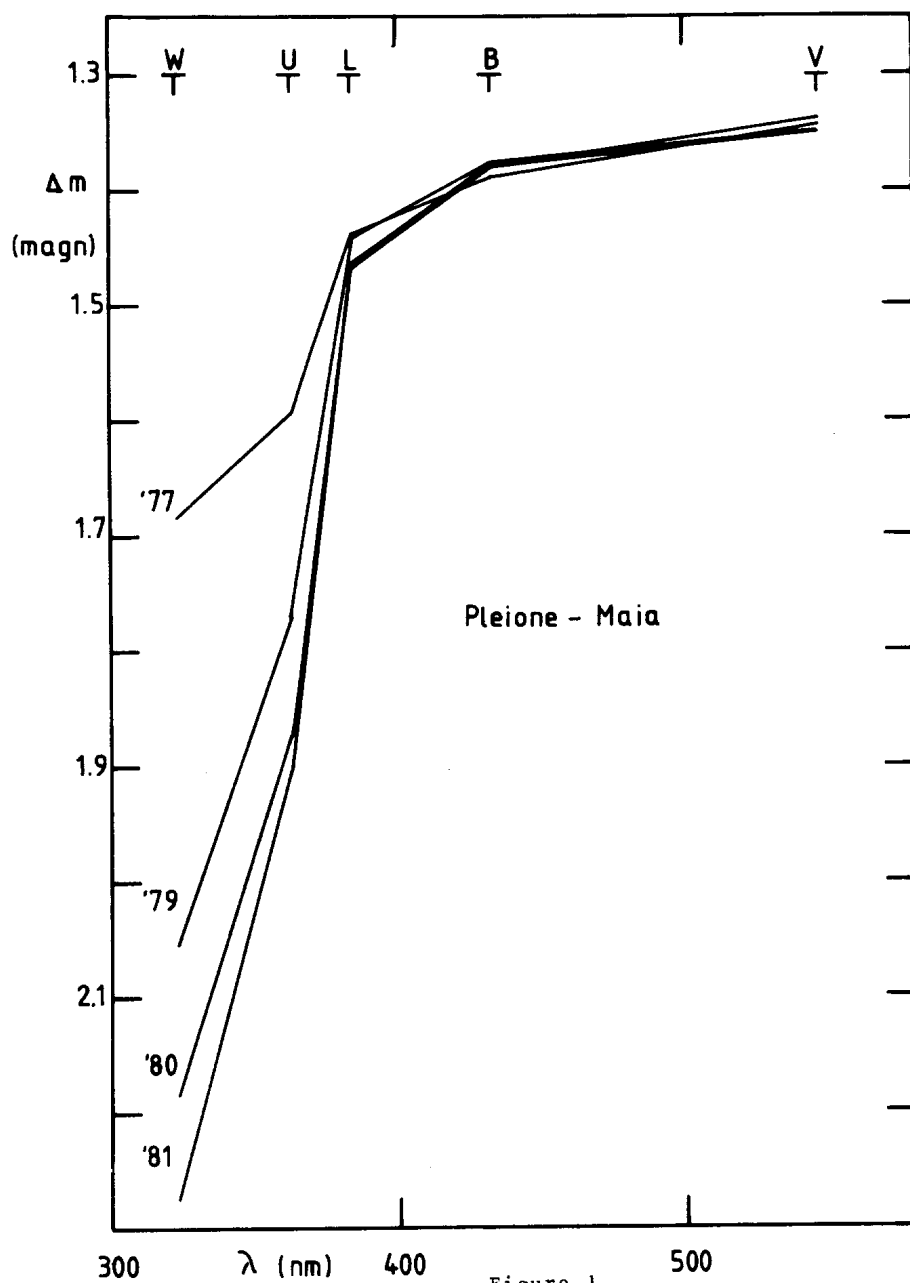


Figure 1

Differences in magnitude between Pleione and Maia for the five Walraven channels as measured during the years 1977 till 1981.

The Ultra Violet blocking by the Hydrogen shell clearly increased during 1980 and 1981, but the increase goes less rapidly than in the years 1977 to 1979. The blocking is prominent in the Balmer continuum and does not influence the B V and L channels. The slope becomes less steep towards the W channel, which is in agreement with IUE observations during 1978-1979 (see Golay and Mauron), which show a maximum absorption at about 2500 \AA . The 1981 measurements may indicate some shorter time scale variations in U and W. On November 17 the U flux had decreased by 0.012 magnitudes, while the W flux had increased by 0.015 magnitudes with respect to the October measurements.

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References:

- Abt, H. A. and Levato H., 1978: Publ. Astron. Soc. Pacific 90, 201-203
 Golay, M. and Mauron, N., 1982: Astron. Astroph. Suppl. Ser. 47, 547-559
 Lub, J., 1979: ESO Messenger 19.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2174

Konkoly Observatory
Budapest
1982 July 8

HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR BY Dra IN 1979

Continuous photoelectric monitoring of the flare star BY Dra has been carried out at the Stephanion Observatory ($\lambda = -22^{\circ}49'44''$, $\phi = +37^{\circ}45'15''$) during the year 1979, using the 30-inch Cassegrain reflector of the Department of Geodetic Astronomy, University of Thessaloniki. Observations have been made with a Johnson dual channel photoelectric photometer in the B colour of the international UBV system. The telescope, the photometer and the observational procedure have been described elsewhere (Mavridis et al., 1982). Here we mention only that the transformation of our instrumental ubv system to the international UBV system is given by the following equations:

$$\begin{aligned} V &= v_0 + 0.099(b-v)_0 + 1.933, \\ B-V &= 0.698 + 1.008(b-v)_0, \\ U-B &= -1.178 + 1.003(u-b)_0. \end{aligned}$$

The monitoring intervals in UT as well as the total monitoring time for each night are given in the Table I. Any interruption of more than one minute has been noted.

During the 19.67 hours of the monitoring time no flare was observed.

Table I

Monitoring intervals in 1979

Date 1979 July	Monitoring intervals (U.T.)	Total monitoring time
11	20 ^h 32 ^m - 21 ^h 01 ^m , 21 ^h 03 ^m - 21 ^h 33 ^m , 21 ^h 36 ^m - 22 ^h 01,	01 ^h 24 ^m
12	19 54 - 20 19 , 20 23 - 20 57 , 21 00 - 21 56,	01 55
13	20 39 - 21 11 , 21 13 - 22 03 .	01 22
14	19 57 - 20 39 , 20 42 - 21 20 , 21 23 - 21 53,	01 50
19	20 21 - 20 52 , 20 54 - 21 06 , 21 09 - 21 42, 21 44 - 22 09 .	01 41
20	19 38 - 20 14 , 20 17 - 20 52 , 20 55 - 21 24,	01 40
21	19 51 - 20 24 , 20 26 - 20 57 , 20 59 - 21 25,	01 30
22	19 43 - 20 08 , 20 14 - 20 49 , 20 51 - 21 16,	01 25
23	20 31 - 20 54 , 20 57 - 21 27 .	53
26	19 24 - 19 58 , 20 00 - 20 31 , 20 34 - 20 57,	01 28
27	19 40 - 20 11 , 20 13 - 20 46 , 20 48 - 21 15,	01 31
30	19 22 - 19 59 , 20 01 - 20 32 , 20 34 - 21 07,	01 41
31	19 47 - 20 22 , 20 25 - 21 10 .	01 20

Total 19^h40^m = 19^h.67

Acknowledgements:

The support of the National Hellenic Research Foundation for this research is gratefully acknowledged.

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Reference:

Mavridis, L.N., Asteriadis, G. and Mahmoud, F.M.: 1982, in:
Compendium in Astronomy, (Eds.: E.G. Mariolopoulos, P.S.
Theocaris, and L.N. Mavridis) D. Reidel, Dordrecht-Holland,
p. 253

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2175

Konkoly Observatory
Budapest
1982 July 12
HU ISSN 0374-0676

HIGH SPEED PHOTOMETRY OF V794 AQUILAE

X-ray and optical observations of V794 Aql were recently reported by Szkody *et al.* (1981), which show that this star is a member of the cataclysmic variable class. Their photometric observations show that V794 Aql is variable by up to 0.5 mag on an hourly timescale, with greater variations on a timescale of days. This note draws attention to the tremendous activity that occurs on a timescale of tens of seconds.

Observations were made on the nights of 30 and 31 May, 1982, with the high speed photometer attached to the 40 inch reflector at the Sutherland site of the South African Astronomical Observatory. Integrations in white light of 5 secs and 10 secs respectively were used. The lengths of observation were 2.0 hours and 3.2 hours respectively.

The light curve (corrected for atmospheric extinction) obtained on 30 May is shown in Figure 1. The mean light level corresponds approximately to $V = 14.6$, so V794 Aql was in a "high state" at the time of observation.

It can be seen from Figure 1 that V794 Aql is one of the most active of cataclysmic variables. Brightness variations of up to 0.5 mag occur on a timescale of minutes with smaller flares on timescales of tens of seconds.

The light curve for 31 May was similar to that seen in Figure 1. Power spectra of each of the light curves do not show any significant periodic components. Nor is there any sign of orbital modulation of the light curve that would indicate a period less than 3 hours.

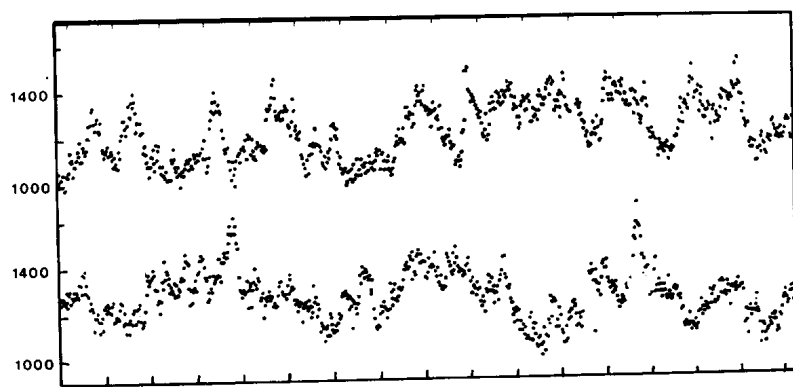


Figure 1

Light curve of V794 Aql at 5 sec time resolutions. The ordinate is counts per second. Abscissa marks are at intervals of 0.0025 day (216 secs) starting in the top left hand corner at JD_0 2445120.5925, and continuing along the lower axis for the bottom curve.

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Reference:

P. Szkody, L. Crosa, G.D. Bothun, R.A. Downes and R.A. Schommer,
Astrophys. J. Letts., 249, L61, 1981.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2176

Konkoly Observatory
Budapest
1982 July 16
HU ISSN 0374-0676

A 2.2 μ m LIGHT CURVE OF THE ECLIPSING BINARY VW CEPHEI

The star VW Cephei is a triple system (Hershey 1975) with a W UMa type eclipsing binary (components A and B; subclass W according to Binnendijk 1970) and a remote companion (C) of estimated spectral type K7V, while G8 is obtained for (A+B). Due to a 0".64 separation between (A+B) and (C), the three lights are included in photometric measurements. Variable period as well as variable light curve have been reported (Kwee 1966 a, b - Van't Veer 1973 - Rovithis and Rovithis-Livanou 1980 - Niarchos 1980). Various models have been proposed for the latter phenomenon (Kwee 1966 a - Leung and Jurkevich 1969 - Van't Veer 1973 - Pustynnik and Sorgsepp 1976) in term of spots and/or circumstellar gas. The observed period shortening possibly contradicts the thermal oscillation theory (Linnell 1980). See also Walter 1979 for a precessional model.

Since the infrared observations we reported for VW Cephei (Lunel et al. 1979) the 77°K PbS photometer was abandoned for a more sensitive InSb version. New observations at $\lambda = 2.2 \mu$ m (K window) were made at the Cassegrain focus of the 80 cm telescope of the Observatoire de Haute-Provence (CNRS France) during the night of 1980 October 25 (Fig. 1). The star BD +75°764 was used as a comparison star.

No strong perturbation can be ascertained in the light curve, despite the improved signal to noise ratio. The mean amplitude of 0.22 mag. at $\lambda = 2.2 \mu$ m as precedently quoted (Lunel et al. 1979) is confirmed. The total flux of the system at maximum light is the same as the one observed in January 1976. The difference between maxima heights is only 0.01 mag. while the difference between minima is about 0.024 mag. According to Heinz (1975) component C is 2.9 mag.

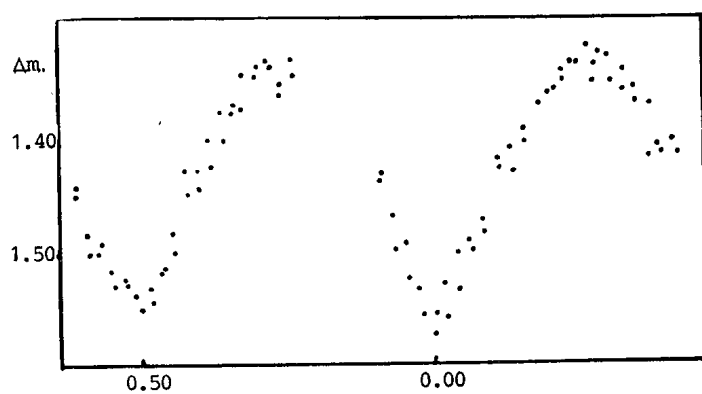


Figure 1

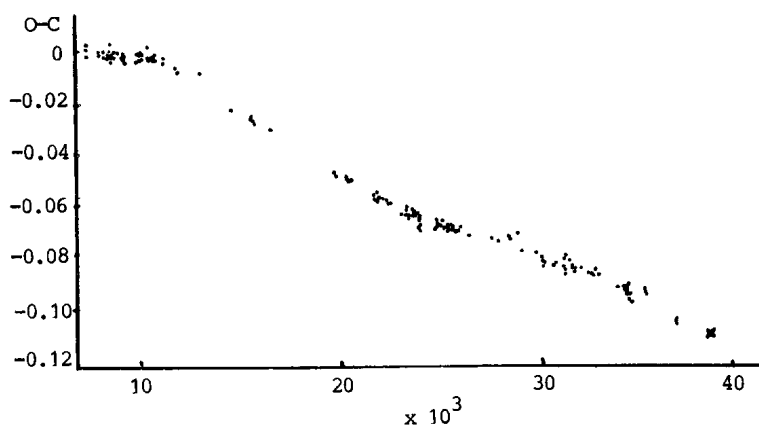


Figure 2

fainter than (A+B) at maximum in visual light. Assuming for C the spectral distribution for a K7V star, a $F(A+B)/F(C) = 4.4$ light ratio is deduced at $2.2 \mu\text{m}$ to be compared to 14.4 in visual light. The observations of Fig. 1 can then be corrected for the third light, using the former ratio. The mean amplitude then becomes 0.28 mag.

The epoch of the primary minimum has been determined by the method of Kwee and Van Woerden (1956). We obtained :

J.D. 2 444 538. 4223 and $O - C = - 0.1131$

in good agreement with the O-C diagram as established by Van't Veer (1973) and Hopp et al. (1979). See Fig. 2 .

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References:

- Binnendijk, L., 1966, *Vistas in Astronomy* 12, 217
 Heinz, W.D., 1975, *IAU Inf. Circ. Vis. Double Stars* No. 64
 Hershey, J.L., 1975, *Astron. J.* 80, 662
 Hopp, U., Witzigmann, S. and Kiehl, M., 1979, *IBVS* No. 1599
 Kwee, K.K., 1966a, *Bull. Astron. Inst. Netherl.* 18, 448
 Kwee, K.K., 1966 b, *Bull. Astron. Inst. Netherl. Suppl.* 1, 265
 Kwee, K.K. and Van Woerden, H., 1956, *Bull. Astron. Inst. Netherl.* 12, 217
 Leung, K.C and Jurkevich, I., 1969, *B.A.A.S.* 1, 251
 Linnell, A.P., 1980, *P.A.S.P.* 92, 202
 Lunel, M., Roux, S., and Bergeat, J., 1979, *IBVS* No. 1670
 Niarchos, P.G., 1980, *IBVS* No. 1729
 Pustyl'nik, I. and Sorgsepp, L., 1976, *Acta. Astron.* 26, 319
 Rovithis, P. and Rovithis-Livaniou, H., 1980 *IBVS* No. 1736
 Rovithis, P. and Rovithis-Livaniou, H., 1980 *Astrophys. and Space Science*, 73, 27
 Van't Veer, F., 1973, *Astron. and Astrophys.* 26, 357
 Walter, K., *Astron. and Astrophys.*, 1979, 80, 27

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2177

Konkoly Observatory
Budapest
1982 July 16
HU ISSN 0374-0676

1981 UBVR PHOTOMETRY OF II Peg

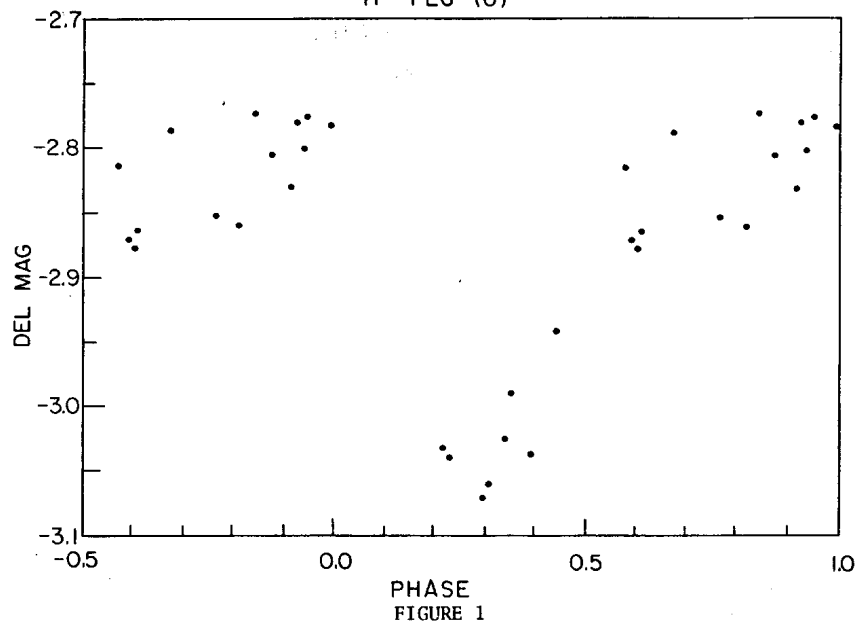
Our long-term program of photometry of RS CVn stars includes the non-eclipsing system II Peg (27°4642, HD224085), whose large light variations began in 1945 (Hartmann, Lõndono and Phillips, 1979). The primary star is K2 IV-V; the secondary is not yet known.

Our observations were made in October-December 1981 with the 61-cm telescope at Capilla Peak Observatory. The photometer, which is computer controlled, is a single-channel, photon-counting design with a cooled (-20° C) EMR 641A tube. The comparison star was +27°4649 for all observations. Phases were calculated from Rucinski's (1979) epoch and period of $\text{MJD} = 43033.10 + 6.724183\text{E}$. Figures 1-4 give the magnitude differences (comparison-source) in the UBVR instrumental system. The data has been folded to show phases 0.0 and 0.5 clearly.

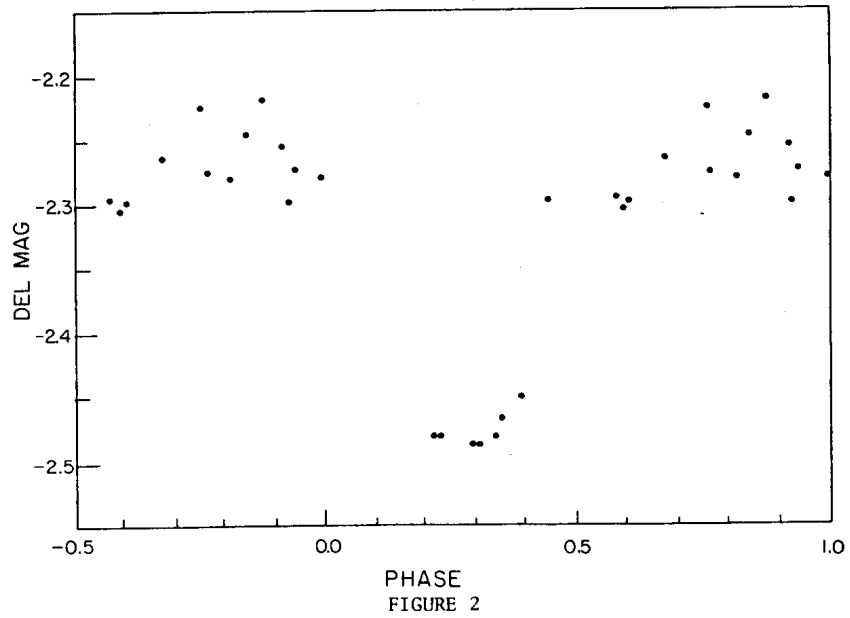
From the V-band curve, we note that the minimum in the distortion wave occurs at about phase 0.3 and that the wave amplitude (peak to peak) is approximately 0.2 mag. Compared to the 1977 data reported by Vogt (1981), the distortion wave has decreased in size (from 0.43 mag) and increase in phase (0.0). Even more curious, the light curve no longer shows the two maxima (at phases 0.45 and 0.85) visible in the 1979 observations of Nations

2

II PEG (U)

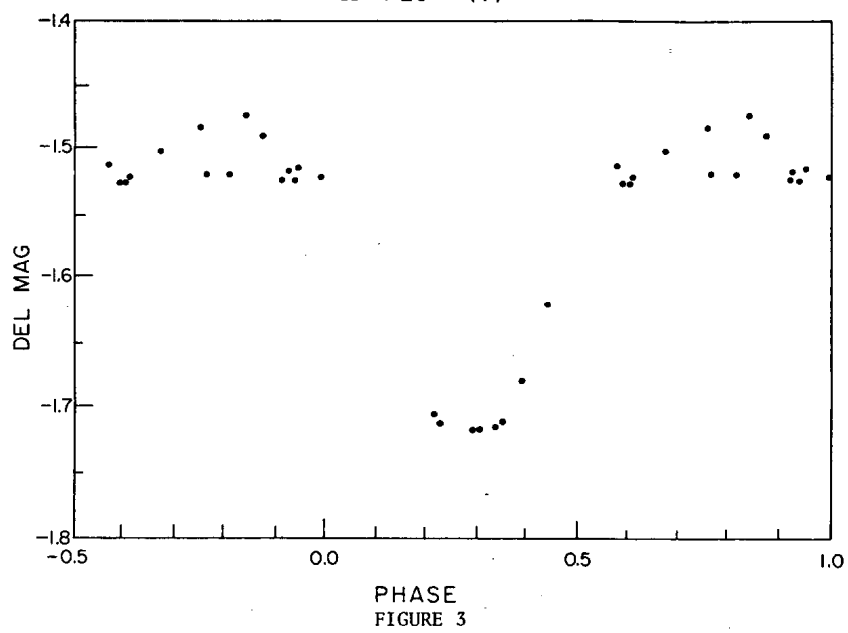


II PEG (B)

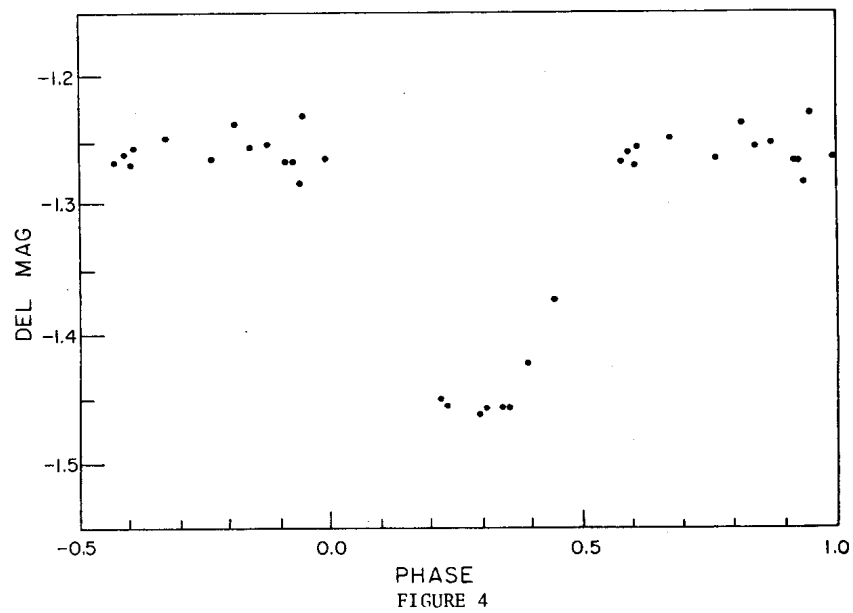


3

II PEG (V)



II PEG (R)



and Ramsey (1981). By 1980 Raveendran et al. (1981) noted only one peak (0.15 mag) at phase 0.6.

It is clear that II Peg must be observed annually to track these dramatic changes in its distortion wave. Also, coordinated efforts of different observatories are needed, as changes occur in only a few cycles. This is seen in the V-band curve at phase ~ 0.8 , where observations 20 days apart show a difference of 0.05 mag.

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References:

- Hartmann, L., L6ndono, C. Phillips, M.J., 1979, *Astrophys. J.* 229, 183
 Nations, H.L. and Ramsey, L.W., 1981, *Astron. J.* 86, 433
 Raveendran, A.V., Mohin, S. and Mekkaden, M.V., 1981, *MNRAS* 196, 289
 Rucinski, S.M., 1977, *PASP*, 89, 280
 Vogt, S.S., 1981, *Astrophys. J.*, 247, 975

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2178

Konkoly Observatory
Budapest
1982 July 20
HU ISSN 0374-0676

THE PHOTOMETRIC CONSTANCY OF 59 PISCUM

59 Psc was first reported as a suspected Delta Scuti star by Seeds and Yanchak (1972) and was confirmed by Gupta and Bhatnagar (1972) with a period of 0.1040 day and amplitude of 0.04 mag in V. The observations were made in two nights 48 days apart with time of observation of 5 hours and 3 hours, respectively. HR 217 was used as comparison star. Gupta and Bhatnagar suggested the presence of beating due to the variation in the amplitude of their light curves. Later, this star was reobserved by Breger and Warman (1973) but no variability could be found from their observations, however, they suggested that it would be interesting to check the behaviour of this star in a later date.

More differential photoelectric photometry of 59 Piscum (HR 214) was made by us during four nights in September 1980 with the 32 inch telescope of Observatorio Astronómico Nacional (San Pedro Mártir, Baja California, México). A refrigerated 1P21 photomultiplier and Johnson's V filter were used. The sequence C_1, V_1, C_2 was followed uninterruptedly, each night. The reductions were made with the method reported by González and Peña (1981) and the probable error in a single observation, estimated from the comparison stars was ± 0.003 mag. The observational details are given in Table I.

In the nights observed, no variability could be found for 59 Psc and the standard deviation calculated for this star and for the difference in magnitudes of the comparison stars was the same in each night (Table II).

Table I

Characteristics of the observed stars					
Star	M_V	Spectrum	$\alpha(1980)$	$\delta(1980)$	Character
59 Psc	6.01	A5	$0^h46^m10^s$	$+19^\circ28'$	Suspected Var.
HR 217	6.45	dF6	$0^h46^m51^s$	$+20^\circ49'$	Comparison
HR 254	5.7	A1V	$0^h53^m31^s$	$+19^\circ05'$	Comparison

Table II

Characteristics of the nights observed

Date	Standard	
Sept. 1980	Time observed	Deviation
(U.T.)	Hrs.	Mags.
25	4.9	± 0.005
26	2.0	± 0.004
27	7.5	± 0.003
28	7.4	± 0.003

These results indicate that 59 Psc was a constant star for these dates and confirm the result of Breger and Warman (1973) about the constancy of this star. However, the light curves detected by Gupta and Bhatnagar in 1972 have evident variation, hence, it is possible to think that 59 Psc stopped its pulsations for some reason and, like Breger and Warman suggested, it would be interesting to determine continuously the behavior of this star in later dates.

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References:

- Breger, M. and Warman, J., 1973 Inf. Bull. Var. Stars No. 837
 González-Bedolla, S.F. and Peña, J.H., 1981 Inf. Bull. Var. Stars No. 2008
 Gupta, S.K. and Bhatnagar, A.K., 1972 Inf. Bull. Var. Stars No. 751
 Seeds, A.M. and Yanchak, A.G. 1972 in The δ Scuti Stars, The Franklin Institute

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2179

Konkoly Observatory
Budapest
1982 July 20
HU ISSN 0374-0676

INVESTIGATION OF THE PULSATONAL PECULIARITIES OF THE HOTTER
COMPONENT IN THE ECLIPSING BINARY SYSTEM AB Cas

Already five eclipsing binary systems containing Delta Scuti pulsating component are known today: AB Cas, Y Cam, RS Cha, AI Hya and UX Mon (ZZ Cyg is not such a system as was recently shown by Frolov et al., 1982). The places of the pulsating components of these systems on the HR diagramme are shown in Figure 1.

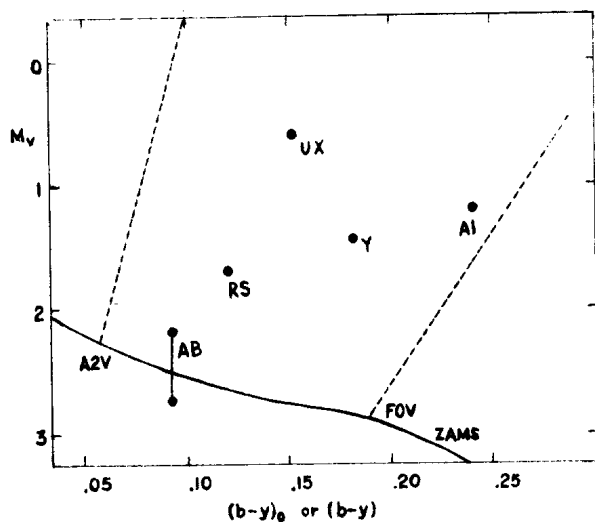


Figure 1

- The parameters needed to construct this diagramme were taken from various sources, the borders of the instability strip are from Breger (1979). Because of large interstellar reddenings in the cases of AB Cas and UX Mon we used the known uvby index calibra-

tions for the determination of the $(b-y)_0$ values.

One can see from Figure 1 that all the five stars are indeed inside the Delta Scuti instability strip. The two M_V values for the hotter component of AB Cas plotted in Figure 1 (taken from different sources) suggest that this star is on the ZAMS and is unlike SX Phe.

Supposing that synchronism between rotation and revolution takes place for all the five systems we calculated rotation velocities V_{rot} of their pulsating components using radius and orbital period values. Pulsation constants Q were calculated for AB Cas, Y Cam, AI Hya and RS Cha using radius, mass, and pulsational period values (pulsational period of UX Mon is practically unknown). These values along with the physical parameters adopted are given in Table I.

Table I

Star	AB Cas	Y Cam	RS Cha	AI Hya	UX Mon
Spectrum	A3V	A9IV-V	A5V	F5	A6V
Mass	2.56 $_{\odot}$	2.15	1.86	2.0	3.47
Radius	1.48 $_{\odot}$	3.03	2.14	3.88	4.30
P_{puls}	0.0582874	0.06646	0.084:	0.13803	0.02::
P_{orb}	1.3668783	3.30553	1.6698684	8.289676	5.90450
M_V	+2.75,+2.2	+1.42	+1.69	+1.18	+0.59
V_{rot}	55 km/sec	46	65	24	37
Q	0.046	0.018	0.037:	0.026	-

The values of V_{rot} and Q confirm that these pulsating components are Delta Scuti type stars. One can also suppose that variable components of AB Cas and RS Cha are pulsating in the fundamental mode, but first and maybe second overtone are excited in AI Hya and Y Cam consequently (in the frames of the radial oscillation hypothesis).

The eclipsing binary AB Cas was observed photoelectrically during 11 nights from November 1/2, 1980 to November 21/22, 1981. The 48-cm reflector of the High altitude station of Sternberg Astronomical Institute near Alma-Ata and a one-channel photometer with photon counting were used. The star was observed in the BV standard system.

Fragments of the light curve of AB Cas in B light versus

phases of the $P_{\text{orb}} = 1.3668783$ are shown in differential magnitudes in Figure 2. One can see a small reflection effect in this system, the same effect was discovered by Ando (1980). Tempesti (1971) was the first who discovered the pulsational nature of the brighter (hotter) component in the AB Cas system. Ando (1980) confirmed this discovery.

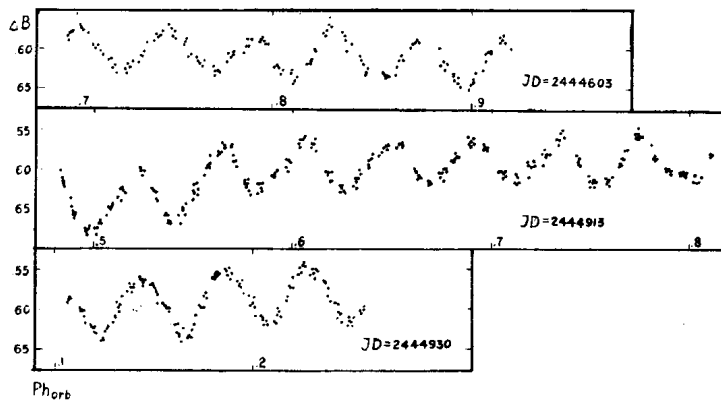


Figure 2

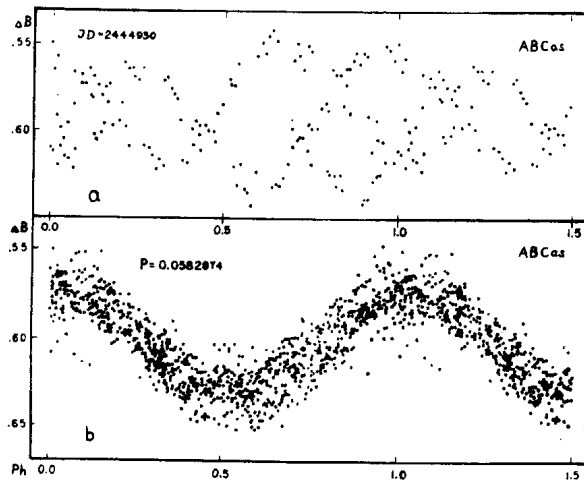


Figure 3.a.b

On the basis of our photoelectric data in B light ($n \approx 900$) we calculated the best single mean pulsational period: $0^d.0582874$. The mean B light curve of the hotter (brighter) pulsating component of AB Cas is shown in Figure 3.b in differential magnitudes. The light elements are:

$$\text{Max hel} = \text{JD } 2444912.1759 + 0^d.0582874.E. \\ \pm 2$$

Our light elements are in accordance with maxima of light variability from B.N. Irkaev's unpublished observations made in the year 1977 (JD 2443065-2443066) and with maxima from the light curve fragments published by Tempesti (1971). Time differences of these two data samples concerning ours are more than 31000 and about 70000 pulsation cycles respectively. Maybe only the small pulsation cycle statistics in Ando's (1980) paper is just the reason of the difference between his mean period $0^d.054 \pm 0.005$ and ours.

The scatter seen in the mean light curve in Figure 3.b is not surprising because even consecutive individual pulsation cycles have often different period lengths and different light amplitudes. Only one exception is noticed by us: the observations made during the last night on 1981 November 21/22 (JD 2444930) are in disagreement with our mean light curve: see Figure 3.a. We do not know what is the reason of this because one can see the usual appearance of pulsations during this night (Figure 2).

We can conclude that a high degree of the Delta Scuti pulsational macrostability does exist in the case of the hotter (brighter) component of AB Cas.

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References:

- Ando H., 1980, *Astrophys. and Space Sci.*, 71, 249
 Breger M., 1979, *Publ. Astron. Soc. Pacif.*, 91, 5
 Frolov M.S., Mironov A.V. and Pastukhova E.N., 1982, *I.B.V.S.*
 No. 2117
 Tempesti P., 1971, *I.B.V.S.* No. 596

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2180

Konkoly Observatory
Budapest
1982 July 23
HU ISSN 0374-0676

ABSENCE OF OPTICAL PULSES IN HD 153919
(= 4U 1700-37 = V884 Sco)

A possible 97-minute period in the brightness of the X-ray source 4U1700-37 was reported by Matilsky et al. (1978). However, it was shown by Hammerschlag-Hensberge et al. (1979) that, because of the particular window function of the data used by Matilsky et al., the existence of a 97-minute period could not possibly be proved. Subsequently, Kruszewski and collaborators (1978, 1979) reported evidence for a modulation of the visual magnitude of the optical counterpart of this source (HD 153919 = V884 Sco), with a period of ~ 90 minutes and amplitude up to ~ 2 percent. According to Kruszewski et al. (1979, 1980) the modulation appeared only near phase 0.5, i.e. when the X-ray source is in front of the optical companion (an O6 f star).

Recently, Van Paradijs and Van der Woerd (1982) presented the results of observations of the visual brightness of HD 153919, relative to HD 153767, obtained on 6 different nights, all near phase 0.5. No evidence was found for a short-term periodic modulation of the visual magnitude of HD 153919, with an amplitude in excess of 0.004 mag. Since these observations during each night covered less than 3 cycles of 90 minutes, we decided to reobserve the source near phase 0.5 for as long as possible.

The observations were made with the Walraven photometer on the 90 cm Dutch telescope at ESO, on 1982 April 15.18-15.40, April 29.11 - 29.38 and May 2.13 - 2.39 (UT). The corresponding phase intervals are 0.475 - 0.539, 0.558 - 0.637 and 0.443 - 0.519, respectively. As a comparison star we used HD 153767. The observations were made through a 16" diaphragm. The variable and companion stars were observed alternately for 4 times 16 seconds.

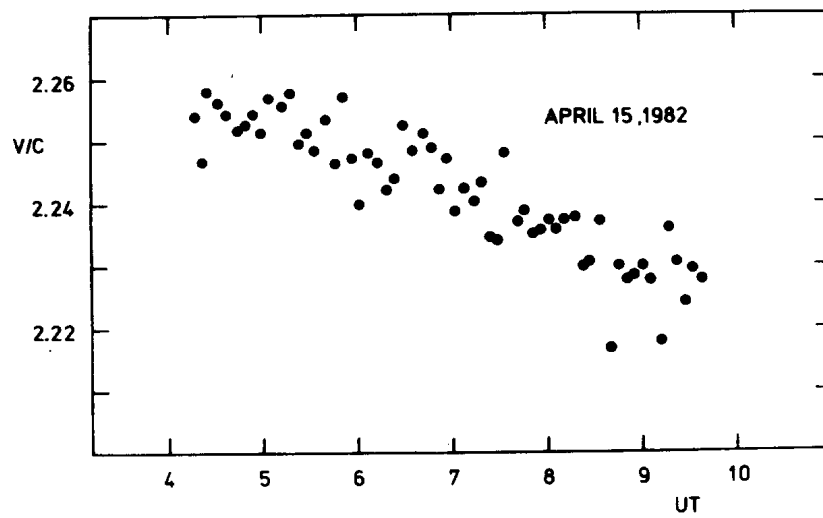


Figure 1 Ratio of the sky-corrected visual brightness of
HD 153919 relative to HD 153767, as observed on April
15, 1982

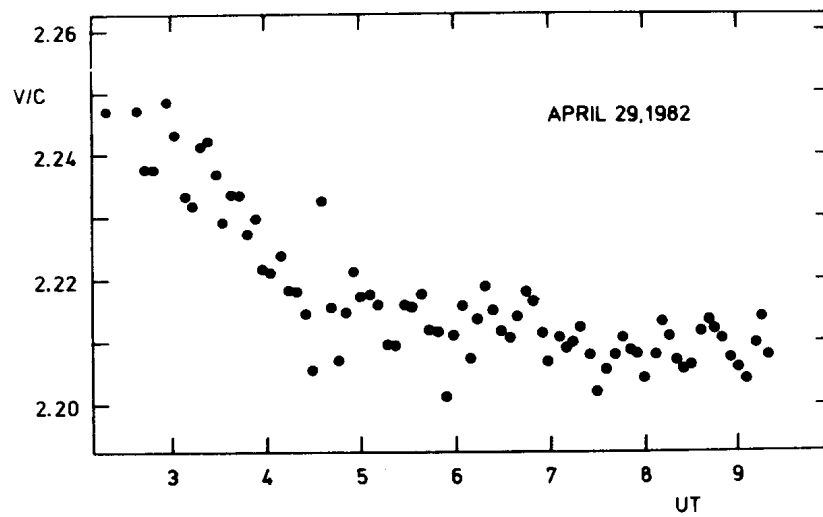


Figure 2 Same for April 29, 1982

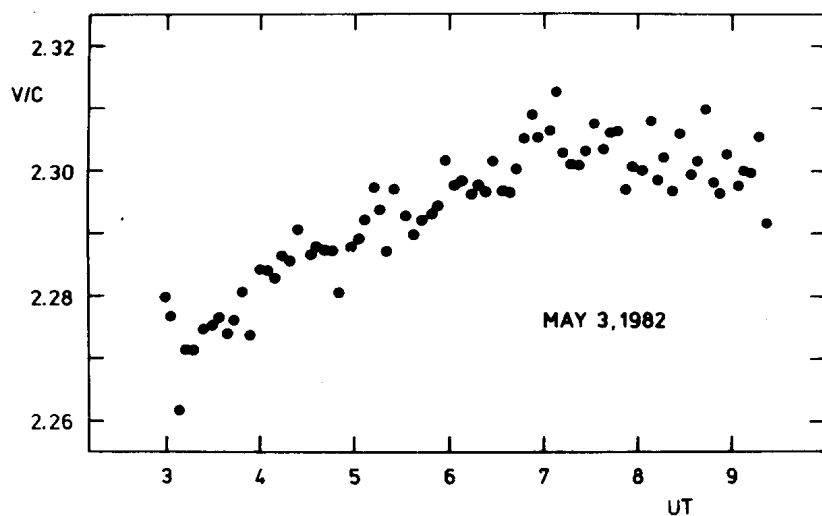


Figure 3 Same for May 3, 1982

Sky measurements were made every 20 to 30 minutes. The ratio of the sky-corrected visual brightness (Walraven V band) of HD 153919 and HD 153767, as observed during the three nights is shown in Figure 1,2 and 3.

It is readily apparent that the visual magnitude of HD 153919 varies on a time scale of many hours, out that any modulation with a period near 90 minutes is not detectable in our data.

The r.m.s. deviation of a single measurement of the ratio of the visual magnitude of HD 153919 and HD 153767 is ± 0.0019 mag on April 15, ± 0.0021 mag on April 29 and ± 0.0022 mag on May 2. The amplitude of any periodic modulation of the visual magnitude of HD 153919 is certainly less than 0.001 mag. This is at least and order of magnitude less than the values reported by Kruszewski et al. (1978, 1979).

The present results reinforce a previous conclusion (Van Paradijs and Van der Woerd, 1982) that the periodic modulation of the optical brightness of HD 153919, reported by Kuszewski et al. (1978, 1979), if real, must have been an ephemeral phenomenon.

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References:

- Hammerschlag-Hensberge, G., Henrichs, H. and Shaham, J., 1979, *Astroph. J. (Letters)* **228**, L 75
Kruszewski, A., 1978, *Inf. Bull. Var. Stars* No. 1424
Kruszewski, A., Surdej, J., Zalewski, J. and Semeniuk, I., 1979, *Acta Astr.* **29**, 481
Matilsky, T., La Sala, J. and Jessen, J., 1979, *Astroph. J. (Lett.)* **224**, L 119
Van Paradijs, J. and Van der Woerd, H., 1982, *Astron. Aph.* (in press).

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2181

Konkoly Observatory
Budapest
1982 July 29
HU ISSN 0374-0676

NEW TIMES OF MINIMA AND THE PERIOD VARIATIONS OF THE
W UMa-TYPE VARIABLE XY Leo

The short period eclipsing variable of W Ursae Majoris type, XY Leo (BD +18°2307) was observed with a photoelectric unrefrigerated photometer attached to the 60 cm Cassegrain telescope at the Ostrowik station of the Warsaw University Observatory. The observations were made through B,V filters and reduced to the Johnson system. BD +18°2306 was used as a comparison star. Five times of minimum were obtained from observations performed between March 1981 and April 1982, and they are given in Table I.

Table I

New times of minima of XY Leo

JD Hel.	E	(O-C)
(244 0000+)		
4694.3710(3)	32419.	0.0195
4702.4638(3)	32447.5	0.0154
5017.5286(5)	33556.5	0.0101
5056.4514(2)	33693.5	0.0106
5074.3486(5)	33756.5	0.0095

The (O-C) values were calculated from the light elements given by Gehlich et al. (1972):

$$\text{Min I} = \text{JD Hel. } 2435\ 484.0222 + 0.^{\text{d}}28410282\text{E} \quad 1.$$

On the basis of our observations we have computed the new elements using the least-squares method, obtaining:

$$\text{Min I} = \text{JD Hel. } 2445\ 074.4906 + 0.^{\text{d}}2840969\text{E} \quad 2.$$

A large difference (O-C) between primary and secondary minima was observed in 1981. All photoelectric times of minimum light available for us were collected, and the (O-C) values were calculated from the equation 1. Times of minima observed after

1972 are listed in Table II.

Table II
Times of minimum light of XY Leo observed after 1972

JD Hel. (244 0000+)	E	(O-C)	Ref.
2051.6196	23117.	-.0075	1
2099.4896	23285.5	-.0085	1
2841.4395	25897.	0.0066	2
3193.7325	27137.	0.0121	3
3193.876:	27137.5	0.014	3
3198.705:	27154.5	0.013	3
3198.8465	27155.	0.0123	3
3567.7564	28453.5	0.0146	4
3572.7288	28471.	0.0152	4
3606.396:	28589.5	0.016	5
3612.6462	28611.5	0.0161	4

References:

1-Burchi et al. (1975), 2-Pohl and Kizilirmak (1977), 3-Hilditch (1981), 4-Koch and Shanus (1978), 5-Pohl and Gülmen (1981)

References to earlier observations are collected by Gehlich et al. (1972). Period variations of XY Leo were interpreted by Gehlich et al. as due to presence of a third body in the system. The "third body" (O-C) sinusoid proposed by these authors is marked by dashed line in Figure 1.

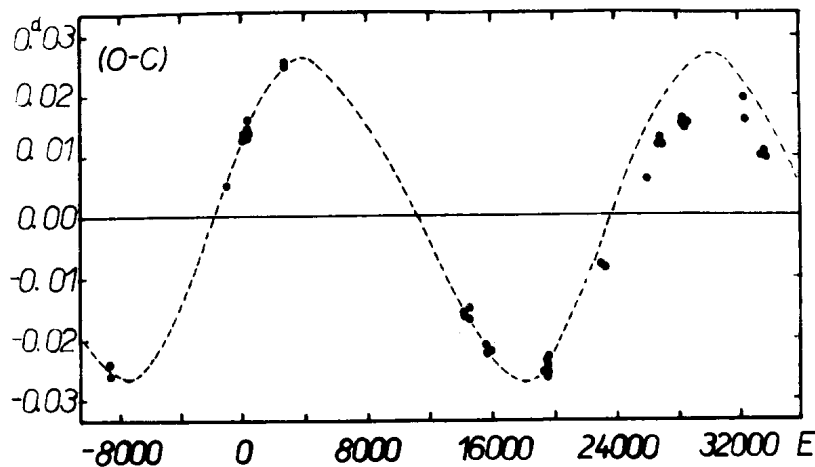


Figure 1

We can see that (O-C) residuals for $20\,000 < E < 30\,000$ lie about 0.01^d under this line. This fact was observed by Pohl and Kizilirmak (1977), and by Koch and Shanus (1978).

The other possibility mentioned by Gehlich and his co-workers is that period variations of XY Leo demonstrate sudden changes. Assuming that the period between the jumps is constant they derived the least squares fit: $P1=0.28410714^d$ and $P2=0.28409807^d$, for 1949-1959 and 1959-1970 intervals, respectively. For 1970-1980 and 1980-1982 intervals, we obtained: $P3=0.28410734^d$ and $P4=0.2840969^d$, respectively. The (O-C) residuals calculated for afore mentioned periods are plotted in Figure 2.

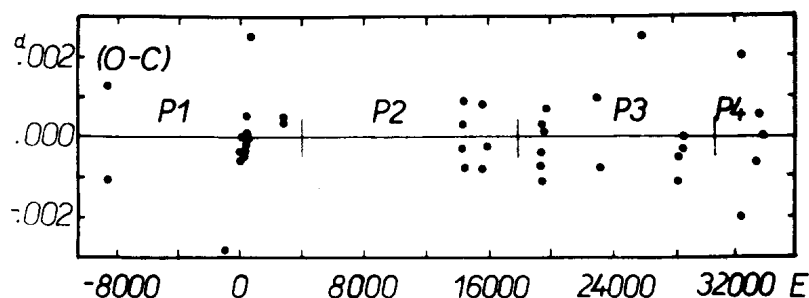


Figure 2

Full light curves of XY Leo in 1981 and 1982 seasons will be published in Acta Astronomica.

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References:

- Burchi, R., Zavatti, F. 1975, I.B.V.S. No. 964
Gehlich, U.K., Prölss, J. and Wehmeyer, R. 1972, Astron.
Astroph. 17, 477
Hilditch, R.W. 1981, M.N.R.A.S. 196, 305
Koch, R.H. and Shanus, C.R. 1978, A.J. 83, 1452
Pohl, E., Gülmen, O. 1981, I.B.V.S. No. 1924
Pohl, E. and Kizilirmak, A. 1977, I.B.V.S. No. 1358

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2182

Konkoly Observatory
Budapest
1982 August 2
HU ISSN 0374-0676

VARIABILITY OF BD +40°4145 A MEMBER OF NGC 6910

UBV photometric standards in galactic cluster NGC 6910 were observed with the 60 cm reflector at Ostrowik Station of Warsaw University Observatory on February 16, 1982. The unrefrigerated one channel photometer with 27" diaphragm was used. Stars Nos. 1, 2, 3, 4, 5, 6, 8 (numeration according to Hoag et al., 1961) were investigated through V and B filters. It was found that the star No. 5 = BD +40°4145 has luminosity $V = 8^m.69$ and colour $B-V=0^m.83$ instead of the catalogue values $V = 10^m.05$ and $B-V = 0.19$ (Hoag et al., 1961). Short time scale variations with the amplitude of about $0^m.20$ were observed in both filters.

Table I
BV observations of BD +40°4145

Date	JD Hel. 244+	V	B-V
Sep. 21, 1981	4869.2870	$10^m.03$	$0^m.20$
Feb. 16, 1982	5017.6545	8.41	1.05
	.6615	8.61	0.89
	.6656	8.59	0.72
	.6689	8.75	0.82
	.6733	9.05	0.65
	.6775	8.61:	0.88:
	.6823	8.79:	0.76:
Mar. 27, 1982	5056.6053	8.64	0.89
Apr. 14, 1982	5076.5236	8.73	0.81
May. 5, 1982	5095.4546	10.05	0.19
Jun. 4, 1982	5125.5031	10.07	0.23
Jun. 25, 1982	5146.3777	10.06	0.18
Jul. 7, 1982	5158.4071	9.97	0.27
Jul. 8, 1982	5159.4226	10.02	0.22

Untypical V and B-V values were also found on March 27, 1982 and April 14, 1982. However, on May 5, 1982 and later the star was in its normal state. We have also reexamined our observations from September 1981. All observations from September 1981 until July 1982 are listed in Table I. Mean errors are $0^m.015$ and $0^m.020$ in V and B-V, respectively. Instrumental quantities were transformed to BV system using standard methods. As far as we know BD +40°4145 has not been known as a variable star.

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Reference:

Hoag, A.A., Johnson, H.L., Iriarte, B., Mitchell, R.I., Hallam, K.L., Sharpless, S. 1961, Photometry of stars in galactic cluster fields, Publ. U.S. Nav. Obs., 17, Part VII, p. 454

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2183

Konkoly Observatory
Budapest
1982 August 2

HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac IN 1976

Continuous photoelectric monitoring of the flare star EV Lac has been carried out at the Stephanion Observatory ($\lambda = -22^{\circ}49'44''$, $\varphi = +37^{\circ}45'15''$) during the year 1976 using the 30-inch Cassegrain reflector of the Department of Geodetic Astronomy, University of Thessaloniki. Observations have been made with a Johnson dual channel photoelectric photometer in the B color of the international UBV System. The telescope, the photometer and the observational procedure have been described elsewhere (Mavridis et al., 1982). Here we mention only that the transformation of our instrumental ubv system to the international UBV system is given by the following equations:

$$\begin{aligned} V &= v_0 + 0.042(b-v)_0 + 2.278 \\ B-V &= 0.706 + 1.043(b-v)_0, \\ U-B &= -2.550 + 1.490(u-b)_0. \end{aligned}$$

The monitoring intervals in UT as well as the total monitoring time for each night are given in Table I. Any interruption of more than one minute has been noted.

During the 198.37 hours of monitoring time 17 flares were observed the characteristics of which are given in Table II. For each flare following characteristics (Andrews et al., 1969) are given: a) the date and universal time of flare maximum, b) the duration before and after the maximum (t_b and t_a , respectively), as well as the total duration of the flare, c) the value of the ratio $(I_f - I_0)/I_0$ corresponding to flare maximum, where I_0 is the intensity deflection less sky background of the quiet star and I_f is the total intensity deflection less sky background of the

Table I
Monitoring Intervals in 1976

Date 1976	Monitoring Intervals (U.T.)	Total Monitoring Time
July		
21-22	23 ^h 52 ^m -00 ^h 37 ^m , 00 ^h 39 ^m -01 ^h 11 ^m .	01 ^h 17 ^m
22-23	22 23 -23 01 , 23 04 -23 45 , 23 48 -00 31, 00 34 -01 05.	02 33
23-24	22 24 -23 13 , 23 16 -00 00 , 00 03 -01 07.	02 37
August		
5-6	23 00 -23 29 , 23 32 -00 02 , 00 05 -00 35, 01 16 -01 36.	01 49
7-8	19 57 -20 26 , 20 28 -21 00 , 21 02 -21 31, 21 43 -22 13, 22 15 -22 48 , 22 50 -23 23 , 23 34 -23 51, 23 53 -00 36, 00 39 -01 06 , 01 08 -01 43 .	05 08
8-9	20 02 -20 27 , 20 29 -20 58 , 21 00 -21 31, 21 49 -22 19, 22 22 -22 49 , 22 51 -23 25 , 23 35 -00 01, 00 55 -01 40.	04 07
12-13	20 03 -20 35 , 20 38 -21 06 , 21 09 -21 35, 21 45 -22 14, 22 16 -22 45 , 22 47 -23 14 , 23 36 -23 54, 23 58 -00 26, 00 29 -01 00 , 01 14 -01 49 .	04 43
14-15	20 16 -20 44 , 20 47 -21 16 , 21 18 -21 46, 21 58 -22 28, 22 31 -23 01 , 23 26 -00 00 , 00 11 -00 41, 00 44 -01 13, 01 16 -01 41 .	04 23
16-17	20 02 -20 32 , 20 36 -21 03 , 21 05 -21 37, 21 40 -22 10, 22 19 -22 46 , 22 49 -23 20 , 23 24 -23 44, 23 55 -00 31, 00 33 -01 12 , 01 14 -01 45 .	05 03
17-18	21 28 -21 56 , 21 59 -22 33 , 22 36 -23 01, 23 11 -23 39, 23 42 -00 07 , 00 09 -00 40 , 00 53 -01 24, 01 26 -02 00.	03 56
18-19	21 19 -21 50 , 21 53 -22 23 , 22 25 -23 13, 00 56 -01 36, 01 38 -02 02 .	02 53
19-20	19 47 -20 20 , 20 23 -20 56 , 20 59 -21 37, 21 52 -22 28, 22 30 -23 04 , 23 06 -23 33 , 23 51 -00 42, 00 43 -01 22, 01 24 -02 11 .	05 38
20-21	19 42 -19 59 , 20 28 -20 54 , 21 01 -21 20, 21 54 -22 04, 22 06 -22 34 , 22 36 -23 00 , 23 11 -23 45, 23 48 -00 05, 00 18 -00 29 , 00 32 -00 54 , 01 17 -02 13.	04 24
21-22	20 36 -21 04 , 21 06 -21 29 , 21 31 -21 38, 21 46 -22 12, 22 14 -22 32 , 22 44 -22 57 , 23 00 -23 14, 23 17 -23 48, 23 51 -00 25 , 00 38 -00 41 , 00 44 -01 31, 01 33 -02 11.	04 42
22-23	23 04 -23 40 , 23 42 -00 15 , 00 18 -00 59, 01 08 -01 44, 01 45 -02 24 .	03 05
25-26	21 35 -21 58 , 22 01 -22 36 , 22 39 -23 14, 23 27 -23 58, 00 01 -00 31 , 00 33 -01 01 .	03 02
26-27	20 33 -21 02 , 21 04 -21 32 , 21 33 -22 00, 22 10 -22 43, 22 46 -23 24 , 23 26 -00 03 , 00 13 -00 57, 01 01 -01 33, 01 35 -02 05 .	04 58
27-28	20 48 -21 27 , 21 29 -21 59 , 22 02 -22 33, 23 13 -23 49, 23 52 -00 32 , 00 34 -01 15 , 01 31 -02 31.	04 37
28-29	20 34 -21 10 , 21 11 -21 40 , 21 43 -22 18, 22 30 -23 06, 23 09 -23 36 , 23 38 -00 09 , 00 22 -00 59, 01 02 -01 46, 01 49 -02 20 .	05 06
29-30	19 42 -20 16 , 20 18 -20 47 , 20 50 -21 18, 21 30 -22 00, 22 02 -22 34 , 22 36 -23 05 , 23 18 -00 00, 00 02 -00 43, 00 46 -01 30 , 01 39 -02 28 .	05 58
30-31	20 00 -20 31 , 20 34 -21 08 , 21 11 -21 37, 21 48 -22 23, 22 25 -22 53 , 23 40 -00 14 , 00 16 -00 55, 00 58 -01 37, 01 46 -02 31 .	05 11
31	22 07 -22 39 , 22 41 -23 23 , 23 25 -00 00.	01 49

Table I (Continued)

September

	00 ^h 10 ^m -00 ^h 50 ^m	00 ^h 53 ^m -01 ^h 03 ^m	01 ^h 06 ^m -01 ^h 59 ^m	01 ^h 43 ^m
1	19 55 -20 25	20 35 -21 18	21 21 -21 54	21 57 -22 27 ,
1-2	23 10 -23 28	23 41 -00 01	00 04 -00 32	00 34 -01 01 ,
	01 12 -01 58 .			04 35
2-3	20 39 -21 12	21 15 -21 51	21 54 -22 27	23 04 -23 43 ,
	23 46 -00 04	00 20 -00 59	01 10 -01 59 .	04 07
3-4	19 57 -20 35	20 39 -21 19	21 21 -22 10	22 52 -23 35 ,
	23 39 -00 13	00 16 -00 51	01 02 -01 28	01 31 -01 57 .
4-5	20 16 -21 02	21 05 -21 42	21 46 -22 22	22 59 -23 29 ,
	23 36 -00 02	00 04 -00 44	00 55 -01 26	01 29 -02 02 .
5-6	19 55 -20 43	20 47 -21 14	21 17 -21 48	21 59 -22 36 ,
	22 38 -23 14	23 16 -23 54	00 10 -00 42	00 44 -01 17 ,
	01 20 -01 59 .			05 21
11-12	19 36 -20 12	20 13 -20 56	20 58 -21 46	22 26 -23 02 ,
	23 04 -23 38	23 40 -00 03	00 14 -01 03	01 05 -01 27 ,
	01 29 -02 01 .			05 23
12-13	20 16 -20 49	20 51 -21 50	22 32 -23 18	23 23 -23 53 ,
	23 55 -00 48	00 58 -01 29	01 31 -02 00 .	04 41
13-14	20 00 -20 35	20 39 -21 14	21 15 -21 47	22 28 -23 10 ,
	23 13 -23 37	23 44 -00 26	00 36 -01 01	01 03 -01 30 ,
	01 33 -01 57 .			04 46
14-15	19 35 -20 16	20 27 -20 41	20 49 -21 41	22 16 -22 49 ,
	22 52 -23 38	23 50 -00 38	00 48 -01 23	01 25 -02 00 .
15-16	19 41 -20 19	20 22 -20 59	21 01 -21 38	22 14 -22 56 ,
	23 11 -23 40	23 43 -00 03	00 12 -00 52	00 55 -01 28 ,
	01 31 -02 01 .			05 06
16-17	19 24 -20 03	20 05 -20 55	20 59 -21 31	22 06 -22 37 ,
	22 54 -23 28	23 31 -23 58	00 00 -00 39	00 50 -01 21 ,
	01 24 -01 58 .			05 17
17	19 36 -20 03	20 07 -21 28	22 02 -22 41	22 45 -23 00 .
18-19	20 26 -21 29	22 01 -22 37	22 38 -23 05	23 12 -23 43 ,
	23 53 -00 36	00 40 -01 14	01 16 -02 02 .	04 40
19-20	20 06 -20 37	20 39 -21 14	21 46 -22 05	22 15 -22 46 ,
	22 49 -23 18	23 20 -23 43	23 54 -00 24	00 27 -00 56 .
25-26	20 09 -21 07	21 43 -22 10	22 13 -22 46	22 48 -23 19 ,
	23 31 -00 05	00 08 -00 31	00 34 -00 58	01 13 -01 56 .
26-27	19 59 -20 46	21 21 -21 49	21 51 -22 22	22 25 -22 52 ,
	23 02 -23 35	23 38 -00 09	00 18 -01 00 .	03 59
28-29	19 19 -20 02	20 04 -20 36	21 09 -21 45	21 47 -22 17 ,
	22 20 -22 56	23 06 -23 26	23 37 -23 42	23 50 -00 21 ,
	00 23 -00 50	00 52 -01 14	01 26 -02 13 .	05 29
29-30	19 36 -20 07	20 09 -20 37	21 10 -21 43	21 45 -22 15 ,
	22 19 -22 57	23 08 -23 37	23 40 -00 10	00 20 -00 45 ,
	00 55 -01 19	01 24 -01 39	01 49 -02 15 .	05 08
30	19 34 -20 01	20 04 -20 36	21 10 -21 47	21 52 -22 22 ,
	22 25 -22 52	23 02 -23 33	23 47 -00 00 .	03 17
October				
1	00 00 -00 32	00 35 -01 03	01 14 -01 57 .	01 43
2-3	20 01 -20 27	20 29 -21 13	21 15 -21 53	22 01 -22 34 ,
	22 38 -23 05	23 08 -23 33	23 44 -00 26	00 28 -00 52 ,
	01 02 -02 02 .			05 19
3-4	19 22 -19 49	19 51 -20 20	20 22 -20 48	21 00 -21 33 ,
	21 35 -22 09	22 10 -22 40	22 53 -23 27	23 39 -00 08 ,
	00 11 -00 44	00 58 -01 31	01 33 -02 02 .	05 37

Table I (Continued)

October										
10	19 ^h 42 ^m -20 ^h 15 ^m , 20 ^h 17 ^m -20 ^h 50 ^m , 20 ^h 52 ^m -21 ^h 23 ^m , 21 ^h 34 ^m -22 ^h 03 ^m ,									
	20 05 -22 31, 22 33 -23 01 .									03 ^h 00 ^m
11-12	19 25 -19 57, 19 59 -20 30, 20 32 -21 05, 21 16 -21 49 ,									
	21 51 -22 23, 22 25 -23 07, 23 20 -23 25, 23 28 -00 07,,									
	00 09 -00 38, 00 50 -01 12 .									04 58
12-13	22 55 -23 28, 23 31 -00 04, 00 07 -00 52, 01 05 -01 12 .									01 58
Total										198 ^h 22 ^m = 198 ^h 37

Table II

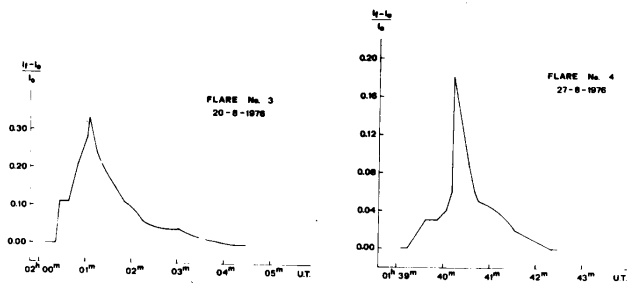
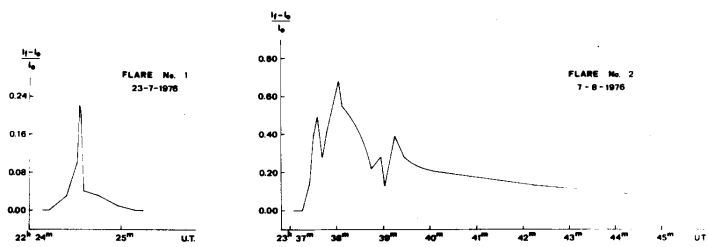
Characteristics of the Flares Observed

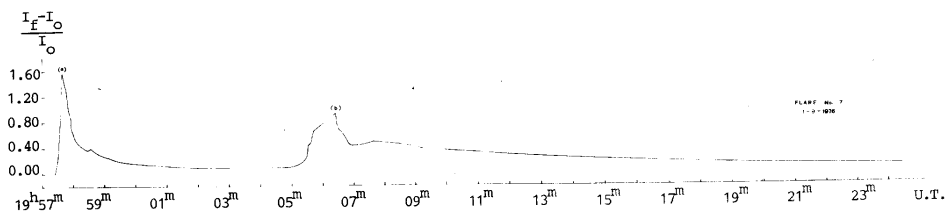
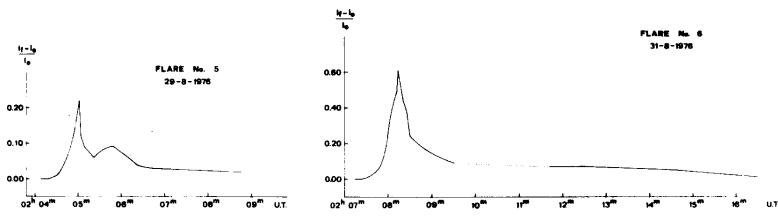
Flare No.	Date 1976	U.T.	t _b	t _a	Duration	I _f -I _o /I _o	P	Δm	σ	Air
	July	max	min	min	min	max	min	mag	mag	mass
1	23	22 ^h 24 ^m 54	0.33	0.62	0.95	0.22	0.04	0.22	0.06	1.02
	Aug.									
2	7	23 38.04	0.78	6.20	6.98	0.68	1.30	0.56	0.09	1.01
3	20	02 01.08	0.74	3.14	3.88	0.33	0.38	0.31	0.06	1.16
4	27	01 40.20	0.96	2.12	3.08	0.18	0.11	0.18	0.06	1.18
5	29	02 05.04	0.72	3.72	4.44	0.22	0.19	0.22	0.05	1.26
6	31	02 08.22	0.84	8.28	9.12	0.61	0.79	0.52	0.07	1.30
	Sept.									
7a	1	19 57.66	0.24	26.78	27.02	1.57	5.71	1.02	0.06	1.14
7b	1					0.93		0.71		
8	3	01 31.68	0.30	0.56	0.86	0.17	0.03	0.17	0.05	1.23
9	15	22 34.14	1.06	11.42	12.48	3.54	5.35	1.64	0.04	1.03
10	15	23 43.92	0.48	9.46	9.94	2.38	3.58	1.32	0.07	1.10
11	16	22 16.86	1.08	15.16	16.24	0.51	3.16	0.45	0.06	1.02
12	19	21 50.82	0.12	1.48	1.60	0.37	0.06	0.34	0.06	1.01
13	25	20 12.84	0.96	14.24	15.20	0.21	1.57	0.21	0.05	1.02
14	28	23 12.18	0.54	0.86	1.40	0.19	0.05	0.19	0.05	1.14
15	30	01 24.36	0.24	3.40	3.64	0.69	0.60	0.57	0.06	1.64
	Oct.									
16	3	23 40.66	0.36	1.98	2.34	0.36	0.15	0.33	0.08	1.26
17	11	20 40.20	0.36	2.42	2.78	0.48	0.25	0.43	0.08	1.02

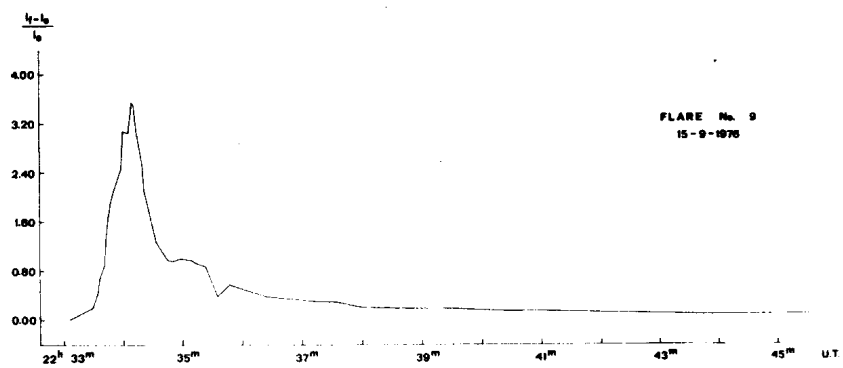
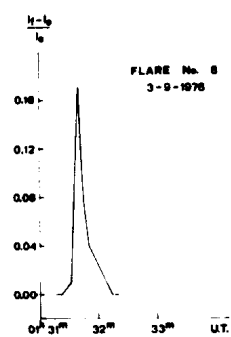
star plus flare, d) the integrated intensity of the flare over its total duration, including preflares, if present,

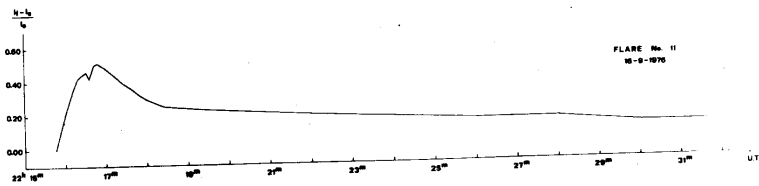
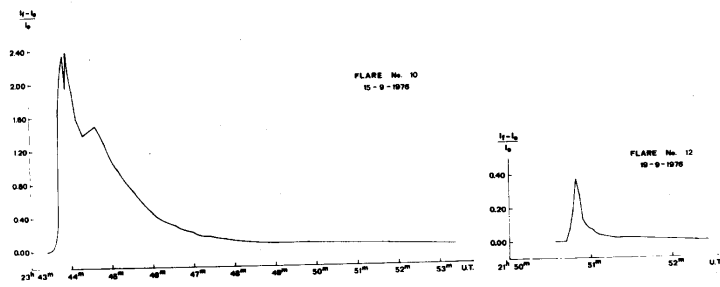
$p = \int (I_f - I_o) / I_o dt$, e) the increase of the apparent magnitude of the star at flare maximum $\Delta m(b) = 2.5 \log(I_f / I_o)$, where b is the blue magnitude of the star in the instrumental system, f) the standard deviation of random noise fluctuation

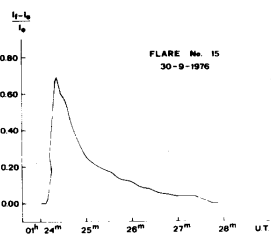
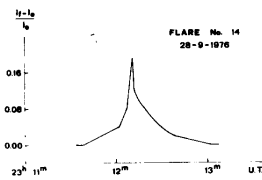
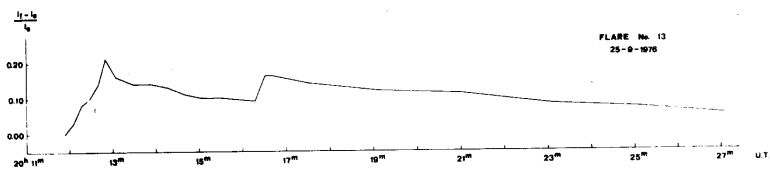
$\sigma(\text{mag}) = 2.5 \log(I_o + \sigma) / I_o$ during the quiet - state phase immediately preceding the beginning of the flare and g) the air mass at flare maximum. The light curves of the observed flares in the b color are shown in Figs. 1-17.

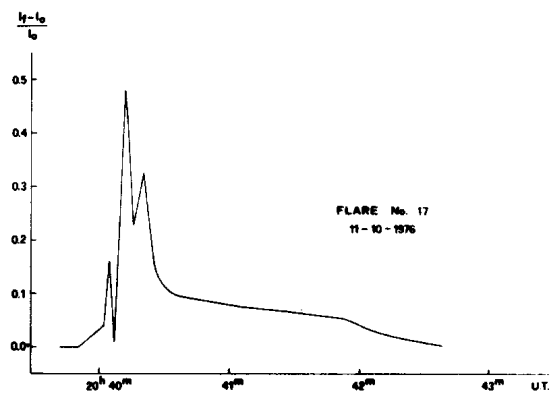
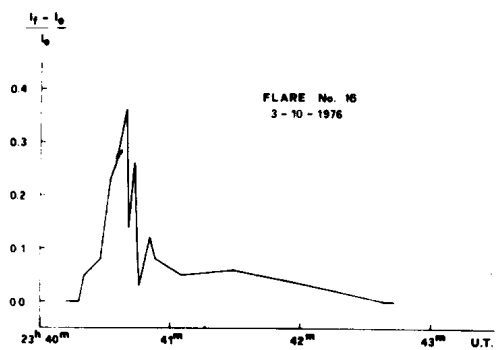












Figures 1-17

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References:

- Andrews, A.D., Chugainov, P.F., Gershberg, R.E. and Oskanian,
V.S.: 1969, I.B.V.S. No. 326
Mavridis, L.N., Asteriadis, G., and Mahmoud, F.M.: 1982, in:
Compendium in Astronomy (Eds.: E.G. Mariolopoulos, P.S.
Theocaris, and L.N. Mavridis) D. Reidel, Dordrecht-Holland,
p.253

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2184

Konkoly Observatory
Budapest
1982 August 6
HU ISSN 0374-0676

AUGUST 1981 CRISIS OF V348 Sgr *

The variability of V348 Sgr was discovered independently by Woods (1926) and Schajn (1929) and the star was classified as an R CrB variable by Parenago (1931) on the basis of a first light curve. Hoffleit (1958), after re-examining the star for the period 1900-1954 on Harvard plates, concluded that it had indeed had an R CrB behavior during the period JD 2417500 - 2425000, but that, outside this interval, the observations suggested rather a semi-regular or even an irregular variable.

The star was reported to spend most of its time either near maximum or near minimum light. The total photographic magnitude range was 10.8 to fainter than 16.4. The transition between the magnitude extrema appeared to take place with relative rapidity. An interval of 30 to 60 days was usually necessary for the complete rise, but the decline was faster and difficult to catch. The time spent by V348 Sgr near maximum light varied from one maximum to another and the mean spacing between two returns to maximum varied between 150 and 250 days.

In this note, we are reporting observations covering what might be the first fairly well observed dramatic drop of brightness of this peculiar variable.

uvby photometric data were collected during an observing run in August 1981 at the 1m ESO telescope equipped with a standard one-channel photometer (Danks, 1981, Chap. II.C.1 and III.B.3). The four filters were measured sequentially and the integrations were repeated until reaching a satisfactory precision depending on the magnitude of the observed star. The comparison stars used

*Based on observations collected at the European Southern Observatory, La Silla, Chile.

for V348 Sgr were HD 174115, HD 176903, SAO 187099 and HD 172256 which turned out to be a Be variable (Heck and Manfroid, 1982a). The overall agreement of the observations with the international uvby standard system for the whole run (Heck and Manfroid, 1982b) was for V, b-y, m_1 , c_1 respectively: 0.011, 0.006, 0.008 and 0.009.

Table I
Observations in the uvby system

JD _⊙ 2.444.000 +	V	b-y	m_1	c_1
835.532	12.58	0.444	-0.102	0.069
835.553	12.60	0.406	0.007	-0.026
837.555	14.03	0.356	0.076	0.025
837.624	14.25	0.315	0.180	-0.150
837.659	14.29	0.380	0.118	-0.050
838.492	15.83	0.025	0.528	-0.391
838.520	15.97	0.151	0.314	-0.495
838.551	16.02	0.099	0.463	-0.780
838.559	16.20	-0.042	0.715	-1.072
838.586	16.11	-0.063	0.744	-0.804
838.613	16.36	0.000	0.557	-0.648
838.641	16.54	-0.261	0.784	-0.721
838.668	16.47	-0.197	0.836	-0.853
839.484	> 17			
839.688	> 17			
841.563	> 17			
842.543	> 17			
843.621	> 17			
844.621	> 17			
844.727	> 17			

The final absolute values are gathered in Table I and the V variation is reproduced in Figure 1. Between JD 2444839 and 2444844, an upper limit at V = 17 has been indicated because of the large errors obtained beyond this magnitude with the equipment. However the dashed line in Figure 1 represents the approximate evolution of the star during this time, on the basis of the estimated brightness in the photometer viewer (barely visible at the beginning, then becoming brighter).

Figure 1 also reproduces amateur estimations of the visual magnitude of V348 Sgr. These observations are due to F. Bateson (1981) in New-Zealand and to M. Verdenet (1981, 1982) in France. No attempt has been made to adjust these estimations to the V magnitude scale. They show a typical spread but the beginning of the fall has been clearly detected by both observers. They had of course to abandon once their instrumental limit had been reached.

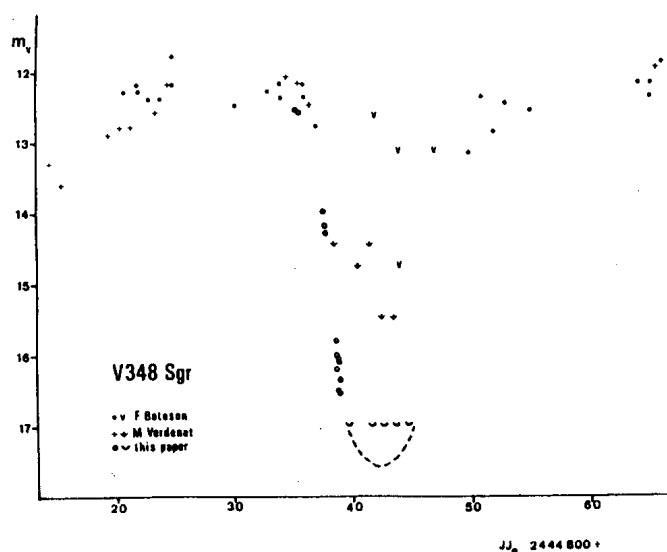


Figure 1

Clearly the descent of V348 Sgr from $m_V \approx 12.2$ to $m_V \approx 17.5(?)$ did not take more than 6 days. Due to the termination of the observing run at ESO, data are unfortunately lacking on the ascending branch, but less than 8 days have been necessary to reach $m_V \approx 13$ and the star was again "stable" at $m_V \approx 12.2$ after 22 days maximum. This is quite different from the characteristic times reported by Herbig (1958) on the basis of Hoffleit's work (1958) and recalled above.

A single observation we obtained at the 1m ESO telescope on JD 2444485 (Sept. 4, 1980) gave $V = 13.02$, $b-y = 0.462$, $m_1 = 0.127$ and $c_1 = -0.067$. All recent observations of V348 Sgr do not reveal a maximum brighter than $m_V \approx 12$ (see also e.g. Mattei, 1974, 1975 and 1981). Comparing this with the maximum at $m_{pg} = 10.6$, mentioned by Herbig (1958) and Hoffleit (1958) might indicate a general fading of the star during the recent decades or some imprecision in the original magnitude scale, although an appropriate reddening might reconcile both values.

Our thanks go to the ESO Observing Programme Committee for the allocation of time at the 1m telescope and to F. Bateson for communicating his observations.

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**Chercheur Qualifié F.N.R.S.

References:

- Bateson, F. 1981, private communication
 Danks, A.C. 1981, The ESO User's Manual, European Southern Observatory
 Heck, A., Manfroid, J. 1982a, A Note on Two Be Stars, in preparation
 Heck, A., Manfroid, J. 1982b, The Variability of RR Tel, in preparation
 Herbig, G.H. 1958, Astrophys. J. 127, 312
 Hoffleit, D. 1958, Astron. J. 63, 78
 Mattei, J.A. 1974, J. Roy. Astr. Soc. Canada 68, 112
 Mattei, J.A. 1975, J. Roy. Astr. Soc. Canada 69, 101
 Mattei, J.A. 1981, private communication
 Parenago, P.P. 1931, Variable Stars 3, 113
 Schajn, P. 1929, Astron. Nachr. 235, 413
 Verdenet, M. 1981, Bull. Ass. Française Obs. Etoiles Var. 18, 33
 Verdenet, M. 1982, Bull. Ass. Française Obs. Etoiles Var. 19, 33
 Woods, I.E. 1926, Harvard Bull. 838

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2185

Konkoly Observatory
Budapest
1982 August 9

HU ISSN 0374-0676

TIMES OF MINIMA FOR SOUTHERN HEMISPHERE ECLIPSING BINARIES

A photoelectric survey in the uvby β filter system has been undertaken at Cerro Tololo Inter-American Observatory on approximately 315 southern hemisphere eclipsing binary stars. The major purpose of this study was to determine accurate colors in and out of the minima, accurate depths of minima, and better ephemerides where necessary. One result of these observations has been the determination of times of minima for many of the program stars. These are presented here.

For each star the average time of minimum in all filters is listed in Table I. Since coverage was generally not symmetrical for ingress and egress, the tracing paper technique has been used throughout.

Table I

Times of Minima-Determinations

<u>Star</u>	<u>J.D. Hel. (2444000.0+)</u>	<u>Minimum</u>
AD Phe	250.5863	I
AA Cet	238.5531	I
RU Eri	249.6161	I
BZ Eri	233.5800	I
RV Pic	233.8021	I
TU CMa	236.7892	II
FF CMa	236.6869	II
MQ Pup	234.5649	I
VZ Hya	236.6532	I
RS Cha	236.7639	I
RZ Pyx	245.7195	II
CW Vel	248.7584	I
RV Crt	247.8151	I
RW CrA	462.5323	I
V681 CrA	460.6822	I
U Sct	468.6658	I
V505 Sgr	461.5901	I
V Gru	463.8040	I
CZ Aqr	468.8852	I

Many stars were also observed only during ingress and minimum or during the minimum and egress. Although accurate times of minima could not be determined, estimates of the center of the minimum have been made for those stars whose ephemerides as listed by Wood et al. (1980) seem significantly off. These are presented in Table II.

Table II
Times of Minima-Estimates

Star	J.D. Hel. (2444000.0+)	Minimum
TY Men	253.709	I
CW CMa	235.679	I
UZ Pup	253.623	I
TT Pyx	234.800	I
GL Car	283.497	I
SS Cen	382.650	I
ES Lib	458.753	II
V535 Ara	458.533	II
RS Sct	458.753	II
BL Tel	470.668	II

In addition the star V Gru has been found to have a period significantly different from that listed by Wood et al. (1980). From observations made on several nights during August 1980 an approximate period of 0.4833 days has been determined. Combined with the new time of minimum listed above the new provisional light elements are

$$\text{JD } 2444463.8040 + 0^{\text{d}}.4833$$

The light curve is a W-type with unequal minima.

Other results from this survey are being published elsewhere.

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Reference:

Wood, F.B., Oliver, J.P., Florkowski, D.R., and Koch, R.H., 1980, A Finding List for Observers of Interacting Binary Stars

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2186

Konkoly Observatory
Budapest
1982 August 11
HU ISSN 0374-0676

FIVE NEW VARIABLE STARS

During the past two years, we have searched for photometric variations in the light of 29 short-period stars in the Seventh Catalogue of the Orbital Elements of Spectroscopic Binary Systems (Batten et al. 1978). We observed through a V-filter with a computer-managed photon-counting photometer mounted on the 16-inch Boller and Chivens reflector of the Oak Ridge Station, and each spectroscopic binary was observed on from 8 to 50 nights relative to a nearby comparison star. Times of observation were reduced to phases using the catalogue value of the orbital period and an arbitrary epoch, and the observed magnitudes were corrected for differential extinction. Our level of detectability is estimated to be about 0.02 mag peak to peak.

We have found four stars whose light can be seen to vary smoothly with the period of the velocity variation, and these stars are listed in Table I.

Table I
Spectroscopic Binaries Showing Photometric Variations

No. in 7th Cat.	HD	Sp.	Period (days)	ΔV (mag.)	K_1/K_2 (km/sec)	Phase Min. ¹
12	1826	A5	1.4323	0.025	53.4/-	0.3
804	193536	B2V	2.9847	0.05	115.0/141.0	0.4
832	198784	B2V	3.3035	0.09	63.8/-	0.95
844	200776	B1IVp	2.9258	0.20 (ecl?)	62.5/-	
896	209961	B2V	2.1727	0.08	121.7/-	0.25

¹Phase of one of the light minima computed with the catalogue period and arbitrary epoch June 1.0, 1980.

Their comparison stars are listed in Table II. These new varia-

Table II		
Comparison Stars		
Variable	Comp. Star	B-V
HD	HD	
1826	1439	-0.66
193536	192983	-0.48
198784	197226	-0.74
200776	200595	-0.05
209961	SAO51686	-0.68

bles show the double-peaked curve that is characteristic of ellipsoidal variables. The fifth variable (HD 200776) has shown an abrupt drop in brightness by about 0.2-0.4 mag on five occasions. The phases of these drops do not seem consistent with a simple eclipse model.

Table III lists stars in the Seventh Catalogue of Spectroscopic Binaries that were found not to show variations with a peak-to-peak amplitude as great as 0.02 mag. Stars which may show varia-

Table III
Stars Showing No Variability Greater than $\Delta V = 0.02$ Mag.
Numbers in Seventh Catalogue

2	24*	33*	50	59	72	137	140	189	195
226	273	468?	584	599?	606	626	742	818*	834?
885*	909	920?	948*						

?Possible light variation.

*More observations required.

bility near our limit of detection are indicated with queries.

A summary of the photometric detection of proximity effects in spectroscopic binaries is in preparation, and we would be grateful to learn the results of similar searches at other observatories.

We wish to express our thanks to Gunther Schwartz for his assistance in some of these observations and George B. Field, Director of the Center for Astrophysics, for allocating some of the funds that supported this work.

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Reference:

Batten, A.H., Fletcher, J.M., and Mann, P.J., 1978, Pub. Dom. Astrophys. Obs., 15, 121-295.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2187

Konkoly Observatory
Budapest
1982 August 13
HU ISSN 0374-0676

A SINGLE NIGHT LIGHT CURVE OF 44 i Boo*

The W-Ursae Majoris type eclipsing binary 44 i Boo was observed on the 7-8 April 1982. The observations were obtained with the 40 cm reflector of the Rothney Astrophysical Observatory near Calgary, Canada, using an uncooled RCA 1P21 and a V filter closely matching the standard Johnson system.

Sky conditions were non-photometric necessitating the use of Calgary's Rapid Alternate Detection System, (Robb, et. al., 1982). This system allows the measurement of the variable star, comparison star and the appropriate sky values within a period of 1 second. Sixty of the 1-second periods were added appropriately to give 1-minute integrations. Each integration has been reduced to give differential magnitudes and comparison star observed magnitudes. The largest variation of successive comparison star measurements was 0.015 magnitudes per minute or 0.00025 magnitudes per second. This is the first use of this system to observe a variable star and an analysis of the errors of the system is in preparation.

The comparison star used was SAO 45347, which has $V = 8.1$ mag and G5 spectral type. Since the difference in (B-V) of the comparison and variable is 0.066 magnitude and the (B-V) color variation of 44 i Boo is small (0.013), (H. W. Duerbeck, 1978), the differential magnitudes have been transformed to the Johnson system with a constant additive term of -

* Rothney Astrophysical Observatory Publication, Series B, No. 9.

0.002 magnitudes. A constant nightly correction of +0.020 magnitudes was added to the differential magnitudes to correct for the systematic differing aspect of the instrument. Because the differential airmass never exceeded 0.004, differential extinction is negligible.

44 i BOO

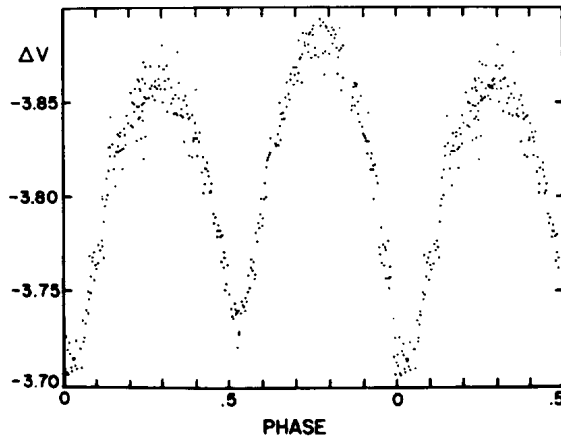


Figure 1. V light curve of 44 i Boo on JD 2445067

The differential V magnitudes are shown plotted in Figure 1 against heliocentric phase calculated with the ephemeris of Duerbeck, (1978). Overlap of consecutive cycles lies between phases 0.23 and 0.25, increasing the scatter of the data and emphasizing the need for single night light curves. Phases of minimum light were found by a computer program based on essentially the method of Kwee and Van Worden, (Chia, et. al., 1977), to be $0.0285 \pm .0018$ and $0.5232 \pm .0014$. A truncated four-term Fourier series was fit to the intensity data including the brighter component between phases 0.1 to 0.4 and 0.6 to 0.9. The coefficients normalized by A_0 with their usual meaning are $A_0 = 1.0 \pm .0009$, $A_1 = -0.0052 \pm 0.0012$, $A_2 = -0.0395 \pm .0014$, $B_1 = -.0114 \pm .0007$, $B_2 = -0.0018 \pm .0008$. Assuming the primary of the triple system is 1.45 times brighter than the variable pair in V, as found by Bergeat, et. al. (1981), its effect can be removed

by dividing the non-A0 terms by 2.45. The A1 and A2 coefficients are then not significantly different from those reported by Duerbeck, (1978) for the years 1975, 1976 and 1977. The B1 term is very much larger, however, since the difference in maxima is 0.035 magnitudes. Thus one can see from the O-C's that the period has changed and from the light curve that 44 i Boo is again in the active phase.

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References:

- Bergeat J., van't Veer F., Tunel M., Garnier R., Sifille F. and Roux S., 1981, *Astron. Astrophys.*, 94, pp. 350-358
Chia T., Milone E., and Robb R., 1977, *Ap. Space Sci.*, 48, pp. 3-19
Duerbeck H., 1978, *Astron. Astrophys. Supp.*, 32, pp. 361-374
Robb R., Milone E., Babbot F., Hansen C., and Swadron D., 1982, *BAAS* Vol. 14, No. 1, p. 574

CORRIGENDUM

In I.B.V.S. No. 2166 the 2nd sentence "From uvby photometry obtained in 1970 ..." should read "From uvby photometry obtained in 1978, 1979 and 1980 ..." .

C. STERKEN

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2188

Konkoly Observatory
Budapest
1982 August 16
HU ISSN 0374-0676

A NEW PROBABLE Be STAR ALPHA Leo

Spectroscopic observations of α Leo have been carried out. This study has been done under our program of spectroscopic observations of Be stars. Suspected variability appears to be a valuable clue in finding new emission stars. Irvine (1975) observed 43 stars, $v \sin i \geq 300$ km, with a 91 cm Cassegrain spectrograph at a dispersion of 67 \AA/mm in the $H\alpha$ region on 103 aF Kodak emulsion. Spectra were widened to 300 or 600 μm . This investigation led to five new and one probable (19 Mon, HR 2648) emission stars. However, Irvine (1975) could not detect emission in $H\alpha$ in α Leo and predicted it would be an excellent candidate for Be star.

We obtained 7 spectra of α Leo, with the 50 cm reflecting telescope, at Cassegrain focus, with plane grating spectrograph at a dispersion of 17.2 \AA/mm at $H\alpha$ on 09802 Kodak photographic plates, widened 800 μm . These spectra were taken on February 22 (two), February 23 (two), February 26 (one), April 8 (two), 1981. On February 22 and 23, we could notice weak emission with central reversal, out of these we are presenting four density tracings in Figure 1. From Figure 1, we conclude that α Leo has variable $H\alpha$ profile, with variable weak centrally reversed emission.

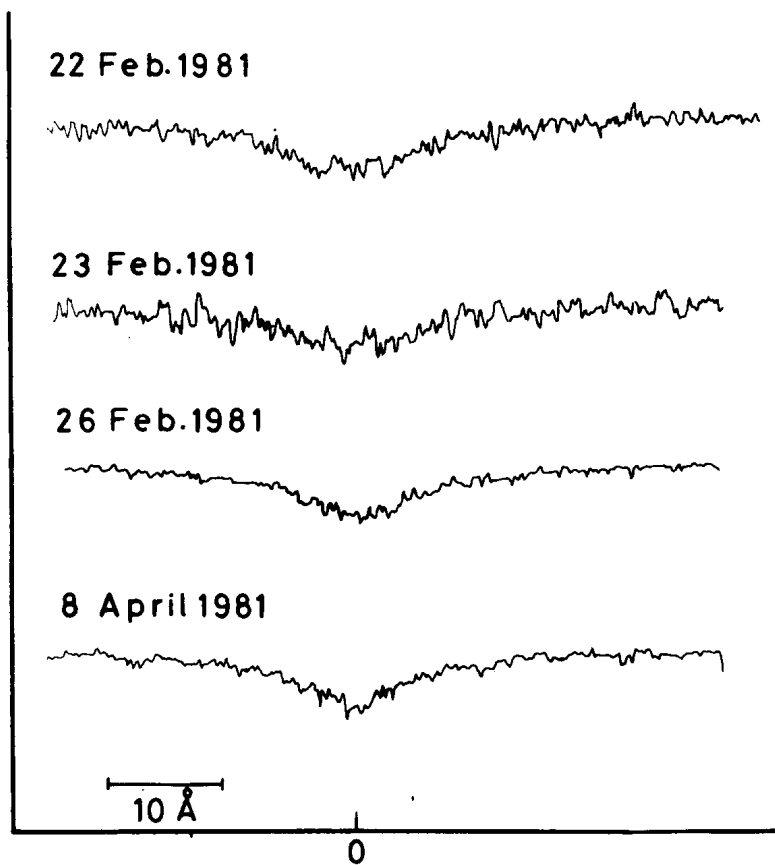


Figure 1: H α density tracings

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Irvine, N.J. 1975, *Astrophys. J.* 196, 773

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2189

Konkoly Observatory
Budapest
1982 August 16

HU ISSN 0374-0676

PHOTOELECTRIC MINIMA OF ECLIPSING BINARIES

The following Table gives photoelectric minima obtained during the years 1980/81 at the Ege University Observatory, Izmir (Turkey) and the Nürnberg Observatory (Germany). Minima of eclipsing binaries observed at both observatories 1960-1979 were published in Astr. Nachr. 288, 69 (1964); 289, 191 (1966); 291, 111 (1968); IBVS 456 (1970), 530 (1971), 647 (1972), 937 (1974), 1053 (1975), 1163 (1976), 1358 (1977), 1449 (1978) and 1924 (1981).

The Table gives the heliocentric minima, three different O-C's, the type of filter, UB_V, the abbreviations of the names of the observers and the type of the instruments used (Izmir: 48 cm Cassegrain, Nürnberg: 34 cm Cassegrain, both with phototube 1P21).

Abbreviations of the observers' names:

Bo = G. Bode	Pl = E. Pohl
Bz = S. Bozkurt	Rd = E. Roderer
Er = A.Y. Ertan	Sn = S. Evren
Fr = W. Freudling	Sr = C. Sezer
Gd = N. Güdür	Tg = I. Thiering
Gl = Ö. Gülmen	Tj = T. Eker
Gr = R. Gröbel	Tm = O. Tümer
Ib = C. Ibanoğlu	Tn = Z. Tunca
Ir = M. Iper	Va = V. Keskin
Kt = M. Kurutaç	Wo = G. Wolfschmidt
Me = T. Mertelmeier	Ze = Th. Zenker
Mi = F. Mittl	

Remarks:

O-C (I): GCVS, Moscow 1969/70 or First or Second or Third Supplement to the Third Edition of the GCVS. Moscow 1971, 1974 and 1976

Table I

Star	Min.hel. 2444	O-C (I)	O-C (II)	O-C (III)	Filt.	Obs.	Instr.	Rem.
RT And	851.3146	-0.0074	-0.0030		B	Ib/Tj	48	
	.3136	-0.0084	-0.0040		V	Ib/Tj	48	
WW Aur	256.3632:	+0.0024:	-0.0013:		V	Fr/Ze	34	MinII
	925.4902:	-0.0006:	-0.0043:		V	Wo	34	MinII
IM Aur	517.4706	-0.0251 =	-0.0251		B, V	Sr/Sn	48	MinII
	567.3674	-0.0202 =	-0.0202		B, V	Gd/Ir	48	
SV Cam	291.3915:	-0.0101:	-0.003:		V	Pl/Rd		
TW Cas	886.4548:	-0.0069:	-0.0111:		V	Wo	34	
DO Cas	294.3536:	-0.0070:	-0.0025:		V	Tg/Ze	34	
	485.3780	-0.0047	+0.0001		B	Tm/Sn	48	
	.3786	-0.0041	+0.0007		V	Tm/Sn	48	2
	498.3856	-0.0057	-0.0010		B	Tm/Sn	48	
	.3858	-0.0055	-0.0008		V	Tm/Sn	48	
	830.4458	-0.0091	-0.0038		B	Tn/Tm	48	
	.4456	-0.0093	-0.0040		V	Tn/Tm	48	
NN Cep	086.4796			-0.0003	B, V	Gd/Gl	48	MinII
	438.4512			+0.0011	B, V	G1/Va	48	MinII
	474.4717			+0.0013	B, V	G1/Va	48	
	504.3151			-0.0007	B, V	Gd/Gl	48	MinII
	506.3741			.0000	B, V	Gd/Sr	48	MinII
	507.4026			-0.0007	B, V	G1/Sn/Va	48	
	511.5194			-0.0005	B, V	G1/Gd	48	
	824.3814			-0.0009	B, V	G1/Ir	48	
	827.467			-0.003	B, V	Sn/Ir	48	MinII
	859.3742			+0.0007	B, V	G1/Sn	48	
RT CrB	438.3595	+0.0974			B	Er/Va	48	
	438.3637	+0.1016			V	Er/Va	48	
	791.4394	+0.0960			B	Er/Tj	48	

Table I (cont.)

Star	Min.hel. 2444	O-C (I)	O-C (II)	O-C (III)	Filt.	Obs.	Instr.	Rem.
RT CrB	791.4474	+0.1040			V	Er/Tj	48	
V477 Cyg	853.4621:	+0.0085:	-0.0048:		V	Wo	34	
V478 Cyg	777.4777	+0.0789			B, V	Gd	48	
	800.5236	+0.0777			B, V	Gd/Sn	48	
	813.5094	+0.0995			B, V	Sr/Tm	48	MinII
	816.3893	+0.0985			B, V	Sr	48	MinII
	826.4533	+0.0794			B, V	Gl/Tm	48	
	829.3318	+0.0770			B, V	Gl/Sn/Va	48	
	849.4970	+0.0760			B, V	Gd/Sr	48	
	852.3781	+0.0762			B, V	Gl/Sn	48	
	862.481	+0.096			V	Gl/Tm	48	MinII ω
V548 Cyg	456.4955	-0.0064 =	-0.0064		B	Er/Tm/Tj	48	
	.4958	-0.0061 =	-0.0061		V	Er/Tm/Tj	48	
	484.4685	-0.0146 =	-0.0146		B	Ib/Er	48	MinII
	.4657	-0.0174 =	-0.0174		V	Ib/Er	48	MinII
V836 Cyg	853.4904	+0.0082	+0.0070		B	Bz/Sn	48	
	.4900	+0.0078	+0.0066		V	Bz/Sn	48	
WW Dra	446.3408	+0.2110	+0.0875	+0.0010	B	Tm/Ir	48	
	.3404	+0.2106	+0.0871	+0.0006	V	Tm/Ir	48	
Z Her	066.4891	-0.0034 =	-0.0034		B	Tn/Tm	48	
	.4887	-0.0038 =	-0.0038		V	Tn/Tm	48	
	070.4841	-0.0012 =	-0.0012		B	Tm/Sn	48	
	078.4710	+0.0001 =	+0.0001		B	Kt/Tn	48	
	.4706	-0.0003 =	-0.0003		V	Kt/Tn	48	
	092.4453	-0.0004 =	-0.0004		B	Ib	48	MinII
	106.4245	+0.0040 =	+0.0040		B	Ib/Kt/Er	48	
	.4237	+0.0032 =	+0.0032		V	Ib/Kt/Er	48	
RX Her	711.5557	+0.0014	+0.0015		V	Gr	34	

Table I (cont.)

Star	Min.hel. 2444	O-C (I)	O-C (II)	O-C (III)	Filt.	Obs.	Instr.	Rem.
RT Lac	472.5261	-0.0247	-0.0210		B	Tm/Tj	48	
	.5240	-0.0268	-0.0231		V	Tm/Tj	48	
	500.4349	-0.0229	-0.0193		B	Sn/Va	48	MinII
	.4287	-0.0291	-0.0255		V	Sn/Va	48	MinII
	845.4617	-0.0290	-0.0254		B, V	Er/Sn	48	MinII
	850.5368	-0.0279	-0.0243		B	Er/Sn	48	MinII
	.5348	-0.0299	-0.0263		V	Er/Sn	48	MinII
SW Lac	925.284:	-0.019:	-0.001:		V	Wo	34	MinII
AR Lac	449.4969	-0.0209	-0.0215	-0.0015	B	Tm/Tj	48	
	.4972	-0.0206	-0.0212	-0.0012	V	Tm/Tj	48	
	451.4807	-0.0203	-0.0209	-0.0009	B	Er/Va	48	
	.4803	-0.0207	-0.0213	-0.0013	V	Er/Va	48	
	458.4220	-0.0202	-0.0208	-0.0007	B	Ib/Va	48	MinII
	.4214	-0.0208	-0.0214	-0.0013	V	Ib/Va	48	MinII
	809.4453	-0.0230	-0.0239	+0.0001	B	Tm	48	MinII
	.4450	-0.0233	-0.0242	.0000	V	Tm	48	MinII
	817.3822	-0.0189	-0.0198	+0.0043	B	Er	48	MinII
	.3811	-0.0200	-0.0209	+0.0032	V	Er	48	MinII
	818.3714	-0.0213	-0.0222	+0.0019	B	Tm	48	
	.3690	-0.0237	-0.0246	-0.0005	V	Tm	48	
UV Leo	292.4549	-0.0035	+0.0103		V	Bo/Gr	34	MinII
XY Leo	706.4411	-0.053	+0.0437		V	Gr	34	MinII
AM Leo	715.420:	-0.005:	-0.017:		V	Gr	34	MinII
ER Ori	252.340:	-0.024	+0.007		V	Fr/Me	34	MinII
FT Ori	590.4619	-0.0009 =	-0.0009		B, V	Gl/Sn	48	
DM Per	491.3405	+0.0443	-0.0113		B, V	Sr/Sn	48	MinII
	499.5237	+0.0443	-0.0113		B, V	Sr	48	MinII
	506.3519	+0.0532	-0.0025		B, V	Sr/Gd	48	

Table I (cont.)

Star	Min.hel. 2444	O-C (I)	O-C (II)	O-C (III)	Filt.	Obs.	Instr.	Rem.
DM Per	510.4348	+0.0445	-0.0112		B, V	Sr/Sn/Tj	48	MinII
	517.2671	+0.0575	+0.0017		B, V	Sr/Sn	48	
	566.3676	+0.0589	+0.0029		B, V	Sr	48	
	855.5057	+0.0578	+0.0003		B, V	Sr/Sn	48	
	885.508	+0.055	-0.003		V	Wo	34	
LX Per	560.4196	-0.0108 =	-0.0108		B	Er/Ir	48	MinII
	.4133	-0.0171 =	-0.0171		V	Er/Ir	48	MinII
IQ Per	290.3461	+0.0062 =	+0.0062		V	Me/Mi	34	
HU Tau	902.6432:	+0.0055:=	+0.0055:		V	Wo	34	
V471 Tau	186.42381	-0.00172		+0.00023	B	Tn/Tm/Sn	48	
	188.50853	-0.00173		+0.00022	B	Tm/Sn	48	
	281.27920	-0.00170		+0.00039	B	Tn/Tm/Sn	48	
	498.61236	-0.00202		+0.00043	B	Tm/Sn	48	
	518.41743	-0.00192		+0.00056	B	Ib	48	
	589.29850	-0.00179		+0.00082	B	Tn/Tm/Ir	48	
	638.28986	-0.00167		+0.00102	B	Ib/Tm	48	
W UMa	293.3981	+0.0073	-0.0004		V	Mi/Ze	34	
	925.6405	+0.0076	-0.0021		V	Wo	34	
AG Vir	709.4356:	+0.0050:	-0.0060:		V	Gr	34	
AH Vir	343.432	+0.057	-0.005		V	Fr/Ze	34	MinII
Z Vul	852.5044	-0.0059	+0.0094		V	Wo	34	
ER Vul	836.4758	+0.0038	+0.0144		B	Ib/Sn/Va	48	
	.4751	+0.0031	+0.0137		V	Ib/Sn/Va	48	
	837.4987	-0.0205	-0.0099		B	Tn	48	MinII
	.5012	-0.0180	-0.0074		V	Tn	48	MinII
	838.5499	-0.0164	-0.0058		B	Sn/Va	48	
	.5546	-0.0117	-0.0011		V	Sn/Va	48	

O-C (II): SAC 53, Krakow 1981

O-C (III): NN Cep 2444 507. 4033 + $2^d.058305.E$ (N. Gdr, . Glmen, IBVS 1881, 1980)

WW Dra 2441 918. 4994 + $4^d.6297444.E$ (Z. Tunca, C. Ibanođlu, M. Kurutaç, S. Evren, O. Tmer, A.Y. Ertan, IBVS 2040, 1981)

AR Lac 2441 593. 7115 + $1^d.98319197.E - 4^d.591 \cdot 10^{-9}.E^2$ (M. Kurutaç, C. Ibanođlu, Z. Tunca, A.Y. Ertan, S. Evren, O. Tmer, Astrophys. Space Science 77, 325, 1981)

V471 Tau 2440 610. 06478 + $0^d.52118371.E - 8.1 \cdot 10^{-11}.E^2$ (Z. Tunca, O. Tmer, M. Kurutaç, C. Ibanođlu, Astrophys. Space Science 64, 421, 1979)

The (O-C)'s for secondary minima (Min II) were calculated on the supposition, that they are symmetric between primary minima (if no special data are given).

The sign = between O-C (I) and O-C (II) indicates that the elements (I) and (II) are equal.

The sign: means that the time of minimum (last decimal) is uncertain.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2190

Konkoly Observatory
Budapest
1982 August 23
HU ISSN 0374-0676

RECENT PHOTOMETRY OF HR 1099 (V711 Tau)

The RS CVn binary HR 1099 was observed on 26 nights during January-February 1982 with the 34-cm Cassegrain reflector of the Kavalur Observatory through standard B and V filters. An unrefrigerated 1P21 together with the conventional d.c. set up was used for the observations. The faint visual companion (ADS 2644B) was included in all the observations. The measurements were made differentially with respect to the comparison star 10 Tau. The Julian days of observation were converted into orbital phases with the following ephemeris (Landis et al. 1978):

$$JD = 2442766.069 + 2.83782 E.$$

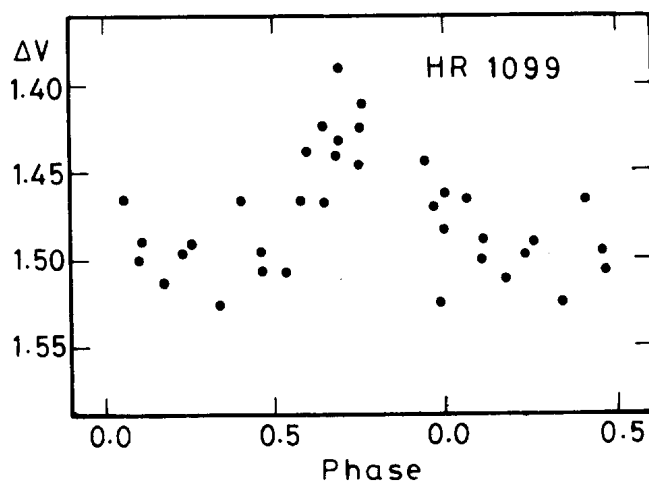


Figure 1

The figure is a plot of the ΔV magnitudes against the orbital phases. Each point is a mean of three or four independent measurements. The typical uncertainty of a value including systematic error is about 0.01 mag. The amplitude of the light variation is about 0.10 mag and the light minimum occurs at ~ 0.40 phase.

In the recent analysis of the photometric behaviour of HR 1099, Mekkaden, Raveendran and Mohin (1982) have shown that during the 1976-82 period, the brightness at light curve minimum was essentially constant with a mean value around $\Delta V = 1.60$ mag and a change in the amplitude of light variation was directly related to an increase in the brightness at light curve maximum. But the present observations indicate that the brightness at light minimum is brighter by about 0.10 mag than that of the previous years. The light curve obtained during the 1980-81 season had two minima (at phases close to 0.15 and 0.45), contrary to the observations of the earlier epochs which always showed only one minimum. The recent photometry shows a nearly sinusoidal light variation indicating that drastic changes have occurred in the distribution of 'active regions' during the period between the present and previous observing runs. It is difficult to decide to which of the two minima of the previous observing season the present minimum corresponds to and hence no definite conclusion on the migration of the photometric wave can be made.

It is interesting to note that the present observations agree well with those obtained by Cousins (1963) in the brightness at both light curve maximum and minimum and the phases at which these occur. It would be worthwhile to monitor this system continuously for the next few years for a better understanding of the nature of its activity.

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References:

- Cousins, A.W.J.: 1963, Mon.Not. astr. Soc. Sth.Afr. 22, 58
Landis, H.J., Lovell, L.P., Hall, D.S., Henry, G.W., Renner, T.R.:
1978, Astr. J., 83, 176
Mekkaden, M.V., Raveendran, A.V., Mohin, S.: 1982, J. Astrophys.
Astr. 3, 27

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2191

Konkoly Observatory
Budapest
1982 August 25
HU ISSN 0374-0676

CSV 6984 - A NEW W UMa TYPE VARIABLE STAR

The variable BV 97 = CSV 6984 = BD +37°2356 was discovered by Kippenhahn (1955). Filatov (1960) suspected W UMa type variability but light elements has not been found. This investigation was undertaken with the aim of classification of the variable and determination of light and orbital elements of the binary. In May 1980, photoelectric observations of CSV 6984 were made in the UBV system at Crimea Station of the Sternberg Institute. The measurements were made using a 60 cm reflector equipped with a photon counting photometer (Lyuty, 1971). HD 113730 served as comparison star (Westerlund, 1963). About 300 observations in V and B bands were obtained and a few in U band. The mean error of a single observation is 0^m.01. The light and colour curves are shown in Figure 1.

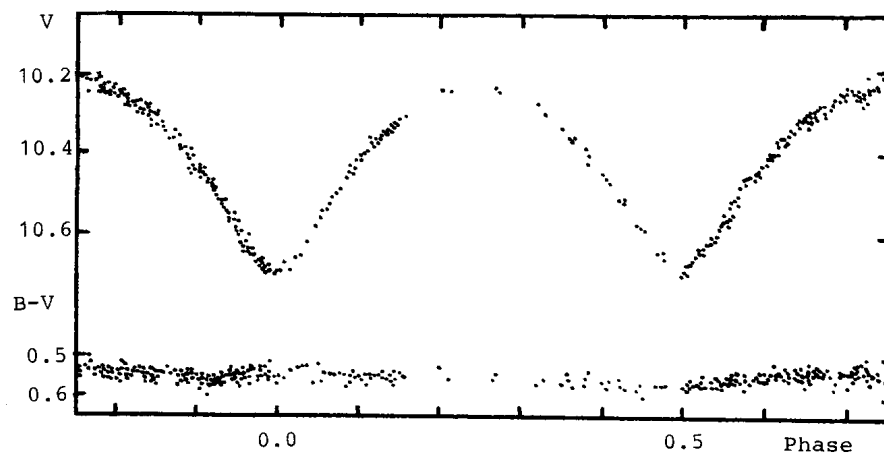


Figure 1

Four moments of minima were determined from the observations:

JD.hel. = 2444365.445 (II), 367.559 (I), 370.439 (II) and 374.4732 (I). The light elements are:

JD.hel. Min I = 2444365.2497 + 0.^d38416 E.

The period could not be determined correctly enough for the short observational set. Therefore, all published epochs of minima could not be represented with a common period.

Least-squares solutions were made for the light at the maxima according to the formula:

$$I = A_0 + A_1 \cos \theta + A_2 \cos 2\theta$$

The Russell - Merrill method (1952) was used to calculate the rectified intensities. An analysis of the light curves using Lavrov's computer code (1976) was made. The orbital elements of the binary are given in Table I.

Table I

Element	V-solution	B-solution	
	occ	occ	
x	0.6	0.6	adopted
k=a ₂ /a ₁	0.66	0.76	+0.16
a ₂	0.33	0.35	+0.06
i	76 ^o	77 ^o	+3 ^o
L ₁	0.70	0.68	+0.11

As the present solution is unreliable, more detailed investigations are needed.

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References:

- Filatov G.S., 1960, Astron. Circ. No. 215, 21
Kippenhahn R., 1955, Kleine Veröff. Bamberg No. 11
Lavrov M.I., 1976, Variable Stars, Suppl., 2, 349
Lyuty V.M., 1971, Sternberg Inst. Reports, No. 182, 30
Russell H.M., Merrill J.E., 1952, Princeton Contr., No. 26
Westerlund B.E., 1963, MNRAS, 127, 83

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2192

Konkoly Observatory
Budapest
1982 August 27
HU ISSN 0374-0676

REMARKS ON FOUR VARIABLE STARS

CSV 5885

CSV 5885 = Wr 67 has been suspected to be a Cepheid (Weber, R., 1958, J.O. 41.4). Variability could be confirmed and first elements could be determined from 123 Sky-patrol-plates (1959-1976):

$$\begin{aligned} \text{Max.} &= \text{J.D. } 24\ 41598.277 + 1^{\text{d}}.9881921.\text{E} & (\text{C}) \\ & (11^{\text{m}}.30 - 11^{\text{m}}.90 \text{ ph.}, M - m = 0^{\text{P}}.35) \end{aligned}$$

CSV 8736

No observations of this star (BV 120) have been published except the discovery (Geyer, E., 1955, Kl. Veröff. Remeis-Sternw. Bamberg No. 11). Eleven maxima were found on Hartha Sky-patrol-plates (1973-1978) and first elements are:

$$\begin{aligned} \text{Max. (hel.)} &= \text{J.D. } 24\ 41921.348 + 0^{\text{d}}.2463557.\text{E} & (\text{RRc}) \\ & (11^{\text{m}}.21 - 11^{\text{m}}.49 \text{ ph.}) \end{aligned}$$

CSV 8883

This star (BV 326) has not been observed since its discovery by Strohmeier, W. and Knigge, R. (Veröff. d. Remeis-Sternw. Bamberg Band V.5) in 1960. Elements could be derived from 193 Hartha Sky-patrol-plates (1959-1976) and an abrupt period change in 1965 October, was detected.

The elements are:

- a. for the interval from J.D. 24 36637-24 39029: (EW)
Min. (hel.) = J.D. 24 37016.435 + 0^d.4900267.E
- b. for the interval from J.D. 24 39052-24 43016:
Min. (hel.) = J.D. 24 43015.413 + 0^d.4900322.E
(10^m.50-10^m.98/10^m.98 ph.)

CSV 101915

CSV 101915 = 711.1933 was discovered by Morgenroth, O. (1933, Astron. Nachr. Bd. 251, 17) who also gave times of minima. A revision of 327 Sky-patrol-plates yields 3 new minima:

Minimum J.D.	Epoch	O-C	Observer
2400000 +			
27275.0	- 40	+ 0. ^d 3	Morgenroth
38235.5	0	+ 0.0	Berthold
372.2	+ 0.5	- 0.3	
39057.3	+ 3	- 0.3	

Used preliminary elements:

$$\text{Min.} = \text{J.D. } 24\ 38235.5 + 274.^d02.E \quad (\text{EA})$$

$$(11.^m64-12.^m75/12.^m75 \text{ ph, } D \approx 5.^d)$$

Period probably must be halved.

Further particulars will be published in "Mitteilungen der Bruno-H.-Bürgel-Sternwarte Hartha" Heft 18.

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COMMISSION 27 OF THE I. A. U.
 INFORMATION BULLETIN ON VARIABLE STARS
 Number 2193

Konkoly Observatory
 Budapest
 1982 August 27
 HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF BY Dra IN 1980 AND 1982

Photoelectric monitoring of the red dwarf star (flare star) BY Dra has been carried out at the mountain station of the Konkoly Observatory of the Hungarian Academy of Sciences in 1980 and 1982, using the 20 inch Cassegrain telescope. The observations were made by a single channel photoelectric photometer in the Johnson B and UBV colours in 1980 and 1982, respectively. In 1980 the registration of the observations was made by a chart-recorder, while in 1982 by a computer managed photometer with 5 or 10 sec integration time.

The monitoring intervals in UT, the mean scatter of the observations and the total monitoring time for each night are given in the Table. Any interruption of more than one minute has been noted.

During the observations no flare event was recorded.

Table

Date	Monitoring intervals (U.T.)	Scatter	Total monitoring time
1980 June 12/13			
	21 ^h 26 ^m 30 ^s - 21 ^h 54 ^m 00 ^s	0.016	1 ^h 3 ^m .5
	21 59 00 - 22 25 00		
	22 31 00 - 22 41 00		
1980 August 6/7			
	21 ^h 49 ^m 30 ^s - 22 ^h 16 ^m 00 ^s	0.013	1 ^h 26 ^m
	22 26 30 - 22 46 00		

Table (cont.)

Date	Monitoring intervals (U.T.)	Scatter	Total monitoring time
1980 August 6/7	23 ^h 28 ^m 30 ^s - 23 ^h 53 ^m 30 ^s 0 01 00 - 0 23 00 0 27 30 - 0 47 00		
1982 May 26/27	21 ^h 18 ^m 00 ^s - 21 ^h 35 ^m 00 ^s 21 49 00 - 22 10 00 22 16 00 - 22 34 00 22 40 30 - 22 57 00 23 06 00 - 23 25 00 23 32 00 - 23 50 30 23 58 00 - 0 17 00 0 24 00 - 0 43 30 0 49 00 - 0 58 00	0.005 (V) 0.006 (B) 0.012 (U)	2 ^h 37 ^m
1982 June 28/29	23 ^h 52 ^m 30 ^s - 0 ^h 11 ^m 00 ^s 0 16 00 - 0 35 00 0 40 00 - 0 48 00	0.006 (V) 0.006 (B) 0.022 (U)	45 ^m 5
Total: 5 ^h 52 ^m			

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2194

Konkoly Observatory
Budapest
1982 August 31
HU ISSN 0374-0676

ON THE PERIOD OF HD 200925

Bedolla and Pena (1979) presented photoelectric observations of HD 200925 in V filter and estimated the period of its variability to be $0.^d.238$ with an amplitude of $0.^m.35$. Later in 1979 this star was observed spectroscopically by Imbert (1980). The radial velocity measures yielded a period of pulsation of $0.^d.26765 \pm 0.00005$ with an indication of a second pulsation mode superposed on the principal mode. Imbert also excluded the possibility that the star HD 200925 might be an eclipsing variable. The star was observed by us photoelectrically in the year 1979 in UBV filters and the period was determined to be:

$$0.^d.267396 \pm 0.000003, \text{ (Gupta and Padalia, 1980)}$$

The light curves obtained by us were analysed further and the physical parameters were determined. The nature of its variability was found to resemble that of a dwarf cepheid (Padalia and Gupta, 1982).

While our observations were still in progress, Dupuy (1981) reexamined the photoelectric V observations of Bedolla and Pena and determined its period to be $0.^d.2675$. He, however, noticed that on (26-27 September, 1978) one night's observations of Bedolla and Pena, the star appeared systematically brighter by about $0.^m.08$.

In order to investigate the multiperiodicity in the light variation of this star as reported by Imbert (1980) and to improve its period, the star was observed further by us on 10 nights from September 1980 to October 1981. The instrumental system and the comparison star are the same as mentioned in

our previous papers. The data were reduced to the standard system.

We tried to draw a comprehensive light curve for our observations of 1980 and 1981. In this, a period of $0^d.267394$ as determined earlier (Padalia and Gupta, 1982) and epoch JD Hel 2443776.835 (which appears as the time of the first maximum in the light curves obtained by Bedolla and Pena) were taken. It was noticed that all the maxima observed during 1980 and 1981 are shifted by about 0.5, in phase. This shift may be attributed either to a wrong choice of epoch (i.e. the time of first maximum) or to a sudden change in the period of this star. From an examination of the light curves, the former reason appeared to be more plausible. Therefore, taking the new epoch of maximum to be 2443776.715 (which is the time of first minimum as reported by Bedolla and Pena), an improved period of $0^d.267299 \pm .000001$ by least squares method was determined. With this new epoch of maximum and improved period, all the observations taken by various authors till 1981 can be explained fully in the sense of drawing a comprehensive light curve. UBV light curves for our observations taken during the years 1980 and 1981 are shown in Figure 1.

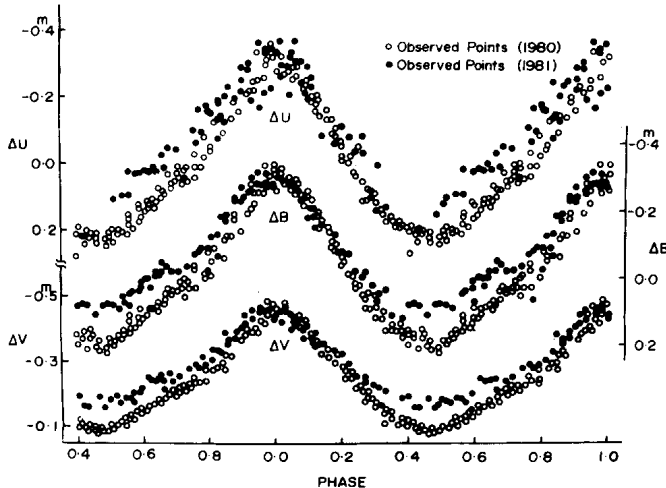


Figure 1: U, B, V light curves of HD 200925

Since the new epoch of maximum (JD Hel 2443776.715) considered by us actually appeared as minimum in the light curve given by Bedolla and Pena, it was felt necessary to remove this confusion through correspondence with them. They confirmed that all the minima that appeared in the individual light curves of their paper are actually maxima and vice-versa.

Dupuy (1981) pointed out that the V observations reported by Bedolla and Pena on the night of September 26-27 were systematically brighter by about $0^m.08$. However our UBV observations of 1981 show that the star is brighter at the times of minima and gradually the light curves merge into the maxima of the light curves of 1980 as shown in Figure 1. A change of $0^m.11$ and $0^m.08$ has been noticed in the B and V filters at the time of minimum, respectively. However due to lack of observations at the time of minimum in U filter, increase in brightness in U could not be estimated.

A hump appears in the ascending branch in the individual light curves, which is usually found in cepheid variables. The hump is more prominent in the U filter than in the B and V filters. Three typical individual light curves with humps in the U filter (one from each year of our observations) are shown in Figure 2a, b, c.

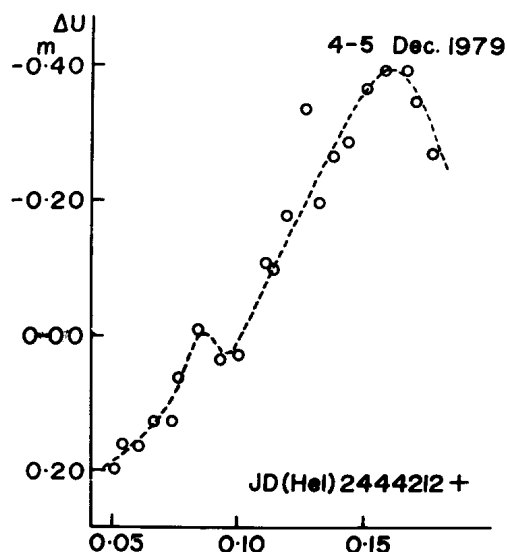


Figure 2a

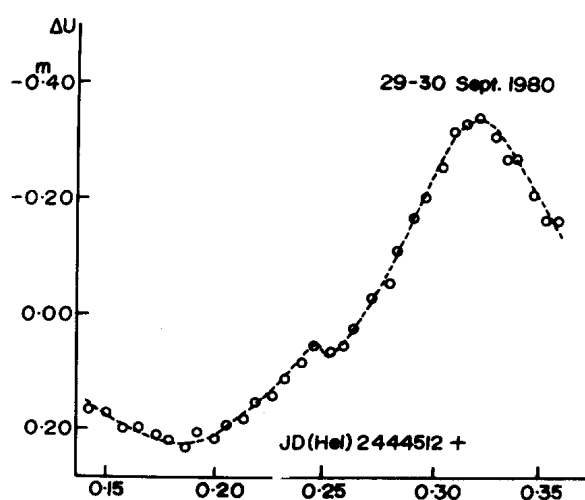


Figure 2b

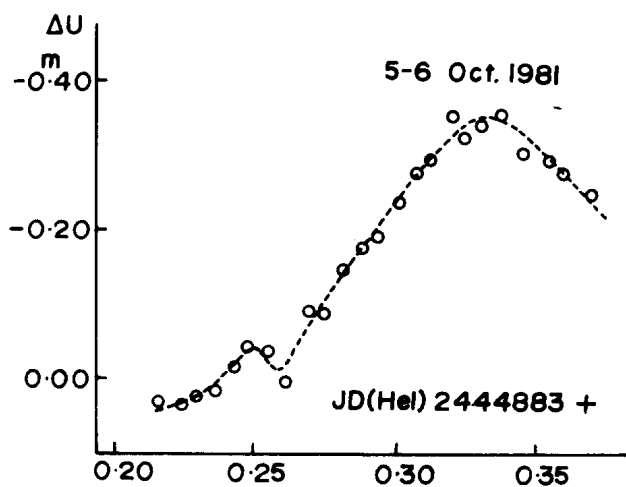


Figure 2c

Figure 2: Individual light curves of HD 200925 in U filter, showing humps.

We conclude that the period of $0.^d.267299$ has remained constant since 1978. The discrepancy in its period which existed so far appeared mainly because the times of its first maximum and minimum were not clear. From the shapes of the existing light curves, possibility of its having RRc nature can not be excluded. Spectroscopic observations are needed to confirm whether the star is a dwarf cepheid or RRc type variable. Further UBV observations for this star are in progress to see whether the brightness change at the time of its minimum has any periodicity.

The authors are thanful to Dr. S.D. Sinvhal for helpful discussions. Thanks are also due to Professor N.S. Nikolov, University of Sofia, Bulgaria for fruitful discussions and suggestions during his visit to Uttar Pradesh State Observatory.

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References:

- Bedolla, S.F.G. and Pena, J.H., 1979, I.B.V.S. No. 1615
Dupuy, D.L., 1981, Publ. Astron. Soc. Pacific, 93, 126
Gupta, S.K. and Padalia, T.D., 1980, I.B.V.S. NO. 1870
Imbert, M., 1980, Astron. Astrophys. 86, 259
Padalia, T.D. and Gupta, S.K., 1982, Astrophys. Space Sci. 81, 251

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2195

Konkoly Observatory
Budapest
1982 September 3
HU ISSN 0374-0676

MISIDENTIFICATION OF EY SGR

In I. B. V. S. No. 2167 (1982), Caldwell and Coulson question the variability of EY Sgr, a variable discovered by Cannon (1925). They identify EY Sgr as one of a pair of stars (called A and B by them), neither of which appear to vary.

A comparison of the chart of Caldwell and Coulson with the finding chart for EY Sgr published by Tsesevich and Kazanasmas (1971) shows that the variable is neither A nor B, but a star slightly to the south and ~5s west of that pair. An examination of Miss Cannon's plates shows that the latter star does indeed vary.

From Caldwell and Coulson's chart, the 1950 position of EY Sgr is 19h 34m 35s, -12° 15'1.

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References:

Cannon, A. J. 1925, Harvard Bulletin 825.

Tsesevich, V. P. and Kazanasmas, M. S. 1971, Atlas of Finding Charts
of Variable Stars, Moscow.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2196

Konkoly Observatory
Budapest
1982 September 6
HU ISSN 0374-0676

EVIDENCE FOR THE VARIATION OF BRIGHTNESS WITHIN THE PRIMARY
MINIMA IN W UMa (BD + 56⁰1400)

Photometry of the star was carried out in Izmir, at Ege University Observatory with the 48 cm Cassegrain reflector and EMI 9781 A unrefrigerated photomultiplier. The first complete light curve was obtained on January 6, 1982 with excellent sky conditions ($k_B = 0.16$, $k_V = 0.19$). On January 7, 1982 only the primary minimum was repeated. Until the end of February, 1982 the variable star could not have been observed due to bad weather conditions. In March 25/26/28, 1982 one light curve was completed. The last uncomplete light curve in this season was obtained in April 6, 1982.

In previous bulletins (I.B.V.S. Nos: 2083, 2102, 2151) timings of primary and secondary minima, corresponding (O-C) values were calculated and presented together with the figures. Intercomparison among the light curves obtained in January, March, April 1982 and particularly between January and April has resulted in conspicuous brightness variation (see Figure 1). The light curves obtained on January 16/17 and the last one obtained on April, 1982 exhibit marked brightness difference within the first minimum, whereas corresponding brightness difference is not so conspicuous within the secondary minimum. The brightness difference within the first minimum is about 0.05 - 0.06 magnitude. In order to check if this value is correct from the point of view of observational errors, the comparison star (BD+56⁰1399) was re-examined and its brightness constancy was checked throughout the observations. It is clear that the comparison star exhibits no variation what so ever and its standard mean error was calculated for the nights and amounted to 0.01 magnitude.

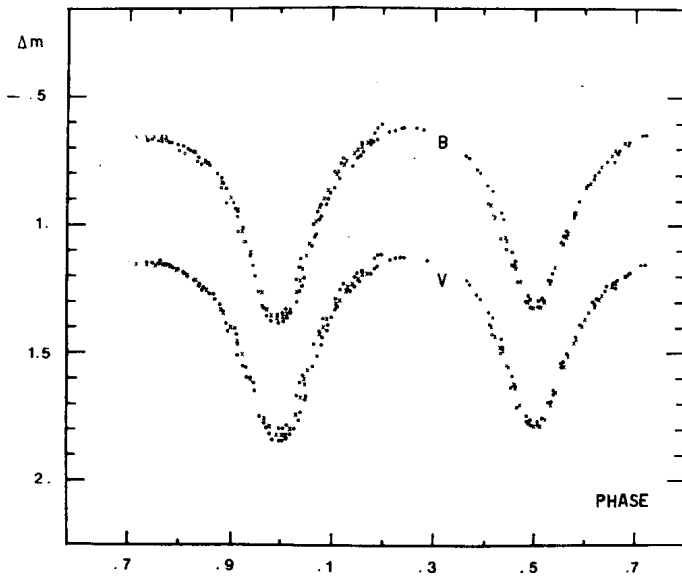


Figure 1: Differential brightness curves of W UMa obtained in January, March and April 1982. Dots, crosses and open circles correspond to the observations obtained on 16/17 January, 1982, 25/26/28 March, 1982 and April 6, 1982 respectively. The dimension of circles (open or filled) correspond to the standard mean error of 0.01 magnitude.

Therefore the brightness variation within the primary minimum is real and is about 0.05-0.06 magnitudes between January and April, 1982.

Acknowledgements: I would like to thank Dr. E. Hamzaoglu and Mr. T. Eker for the observations of the star.

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References:

- Tunca, Z., Tümer, O., Evren, S., 1979, I.B.V.S. No. 1607
Hamzaoglu, E., Keskin, V., Eker, T., 1982, I.B.V.S. No. 2083
Hamzaoglu, E., Keskin, V., Eker, T., 1982, I.B.V.S. No. 2102
Hamzaoglu, M., Hamzaoglu, E., Eker, T., 1982, I.B.V.S. No. 2151

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2197

Konkoly Observatory
Budapest
1982 September 9
HU ISSN 0374-0676

LIGHT ELEMENTS OF ST INDI

The variability of ST Ind = CoD-48^O13615 = S5110 was discovered by Hoffmeister (1949) from photographic plates and visual estimates made in South Africa. He found for this system a W UMa-like light variation with abnormal dispersion (Hoffmeister, 1955a). Further, Hoffmeister (1955b) published the following linear light elements: $P = 0.^d401888$, $T_0 = \text{JD } 2434274.^d407$; also he gave the light curve and 24 times of minimum light. Seven of these minima were determined photographically and the rest visually (Hoffmeister, 1956).

In this note we present six times of minimum light determined from 413 UBV observations made in August 1981 at CTIO*, in Chile, with the 60 cm Lowell telescope.

Individual minima are listed in Table I (the standard errors are given in parenthesis). They were determined from the light curve on each pass-band. The colour average of these minima are listed in Table II (standard deviations in parenthesis) together with the minima given by Hoffmeister.

Table I . Individual times of minima of ST Indi

JDHel 2444000+		
V	B	U
837.68610(13)	837.68667(07)	837.68566(14)
837.88998(37)	837.88917(33)	837.89031(41)
838.49086(12)	838.49074(14)	838.49054(24)
838.69297(29)	838.69267(18)	838.69272(19)
839.69607(32)	839.69588(14)	839.69631(15)
843.51579(43)	843.51519(25)	843.51471(42)

*Cerro Tololo Interamerican Observatory is operated by AURA, Inc., under contract with the NSF (USA).

Table II . Minima of ST Indi

Meth.	JDHel. 2400000+	w	E	(o-c)	(o-c)'	(O-c)"
Pg	34274.417	0.1	-26289.5	0.0057		0.0070
Pg	34302.319	0.1	-26220	-.0231		-.0220
Pg	34478.574	0.1	-25781.5	.0065		.0068
Pg	34488.628	0.1	-25756.5	.0134		.0137
Pg	34490.634	0.1	-25751.5	.0100		.0103
Vis	34505.505	0.1	-25714.5	.0114		.0115
Vis	34507.494	0.1	-25709.5	-.0090		-.0089
Pg	34542.467	0.1	-25622.5	.0002		.0002
Vis	34547.471	0.1	-25610	-.0193		-.0194
Pg	34550.567	0.1	-25602.5	.0626		.0625
Vis	34561.350	0.1	-25575.5	-.0053		-.0054
Vis	34562.363	0.1	-25573	.0030		.0029
Vis	34563.390	0.1	-25570.5	.0253		.0252
Vis	34567.373	0.2	-25560.5	-.0105		-.0106
Vis	34568.392	0.2	-25558	.0038		.0037
Vis	34568.598	0.2	-25557.5	.0089		.0087
Vis	34569.390	0.2	-25555.5	-.0029		-.0030
Vis	34569.594	0.2	-25555	.0002		.0000
Vis	34570.387	0.2	-25553	-.0106		-.0108
Vis	34570.602	0.2	-25552.5	.0034		.0033
Vis	34571.393	0.2	-25550.5	-.0093		-.0095
Vis	34571.598	0.2	-25550	-.0053		-.0054
Vis	34573.400	0.2	-25545.5	-.0117		-.0119
Vis	34573.606	0.2	-25545	-.0067		-.0068
UBV	44837.68622(50)	1.2	-5	-.0011	-.0009	
UBV	44837.88982(59)	0.4	-4.5	.0016	.0018	
UBV	44838.49075(16)	0.8	-3	-.0003	-.0002	
UBV	44838.69279(16)	2.0	-2.5	.0008	.0009	
UBV	44839.69607(22)	2.0	0	-.0006	-.0007	
UBV	44843.51530(54)	0.8	9.5	.0007	.0002	

A least squares linear solution for the 24 photographic and visual minima gives the following light elements:

$$\text{Min I} = \text{HJD } 2434424.^d_{1119} + 0.^d_{401884} \text{ E} \\ \pm .0050 \quad \pm .000015 \text{ m.e.} \quad (1)$$

while for the present six photoelectric minima a least squares solution gives the following linear light elements:

$$\text{Min I} = \text{HJD } 2444839.^d_{69675} + 0.^d_{401930} \text{ E} \\ \pm .00021 \quad \pm .000049 \text{ m.e.} \quad (2)$$

These results show the period to be constant within the errors. Finally a least squares linear fit was performed with all the minima giving the following light elements (cycles were calculated with the period given in (1)):

$$\text{Min I} = \text{HJD } 2444839^{\text{d}}.6967 + 0.^{\text{d}}.40188233 \text{ E}$$

$$\pm .0010 \quad \pm .00000010 \text{ m.e.}$$

The cycles E and the residuals (O-C) from the latter ephemeris are listed in Table II while the columns labeled (O-C)' and (O-C)" refer to the residuals from (1) and (2), respectively.

Differential V and colour curves are displayed in Figure 1.

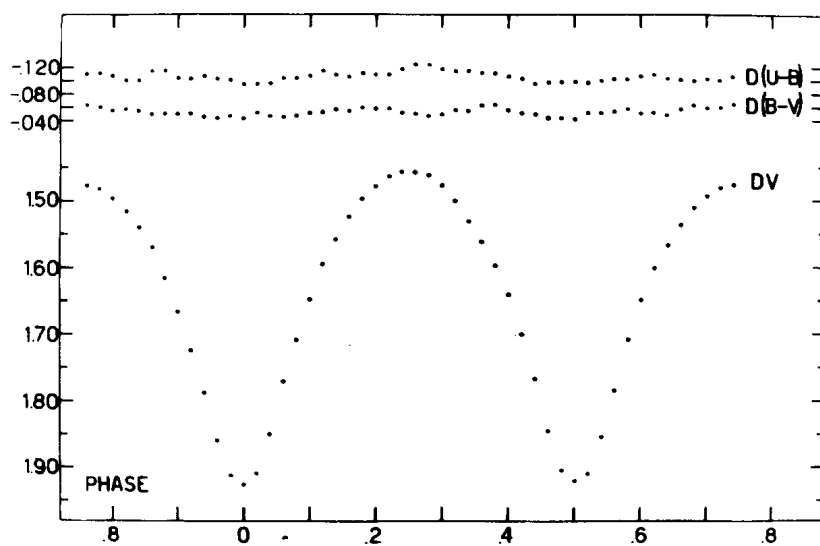


Figure 1

ST Ind is a typical W UMa star as previously classified, eclipses are partial and of equal depths (0.49 mag), thus letting as arbitrary the distinction between primary and secondary minima.

Maxima are highly curved and the light at phase 0.25 exceeds in 0.02 mag the light at phase 0.75. Colours are almost constant throughout the period.

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References:

- Hoffmeister, C. 1949, Astron. Abh., Erg. zu den Astron. Nach.,
12, No. 1
Hoffmeister, C. 1955a, Astron. Nach., 282, 260
Hoffmeister, C. 1955b, Mitt. über Veränd. Sterne, No. 186
Hoffmeister, C. 1956, Veröff. der Sternw. Sonneberg, 3, No. 1

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2198

Konkoly Observatory
Budapest
1982 September 14
HU ISSN 0374-0676

A NOTE ON TWO Be STARS*

HD 30076

HD 30076 (= HR 1508 = 56 Eri) is known as a variable at least since Cousins (1963). It appears also in the Second Catalogue of Suspected Variable Stars (Kukarkin et al., 1965) under the number 6131. The spectral type given by Cousins was B5ne and the range of variation in V was 5.90 - 5.99. Later UBV observations by Feinstein (1968) pointed out variations of $0^m.12$ in V, $0^m.03$ in B-V and U-B (see Table III) in 35 months. However, HD 30076 is listed without indication of variability both by Crawford et al. (1971) and by Grønbech and Olsen (1976a).

We were unaware of this variability and HD 30076 was included in several occasions as a secondary reference or as a comparison star in our observing runs. uvby observations of this star have then been carried out at the ESO 1m telescope in September 1980 and August 1981, and at the Danish 50cm telescope at La Silla in January 1982. The 1m telescope was equipped with a standard one-channel photometer (Danks, 1981, Chap. II.C.1 and III.B.3) and the Danish 50cm telescope with a simultaneous four-channel photometer (Danks, 1981, Chap. II.H.1 and III.B.8). The integrations were repeated until reaching a satisfactory precision of the counts. For each run, the typical overall agreement of the observations with the international uvby standard system was for V, b-y, m_1 , c_1 respectively less than $0^m.011$, $0^m.006$, $0^m.008$ and $0^m.009$. The results are presented in Tables I and II.

*Based on observations collected at the European Southern Observatory, La Silla, Chile

Table I

uvby observations of HD 30076 at the ESO 1m
telescope (Sept. 1980 and Aug. 1981)

JD _☉	V	b-y	m ₁	c ₁
2,440,000 +				
4487.8350	5.886	-0.013	0.066	0.078
4835.8886	5.842	-0.033	0.074	0.119
4839.8748	5.874	-0.032	0.075	0.130
4841.8664	5.893	-0.034	0.075	0.119

Table II

uvby observations of HD 30076 at the Danish 50cm
telescope (Jan. 1982)

JD _☉	V	b-y	m ₁	c ₁
2,440,000+				
4972.6373	5.909	-0.031	0.064	0.148
4973.6607	5.906	-0.031	0.064	0.163
4974.6450	5.934	-0.016	0.059	0.128
4975.6371	5.879	-0.017	0.055	0.131
4978.5979	5.898	-0.027	0.064	0.144
4979.6252	5.979	-0.030	0.069	0.145
4980.5861	5.923	-0.030	0.070	0.145
4981.5899	5.898	-0.032	0.073	0.146
4982.6172	5.923	-0.035	0.072	0.161
4983.6289	5.939	-0.023	0.069	0.137
4984.6327	5.954	-0.021	0.067	0.146
4985.6248	5.948	-0.026	0.065	0.145

In Tables III and IV, we have gathered past observations of this star. The indices in the seven-colour (Geneva) system are the following (Rufener, 1981): $m_V = 5.890$, $U = 0.391$, $V = 1.065$, $B_1 = 0.797$, $B_2 = 1.585$, $V_1 = 1.758$ and $G = 2.261$. The star was pointed out as a suspected variable in Rufener and Bartholdi (1982) with $\sigma_V = 0.035$ and $\sigma(\text{colours}) = 0.007$. Feinstein (1968) found also $R = 6.69$ and $R-I = -0.06$ from two measurements in November 1965.

It is not easy to draw a light curve with all these data because the epochs are missing for most observations. But clearly, from our own observations and from the past data, variability appears to be present both on a short and long timescales with different amplitudes difficult to separate: daily fluctuations of a few hundredths of magnitude, while monthly or yearly effects are more important. The total variability seems to be fairly typical for a Be star and amounts to (from individual variations): $0^m.22$ in V, $0^m.07$ in b-y, $0^m.05$ in m_1 , $0^m.15$ in c_1 , $0^m.02$ in β , $0^m.06$ in U-B and in B-V.

Table III

UBV observations of HD 30076

V	B-V	U-B	n	Ref.
5.92	-0.11	-0.83		Mendoza (1958)
5.90	-0.11	-0.81		Cousins (1963)
5.90	-0.13			Lake (1963)
5.91	-0.09	-0.77	4	Feinstein (1968) (Jan. 1963)
5.81	-0.10	-0.80	4	" (Dec. 1964)
5.79	-0.07	-0.77	4	" (Nov. 1965)
5.86	-0.09	-0.80	4	Crawford et al. (1971)
5.90	-0.11	-0.81		Nicolet (1978)

Table IV
uvby β observations of HD 30076

V	b-y	m ₁	c ₁	n	β	n	Ref.
5.86	0.006	0.040	0.069	4	2.469	3	Crawford et al. (1971)
5.800	0.013						Grønbech (1974) (JJ _⊙ 42,000.79-83)
5.765	0.023						" 1.74-80)
5.794	0.024						" 2.67-82)
5.780	0.017						" 3.75)
5.760	0.023						" 4.67)
5.762	0.015						" 5.76)
					2.470	3	Feinstein (1974) (observ. in 1970)
					2.484	3	" 1972)
	0.006	0.040	0.069		2.469		Hauck & Mermilliod (1975)
5.836	0.034	0.021	0.015	2			Grønbech & Olsen (1976a)
± 0.009	± 0.002	± 0.009	± 0.005		2.463	3	Grønbech & Olsen (1976b)
					± 0.010		
5.886	-0.013	0.066	0.078	1			Table I (1980)
5.870	-0.032	0.074	0.123	3			Table I (1981)
± 0.026	± 0.001	± 0.001	± 0.006				
5.924	-0.027	0.066	0.145	12			Table II
± 0.028	± 0.006	± 0.005	± 0.010				

Table V

uvby observations of HD 172256

J.D. _☉	v	b-y	m ₁	c ₁
2,440,000+				
4838.4851	8.667	0.120	-0.013	0.159
.5008	8.662	0.112	0.003	0.156
.5276	8.658	0.112	-0.005	0.167
.5371	8.661	0.119	-0.021	0.180
.5585	8.667	0.111	-0.007	0.180
.5675	8.671	0.113	-0.003	0.166
.5837	8.686	0.117	-0.013	0.166
.5939	8.690	0.113	-0.002	0.151
.6179	8.734	0.107	-0.011	0.149
.6285	8.740	0.101	0.004	0.129
.6455	8.743	0.110	-0.008	0.124
.6558	8.751	0.108	-0.006	0.124
.6733	8.742	0.106	0.001	0.111
.6826	8.733	0.108	-0.002	0.115
4839.4795	8.674	0.115	-0.007	0.147
.4903	8.673	0.109	0.005	0.140
.5808	8.740	0.112	0.000	0.162
.5955	8.740	0.121	-0.011	0.168
.6852	8.738	0.117	-0.003	0.131
.6971	8.729	0.124	-0.021	0.146
4840.5550	8.750	0.119	-0.007	0.173
.5660	8.755	0.121	-0.008	0.169
4841.5610	8.680	0.117	-0.005	0.153
.5726	8.678	0.122	-0.018	0.161
4842.5432	8.693	0.119	-0.011	0.144
.5531	8.701	0.117	-0.009	0.143
4843.6192	8.755	0.120	-0.008	0.154
.6291	8.761	0.121	-0.006	0.156
4844.6194	8.704	0.114	-0.006	0.154
.6281	8.696	0.117	-0.009	0.153

overall average (n = 30)

8.709±0.035 0.115±0.005 -0.008±0.006 0.151±0.017

Table V (cont.)

daily averages

2,400,000+

4838 (n = 14)	8.700 \pm 0.037	0.111 \pm 0.005	-0.006 \pm 0.007	0.148 \pm 0.024
4839 (n = 6)	8.716 \pm 0.033	0.116 \pm 0.005	-0.006 \pm 0.009	0.149 \pm 0.014
4840 (n = 2)	8.752 \pm 0.003	0.120 \pm 0.002	-0.008 \pm 0.001	0.171 \pm 0.003
4841 (n = 2)	8.679 \pm 0.002	0.119 \pm 0.003	-0.012 \pm 0.009	0.157 \pm 0.006
4842 (n = 2)	8.697 \pm 0.005	0.118 \pm 0.002	-0.010 \pm 0.001	0.143 \pm 0.001
4843 (n = 2)	8.758 \pm 0.004	0.120 \pm 0.001	-0.007 \pm 0.002	0.154 \pm 0.002
4844 (n = 2)	8.700 \pm 0.005	0.116 \pm 0.002	-0.007 \pm 0.003	0.153 \pm 0.001

mean of the daily averages (n = 7)

8.715 \pm 0.030	0.117 \pm 0.003	-0.008 \pm 0.002	0.154 \pm 0.009
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HD 172256

HD 172256 (=SAO 187112) was found variable when used as a comparison in our observations of V348 Sgr (Heck et al., 1982), which is not too surprising since it is listed as a Be star under # 606 in Wackerling's catalogue (1970). Its radial velocity is +3.3 km sec⁻¹ (Wilson, 1953).

Our detailed observations are gathered in Table V. They were carried out in August 1981 at the ESO 1m telescope and the characteristics are the same as for HD 30076. The daily averages are also given in Table V. We have been unable to extract any periodicity out of the variations.

Here the amplitudes are relatively small, especially in b-y and m₁. It would be interesting to check the variability on a longer timescale.

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References:

- Cousins, A.W.J. 1963, Monthly Not. Astron. Soc. South Africa 22, 58
 Crawford, D.L., Barnes, J.V., Golson, J.C. 1971, Astron. J. 76, 1058
 Danks, A.C. 1981, The ESO User's Manual, European Southern Observatory
 Feinstein, A. 1968, Zeit. f. Astrophys. 68, 29
 Feinstein, A. 1974, Monthly Not. Roy. Astron. Soc. 169, 171
 Grønbech, B. 1974, IAU Comm. 27 Inf. Bull. Var. Stars 890
 Grønbech, B., Olsen, E.H. 1976a, Astron. Astrophys. Suppl. 25, 213
 Grønbech, B., Olsen, E.H. 1976b, Astron. Astrophys. Suppl. 27, 443
 Hauck, B., Mermilliod, M. 1975, Astron. Astrophys. Suppl. 22, 235
 Heck, A., Houziaux, L., Manfroid, J. 1982, IAU Comm, 27 Inf. Bull. Variable Stars 2184
 Kukarkin, B.V., Kholopov, P.N., Efremov, Y.N., Kurochkin, N.E. 1965, Second Catalogue of Suspected Variable Stars, Moscow
 Lake, R. 1963, Monthly Not. Astron. Soc. South Africa 22, 79
 Mendoza, E.E.V. 1958, Astrophys. J. 128, 207
 Nicolet, B. 1978, Astron. Astrophys. Suppl. 34, 1
 Rufener, F. 1981, Astron. Astrophys. Suppl. 45, 207
 Rufener, F., Bartholdi, P. 1982, Astron. Astrophys. Suppl. 48, 503
 Wackerling, L.R. 1970, Mem. Roy. Astron. Soc. 73, 153
 Wilson, R.E. 1953, General Catalogue of Stellar Radial Velocities, Carnegie Inst. Washington 601

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2199

Konkoly Observatory
Budapest
1982 September 24
HU ISSN 0374-0676

IS HD 90994 A "REDUCTION VARIABLE"? *

Discrepant results in reducing uvby observations of HD 90994 (= HR 4119 = 30 Sex = β Sex, B6V) led us to gather the photometric values given for that star in the literature. Original observational UB data (i.e. not resulting from a compilation) are presented in Table I, while original uvby β indices are given in Table II, together with the results of our own observing runs. The penultimate line of Table II corresponds to observations carried out with the Danish 50 cm telescope at La Silla. The indices in the seven-colour (Geneva) system are the following (Rufener, 1976, 1981): $m_V = 5.055$, $U = 0.391$, $V = 1.119$, $B_1 = 0.825$, $B_2 = 1.572$, $V_1 = 1.819$ and $G = 2.344$, with $\sigma_V = 0.006$ and $\sigma(\text{colours}) = 0.003$. In the DAO system where HD 90994 was selected as a standard star, the indices are (Hill et al., 1971): $V = 5.04$, $c(35-44) = -0.683$, $c(38-44) = -0.474$, $c(38-42) = -0.372$, $c(44-54) = -0.094$, $c(42-56) = -0.168$ and $B-V = -0.12$.

Table I

UBV observations of HD 90994

V	U-B	B-V	n	Ref.
5.00		-0.14		Bouige, 1959
	-0.518	-0.145		Belyakina & Chugainov, 1960
5.07	-0.50	-0.14		Cousins & Stoy, 1962
5.09	-0.54	-0.13		Iriarte et al., 1965
5.09		-0.126		Haggkvist & Oja, 1966
5.10	-0.53	-0.14		Johnson et al., 1971
5.07	-0.51	-0.14	5	Crawford et al., 1971

* Based on observations collected at the European Southern Observatory,
La Silla, Chile

Table II

uvby β observations of HD 90994

V	b-y	m ₁	c ₁	n	β	n	Ref.
					2.730	3	Crawford & Mander, 1966
	-0.056	0.108	0.487	1	2.736	1	Cameron, 1966
5.1	-0.064 <u>+0.009</u>	0.116 <u>+0.011</u>	0.466 <u>+0.010</u>	7			Crawford & Barnes, 1970
	-0.059 <u>+0.005</u>	0.116 <u>+0.005</u>	0.475 <u>+0.007</u>	2	2.731 <u>+0.007</u>	2	Johansen & Gyldenkerne, 1970
5.07	-0.064	0.116	0.466	std	2.730	std	Crawford et al., 1971
5.04					2.738	4	Stokes, 1972a
5.08	-0.065	0.113	0.480	7	2.727	7	Stokes, 1972b
					2.733	10	Claria, 1974
					2.722 <u>+0.011</u>	7	Feinstein, 1974 (obs. in 1970 & 1972)
	-0.065 <u>+0.006</u>	0.115 <u>+0.007</u>	0.485 <u>+0.004</u>	31			Grønbech et al., 1976
					2.729 <u>+0.004</u>	24	Grønbech & Olsen, 1977
	-0.062 <u>+0.008</u>	0.107 <u>+0.008</u>	0.478 <u>+0.001</u>	2	2.732 <u>+0.003</u>	4	Warren & Hesser, 1977
	-0.067 <u>+0.004</u>	0.109 <u>+0.003</u>	0.480 <u>+0.011</u>	3	2.725 <u>+0.004</u>	10	Warren & Hesser, 1977
5.072 <u>+0.004</u>	-0.064 <u>+0.004</u>	0.116 <u>+0.010</u>	0.481 <u>+0.009</u>	4			Heck & Manfroid, 1980 (obs. in June 1978)
5.077 <u>+0.010</u>	-0.060 <u>+0.004</u>	0.107 <u>+0.004</u>	0.498 <u>+0.005</u>	16			see text (obs. in March 1980)
5.076 <u>+0.004</u>	-0.067 <u>+0.003</u>	0.119 <u>+0.004</u>	0.480 <u>+0.002</u>	10			Manfroid & Renson, 1982

HD 90994 is also known as a β standard (Crawford & Mander, 1966) and has been extensively used as such in spite of the variations shown, amounting up to ~ 0.06 in V, 0.013 in b-y, 0.032 in c_1 , 0.020 in m_1 to take only the uvby photometry.

These variations might however result from reduction problems as HD 90994 has an extreme value in b-y (refer for instance to Oblak et al., 1976). If the standard stars used for a given run are not well spread enough in the ranges of the photometric indices, the extrapolation to extreme reduced values can be wrong. Since the (b-y) term appears in all the reduction equations (see e.g. Crawford & Barnes, 1970), all reduced color indices can be affected. This kind of problem will be treated in detail elsewhere (Manfroid & Heck, 1982).

However in a recent paper, Manfroid & Renson (1982) believe HD 90994 could be also intrinsically variable by 0.01^m or slightly more in y and by 0.02^m in u. They even suspect this variation to be periodic, with $P \approx 8^d$ (or the double, with a double maximum).

We would then urge a series of detailed observations with carefully selected standard stars in order to precise the type of possible variations of the star, independently from reduction problems.

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References

- Belyakina, T.S., Chugainov, P.F. 1960, Izv. Krymsk. Astrophys. Obs. 22, 257
- Bouige, R. 1959, Ann. Toulouse 27, 47
- Cameron, R.C. 1966, Georgetown Obs. Monograph 21
- Claria, J.J. 1974, Astron. J. 79, 1022
- Cousins, A.W.J., Stoy, R.H. 1962, Roy. Obs. Bull. 64
- Crawford, D.L., Barnes, J.V. 1970, Astron. 75, 978
- Crawford, D.L., Barnes, J.V., Golson, J.C. 1971, Astron. J. 76, 1058
- Crawford, D.L., Mander, J. 1966, Astron. J. 71, 114
- Feinstein, A. 1974, Monthly Not. Roy. Astron. Soc. 169, 171
- Grønbech, B., Olsen, E.H. 1977, Astron. Astrophys. Suppl. 27, 443
- Grønbech, B., Olsen, E.H., Stroemgren, B. 1976, Astron. Astrophys. Suppl. 26, 155
- Haggkvist, L., Oja, T. 1966, Arkiv. Astron. 4, 137
- Heck, A., Manfroid, J. 1980, Astron. Astrophys. Suppl. 42, 311
- Hill, G., Morris, S.C., Walker, G.A.H. 1971, Astron. J. 76, 246
- Iriarte, B., Johnson, H.L., Mitchell, R.I., Wisniewski, W.Z. 1965, Sky & Tel. 30,
21
- Johansen, K.T., Gyldenkerne, K. 1970, Astron. Astrophys. Suppl. 1, 165
- Johnson, H.L., Mitchell, R.I., Iriarte, B., Wisniewski, W.Z. 1966, Publ. Lunar
Plan. Lab. 63
- Manfroid, J., Heck, A. 1982, A Generalized Algorithm for Efficient Photometric
Reductions, in preparation
- Manfroid, J., Renson, P. 1982, Astron. Astrophys., in press
- Oblak, E., Considère, S., Chareton, M. 1976, Astron. Astrophys. Suppl. 24, 69
- Rufener, F. 1976, Astron. Astrophys. Suppl. 26, 275
- Rufener, F. 1981, Astron. Astrophys. Suppl. 45, 207
- Stokes, N.R. 1972a, Monthly Not. Roy. Astron. Soc. 159, 165
- Stokes, N.R. 1972b, Monthly Not. Roy. Astron. Soc. 160, 155
- Warren, W.H. Jr., Hesser, J.E. 1977, Astrophys. J. Suppl. 34, 115

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2200

Konkoly Observatory
Budapest
1982 September 27
HU ISSN 0374-0676

AN INTENSE OPTICAL FLARE FROM XY UMa

As part of our on-going program of UBVR photometry of RS CVn stars, we have observed at four colors a flare episode from XY UMa ($+55^{\circ}$ 1317, SAO 27143), a system with a 0.48 day period. The primary star is G2-G5; the secondary K5 (Geyer, quoted by Loronzi and Scaltriti, 1977). All observations were made with the Capilla Peak Observatory's 61-cm reflecting telescope and a single-channel, photon-counting photometer with an EMR 641A tube cooled to -20°C . The comparison star was $+54^{\circ}$ 1278 (SAO 21739).

The flare occurred on 31 January 1982 UT as the system was emerging from secondary eclipse at about phase 0.54, the time was 05:14 UT. Figures 1-4 show the flare in the UBVR instrumental bands relative to the underlying light curve. The symbol "+" indicates actual data points; the solid dots are a Stineman fit to the data; the solid lines the average light curve of the system with the flare removed. The data points have a statistical accuracy of ± 0.01 mag or better.

The flare peak occurred at about phase 0.55 at 05:29 UT. The total duration of the main body of the flare was about 30 minutes. Note that a much less intense tail appears after the main burst (this tail is especially visible at the V and R bands). Relative to the average light curve of the system, the peak increase in apparent magnitude was 0.30 at U, 0.13 at B, 0.09 at V, and 0.04 at R. At peak, $V=9.62$, $R=8.86$, $B-V=+0.77$, and $U-B=0.27$.

No optical flares have been previously found in photometric or polarimetric (Geyer and Metz, 1977) observations of XY UMa. However, Patkos (1981) found three flares in 1980 from SV Cam, a system that resembles XY UMa (primary G3, secondary K4, period 0.59 d). The strongest of the three was seen at phase 0.61 as the system emerged from secondary eclipse; its duration was 43 min. and peaked at 0.12 mag above the system at U. Our XY UMa flare had a similar

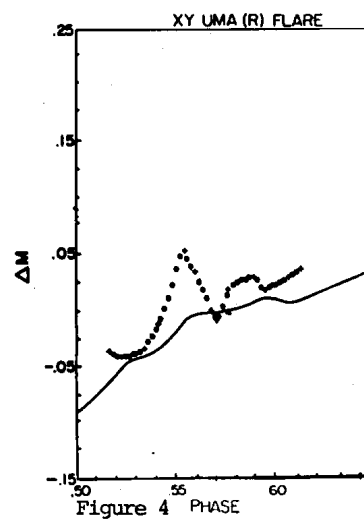
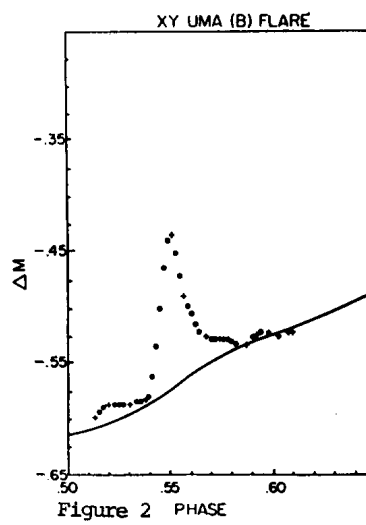
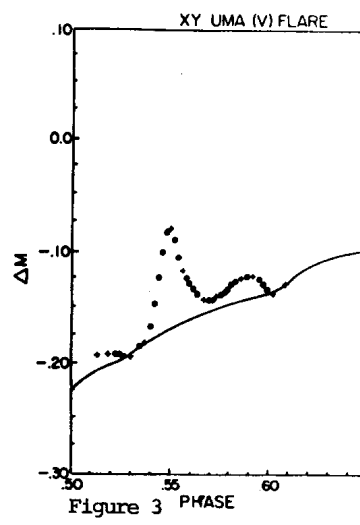
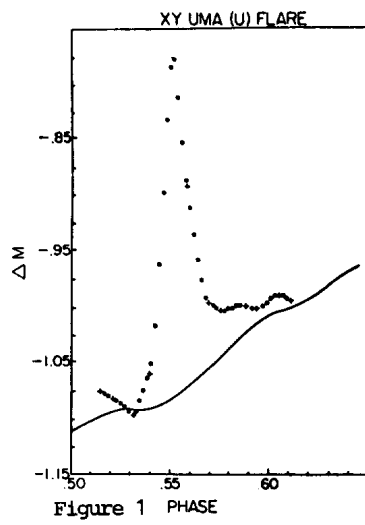


Figure 1-4

duration but a much more intense peak and total flux.

The integrated fluxes are:

<u>Filter</u>	<u>Flux</u>	<u>Flare/Base</u>
U	2.5×10^4 mJy·sec	0.10
B	4.6×10^4	0.05
V	8.0×10^4	0.05

where the last column gives the ratio of the flare's flux to the underlying flux of the system over the same period of time.

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References:

Geyer, E. H., *Astrophys. and Space Sci.*, Vol. 48, 137, 1977.

Geyer, E. H. and Metz, K., *Astrophys. and Space Sci.*, Vol. 52, 35, 1977.

Lorenzi, L. and Scaltriti, F., *Acta Astron.*, Vol. 27, 273, 1977.

Patkos, L., *Astrophys. Lett.*, Vol. 22, 131, 1981.