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Nos. 1501 - 1600
1978 November - 1979 May

EDITOR: B. SZEIDL, KONKOLY OBSERVATORY

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C O N T E N T S
1978

1979

A U T H 0 R   I N D E X

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Number 1501

Konkoly Observatory
Budapest
1978 November 9

OBSERVATIONS OF 44i Boo WITH THE NEW 48 INCH REFLECTOR OF THE NATIONAL OBSERVATORY OF ATHENS AT KRYONERION, GREECE

Photoelectric observations of 44i Boo were made on April (5-18) of this year during a program of four-colour photometry on some eclipsing binaries. The new 48 inch Cassegrain reflector of Kryonerion Station (G. Contopoulos and C. Banos, 1976) was used, together with the two beam, multi-mode, nebular stellar photometer (C. Goudis and J. Meaburn, 1973) of the National Observatory of Athens.

The four filters which have been used are in close accordance with the standard colour system (U,B,V,R).

The calculations and reduction of the observations were based on the method of "Photoelectric Reduction" by R. Hardie (1962). Thirty nine standard stars, given in the Naval Observatory Catalogue (1968) and in the catalogue of Iriarte et al. (1965), were used for the calibration.

The following results for the times of minima were found:

H.J.D. (min) 2440000+	Type of Min.	Magnitude V	Colours B-V	V-R
3614.3611	s	6.91	+0.55	0.26
3614.5000	p	6.98	+0.58	0.31
3615.5710	p	7.02	+0.55	0.31

The obtained light curves will be published soon.

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References:

Contopoulos, G., and Banos, C.: 1976, Sky and Telesope, 51, 154

Goudis, C., and Meaburn, J.: 1973, Astrophys, and Sp. Sci.20,149

Hardie, R.H.: 1962, Astronomical Techniques, Stars and Stellar Systems Vol.II,ed.Hiltner, W.A.,The Univ.of Chicago Press

Iriarte,B.et al.:1965,Sky and Telescope, 30, 21

Blanco, V.M. et al.: Publ. of the U.S.Naval Observatory, Vol. XXI, Washington, 1968

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Konkoly Observatory
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1978 November 9

MINIMA OF ECLIPSING BINARY STARS

Presented are 33 minima of eclipsing binary stars. All observations were visual with both the descending and ascending branch of the light curve observed. Times of minima were found by the tracing paper method.

Column one gives the heliocentric time of minima. Column two gives the number of visual brightness estimates used in the light curve. Columns three and four give the epoch and O-C from the linear elements of GCVS 1969. Epoch and O-C for AZ Virginis are from the linear elements of studies by Meinunger, L. (March 1977, Mitteilungen über Veränderliche Sterne, 185-188). Column 5 gives the standard deviation, σ expected for a single visual minimum of that star is given. These standard deviations are calculated from studies by Mallama, A.D. (1974a, JAAVSO, 3, 11 and 1974b, JAAVSO, 3, 49).

Telescopes used were as following: 20.3 cm refractor, 36.2 cm reflector, and a 15.2 cm reflector.

JD hel. 2,440,000 +	n	Epoch	O-C days	σ
OO Aquilae				
3348.654	10	18594	-.043	^{d}.009
WW Aurigae				
3127.690	9	4032.5	+.011	.004
SV Camelopardalis				
3219.717	11	15921	-.004	.004
3225.643	8	15931	-.009	
3231.572	7	15941	-.011	
3244.616	9	15963	-.014	
3263.600	10	15995	-.009	
3381.637	9	16194	+.007	
3591.579	7	16548	+.002	
RZ Cassiopeiae				
3428.586	8	5258	-.011	.003

Table (cont.)

JD hel. 2,440,000 +	n	Epoch	O-C days	σ
U Coronae Borealis				
3274.683	10	7684	-.018	^{d}.004
3350.623	8	7706	-.027	
Y Cygni				
3340.627	8	11282.5	+.177	^{d}.016
3352.615	8	11286.5	+.180	
ZZ Cygni				
3298.687	10	35254	-.036	.006
V477 Cygni				
3339.650	12	4471	-.021	.007
AI Draconis				
3273.643	10	3517	+.003	.002
3291.625	9	3532	+.003	
3701.615	9	3874	-.001:	
YY Eridani				
3461.727	9	30620	-.007	.002
CT Herculis				
3260.717	8	2186	+.058	.018
SZ Herculis				
3274.709	10	10130	+.033	.002
3283.706	11	10141	+.030	
FL Lyrae				
3248.703	8	2308	-.028	.013
RU Monocerotis				
3225.587	11	3789.5	+.030	.006
ER Orionis				
3211.616	10	15831	-.029	.007
3479.647	8	16464	-.011	
V505 Sagittarii				
3368.627	9	8330	-.022	.05
HU Tauri				
3185.625	9	8532	+.014	.009
X Trianguli				
3427.616	9	6027	-.044	.006
3428.588	8	6028	-.044	
AZ Virginis				
3587.704	10	44789	-.011	.003
3600.648	10	44826	-.005	

JD hel. equals the heliocentric Julian Day for minima. n equals the number of visual brightness estimates used to plot the light curve. Epoch and O-C are from the linear elements in the 1969 General Catalogue of Variable Stars. (See introductory note on AZ Virginis).

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INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1978 November 13

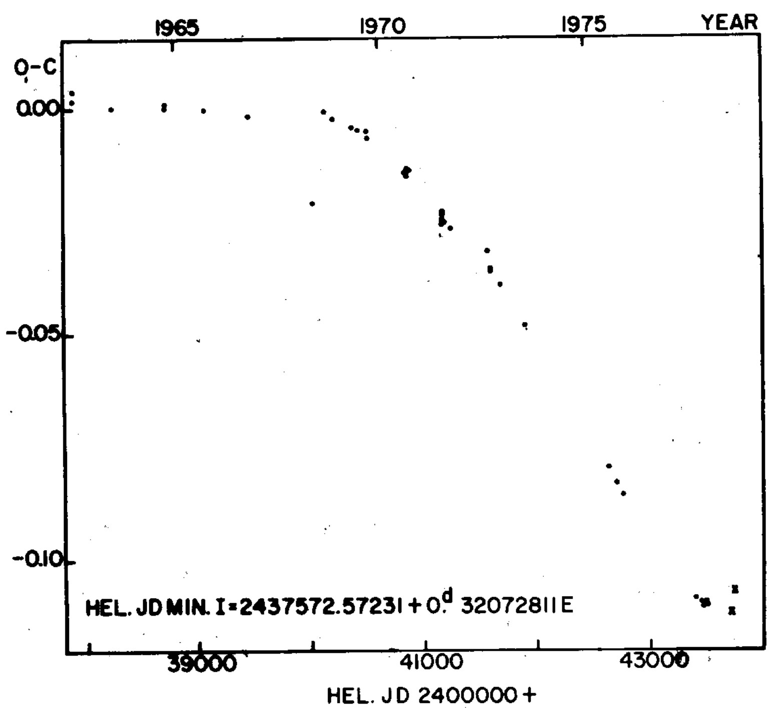
AN INCREASE IN THE PERIOD OF SW LACERTAE ?

The W Ursae Majoris-type eclipsing binary system SW Lac (BD+37°4717) is known for the depths of its eclipse curves, the variation in the shape of its light curve, and its period behavior. Frasinska and Kreiner (IBVS No. 1285, 1977) noted that after increasing during the interval 1893-1968, the period decreased by 1.2 sec in the interval 1969-1973.

One secondary and three primary eclipse curves of SW Lac were observed photoelectrically in 1977 with the 40 cm telescope at North Georgia College, Dahlonega. The photometer houses a thermoelectrically-cooled EMI 6256 photomultiplier and standard B and V filters. BD+37°4715 was observed as the comparison star. The bisection-of-chords method was utilized to determine the following epochs of minimum light.

JD Hel. 2443400+	Min.	O-C
59.7476	I	-0.1099
60.5490	II	-0.1103
87.6504	I	-0.1104
88.6128	I	-0.1102

The O-Cs were formed from the ephemeris given by Bookmyer (Astr. J. 70, 415, 1965). These O-Cs, and those formed from all other epochs of minimum light observed photoelectrically within the past 15 or 16 years, are plotted versus Hel. JD in Figure 1. Also included are 2 normal points representing 16 times of minimum light observed visually early in this season (BBSAG No. 38, 1978).



Examination of the O-C curve shows there may have been a recent increase in the period of SW Lac. Additional observations are needed to confirm this. The following ephemeris,

$$\text{JD Hel. Min.I} = 2443459.74760 + 0^{d}.3207216E,$$

is given to predict epochs of minimum light in the near future.

The use of the observing facilities and the assistance of Dr. D. Kinkaid, Dr. M. Davis, and students in the Department of Physics at North Georgia College are acknowledged.

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Konkoly Observatory
Budapest
1978 November 17

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR UV Cet IN 1973

Continuous photoelectric monitoring of the flare star UV Cet has been carried out at the Stephanion Observatory during the year 1973 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 and photometer will be described elsewhere. Here we mention only that the transformation of our instrumental ubv system to the international UBV system is given by the following equations:

$$V = v_o + 0.030(b-v)_o + 1.756,$$

$$(B-V) = 0.845 + 1.042\ (b-v)_o,$$

$$(U-B) = -1.778 + 1.102(u-b)_o.$$

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. In the fourth column of Table I the standard deviation of random noice fluctuation σ(mag)= 2.5 $\log(I_o+\sigma)/I_o$ for different times (UT) of the corresponding monitoring intervals is given.

During the 47.18 hours of monitoring time 20 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 $(I_f-I_o)/I_o$ 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 noice fluctuation $\sigma(mag) = 2.5\log(I_o+\sigma)/I_o$ 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 colour are shown in Figs.1-20.

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

Table I

Date 1973	Monitoring intervals (U.T.)	Total Monitoring Time	σ(U.T.)
Sept.			
20-21	22^h14^m-22^h24^m,2228-2241,2244-2254, 2256-2302,2304-2309,2312-2330, 2332-2341,2349-0017,0025-0033, 0043-0052,0101-0117.	2^h12^m	0.08(22^h17^m),0.08 (22^h33^m),0.09(23 01), 0.12(23 37),0.18 (00 03),0.30(01 10)
21-22	2304-2329,2333-2343,2346-2349, 2353-0003,0006-0016,0023-0033, 0048-0059,0101-0111,0114-0123, 0127-0136,0139-0158,0202-0235.	2 39	0.11(23 08),0.09 (23 36),0.08(00 10), 0.09(00 51),0.10 (01 31),0.11(02 28).
22-23	2212-2227,2234-2305,2308-2337, 2344-0008,0010-0022,0025-0049, 0051-0100,0104-0114,0117-0124, 0129-0136,0151-0201,0211-0225, 0234-0240.	3 18	0.07(22 36),0.09 (23 00),0.06(23 27), 0.09(00 02),0.10 (00 40),0.10(01 20), 0.13(01 54),0.16 (02 24).
23-24	2230-2239,2241-2304,2308-2331, 2334-2345,2346-2356,2359-0017, 0024-0054,0057-0125,0129-0138, 0141-0151,0153-0158,0212-0222, 0225-0240,0243-0250.	3 28	0.12(22 47),0.09 (23 23),0.09(23 41), 0.07(00 41),0.09 (01 08),0.09(01 46), 0.13(02 30).
24-25	2223-2304,2307-2343,2347-2357, 2359-0018,0025-0041,0043-0103, 0112-0116,0118-0136,0140-0149, 0157-0204,0207-0215,0222-0227, 0229-0239.	3 23	0.10(22 52),0.07 (23 29),0.08(00 03), 0.08(00 48),0.08 (01 23),0.09(02 01), 0.11(02 33).
25-26	2204-2234,2237-2315,2319-0005, 0012-0039,0042-0123,0127-0155, 0202-0213,0215-0234.	4 00	0.06(22 28),0.05 (22 56),0.06(23 32), 0.07(23 57),0.06 (00 30),0.06(01 05), 0.07(01 34),0.09(02 17).
26-27	2201-2215,2216-2223,2227-2247, 2300-2334,2338-0005,0058-0119, 0121-0135,0139-0149,0151-0211, 0215-0240.	3 12	0.09(22 08),0.08 (22 41),0.08(23 15), 0.07(23 51),0.08 (01 03),0.09(01 28), 0.11(02 05),0.11 (02 31).
29-30	2227-2241,2243-2248,2252-2318, 2322-2351,2357-0025,0026-0032, 0036-0104.	2 16	0.09(22 35),0.08 (23 11),0.10(23 39), 0.10(00 20),0.09 (00 46).
30	2127-2159,2202-2230,2234-2245, 2250-2304,2314-2356.	2 07	0.11(21 39),0.09 (22 25),0.11(22 54), 0.10(23 45).
Oct.			
1	0000-0030,0037-0059,0107-0134, 0138-0150,0152-0202,0207-0225.	1 59	0.11(00 23),0.10 (00 50),0.12(01 24), 0.09(01 54).
1-2	2147-2217,2222-2251,2255-2322, 2327-2359,0003-0034,0039-0107, 0113-0141,0145-0205,0207-0212.	3 50	0.08(22 01),0.07 (22 35),0.08(23 08), 0.08(23 42),0.08 (00 12),0.09(00 52), 0.08(01 30).

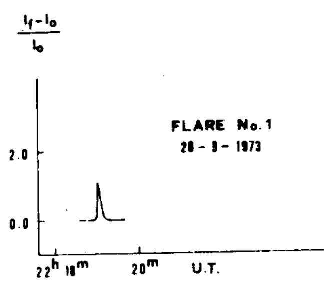
Table I (cont.)

Date 1973 Oct.	Monitoring intervals (U.T.)	Total Monitoring Time	σ(U.T.)
2-3	21^h37^m-22^h03^m,2207-2241,2245-2317 2325-2356,0000-0029,0034-0102, 0109-0134,0137-0202,0207-0215, 0218-0229.	4^h09^m	0.09(21^h40^m),0.09 (22 11),0.08(22 50), 0.08(23 30),0.07 (00 03),0.10(00 38), 0.07(01 13),0.10 (01 40),0.10(02 11).
3-4	2143-2214,2217-2253,2256-2328, 2337-0002,0007-0038,0045-0104, 0113-0132,0139-0153,0203-0219,	3 43	0.08(21 48),0.05 (22 26),0.06(23 07), 0.08(23 52),0.10 (00 18),0.09(01 18), 0.10(01 47).
19-20	2052-2112,2115-2142,2145-2205, 2207-2229,2323-2348,2352-0010, 0014-0029,0032-0047.	2 42	0.10(21 03),0.07 (21 32),0.08(22 13), 0.13(23 40),0.19 (00 26).
20-21	2021-2035,2037-2050,2052-2058, 2102-2125,2129-2201,2207-2230, 2326-2351,2355-0015,0020-0033, 0037-0049,0059-0112.	3 14	0.08(20 40),0.08 (21 15),0.08(21 47), 0.09(21 47),0.09 (22 15),0.13(23 38), 0.12(00 11),0.14 (00 43).
22	2023-2041,2043-2107,2112-2129.	59	0.10(20 45),0.07 (21 15).
	Total	47^h11^m	

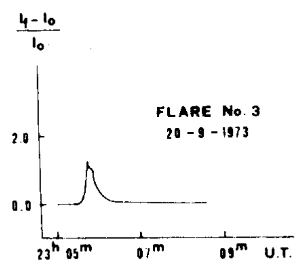
Table II

Characteristics of the Flares Observed

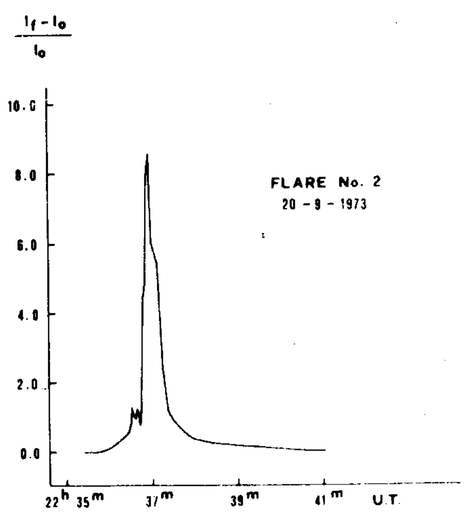
Flare No.	Date 1973 Sept.	U.T. max.	t_b min.	t_a min.	Duration min.	I_f-I_o/I_o P max.	min.	Δm mag.	σ mag.	Air mass
1	20	$22^h19^m.0$	0.1	0.3	0.4	1.10	0.10	0.80	0.08	2.08
2	20	22 36.9	1.1	3.8	4.9	8.56	4.16	2.45	0.08	1.98
3	20	23 05.8	0.2	2.2	2.4	1.26	0.43	0.89	0.09	1.87
4	20	23 39.5	0.3	>0.5	>0.9	0.76	>0.20	0.61	0.12	1.80
5	21	01 13.6	0.4	>3.2	>3.6	3.99	>3.88	1.75	0.30	1.88
6	22	22 18.7	0.9	>8.3	>9.2	15.36	>22.86	3.06	0.07	2.04
7	22	23 02.2	0.1	1.4	1.5	1.17	0.24	0.84	0.09	1.85
8	23	23 26.4	1.3	>4.6	>5.9	0.84	>1.17	0.66	0.09	1.80
9	23	23 48.1	2.0	45.9	47.9	5.50	>38.82	2.03	0.09	1.78
10	25	00 49.9	0.6	4.8	5.4	0.59	0.73	0.50	0.08	1.87
11	25	22 58.1	0.02	0.15	0.17	0.78	0.08	0.63	0.05	1.83
12	26	00 32.25	0.6	>6.75	>7.35	1.54	>1.34	1.01	0.06	1.82
13	26	01 06.05	0.1	0.9	1.0	0.44	0.06	0.39	0.06	1.93
14	26	01 36.25	0.1	0.6	0.7	0.64	0.13	0.54	0.07	2.08
15	27	01 30.2	0.1	3.9	4.0	2.23	0.45	1.27	0.09	2.07
16	30	22 34.6	0.1	9.9	10.0	9.94	7.01	2.60	0.09	1.84
	Oct.									
17	2	22 46.15	0.2	1.0	1.2	0.65	0.22	0.55	0.08	1.80
18	3	21 57.3	0.8	6.8	7.6	20.39	18.44	3.33	0.08	1.93
19	20	21 16.45	0.25	2.75	3.0	2.72	1.07	1.43	0.08	1.84
20	20	22 17.95	0.1	1.7	1.8	1.00	0.18	0.75	0.09	1.78



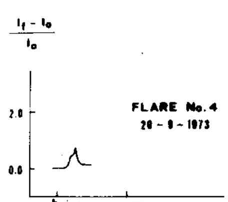
$\frac{I_f - I_o}{I_o}$
FLARE No. 1
20 - 9 - 1973
2.0
0.0
22h 18m
20m
U.T.



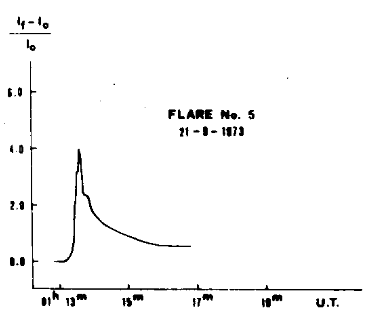
$\frac{I_f - I_o}{I_o}$
FLARE No. 3
20 - 9 - 1973
2.0
0.0
23h 05m
07m
09m
U.T.



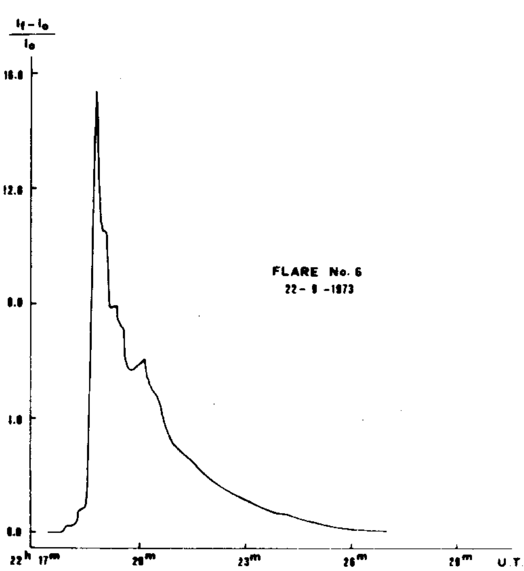
$\frac{I_f - I_o}{I_o}$
10.0
8.0
6.0
4.0
2.0
0.0
FLARE No. 2
20 - 9 - 1973
22h 35m
37m
39m
41m
U.T.



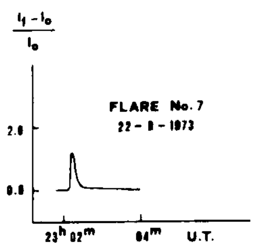
$\frac{I_f - I_o}{I_o}$
FLARE No. 4
20 - 9 - 1973
2.0
0.0
23h 39m
41m
U.T.



$\frac{I_f - I_o}{I_o}$
6.0
4.0
2.0
0.0
FLARE No. 5
21 - 9 - 1973
01h 13m
15m
17m
19m
U.T.



$\frac{I_f - I_o}{I_o}$
16.0
12.0
8.0
4.0
0.0
FLARE No. 6
22 - 9 - 1973
22h 17m
20m
23m
26m
29m
U.T.



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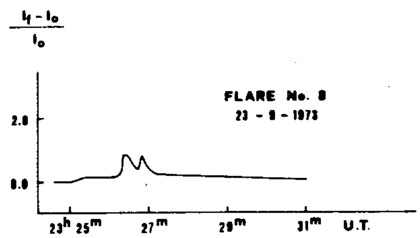
22 - 9 - 1973
U.T.



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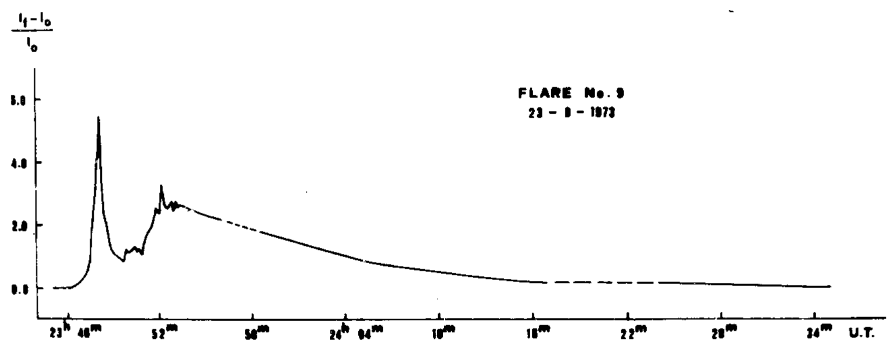

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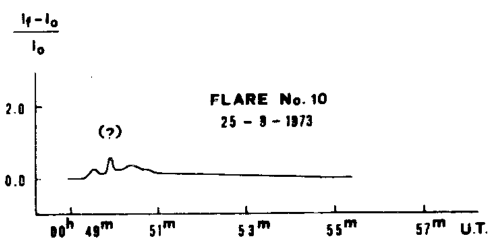
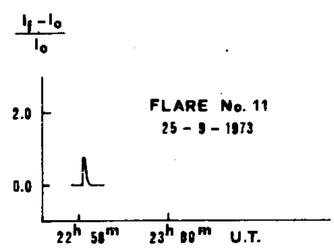
23 - 9 - 1973
U.T.



FLARE No. 10
25 - 9 - 1973
(?)
U.T.



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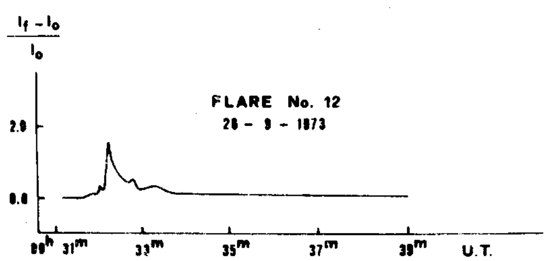
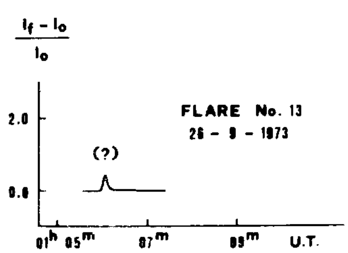
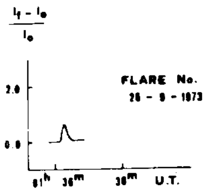
U.T.



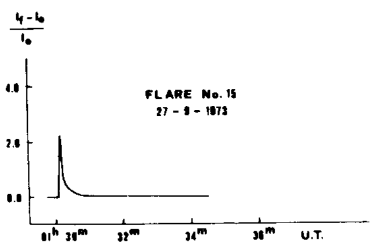
FLARE No. 12
26 - 9 - 1973
U.T.



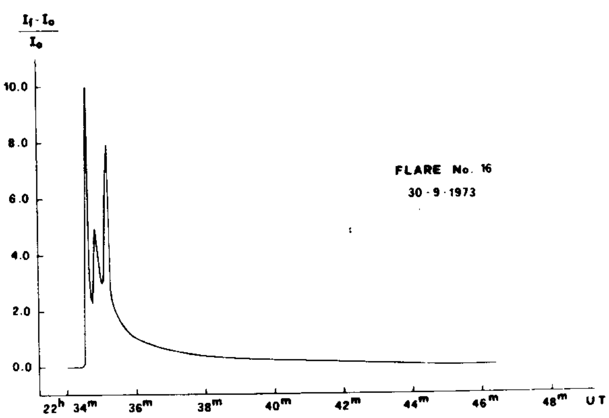
FLARE No. 13
26 - 9 - 1973
(?)
U.T.



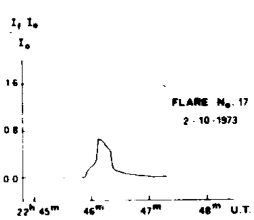
FLARE No. 14
26 - 9 - 1973
U.T.



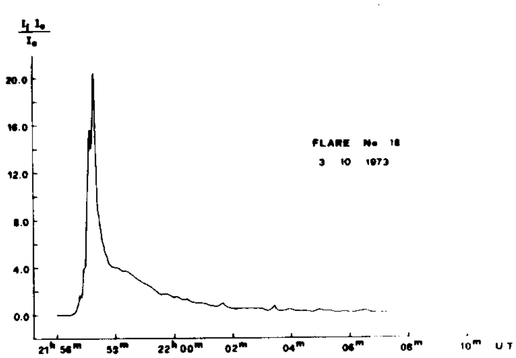
FLARE No. 15
27 - 9 - 1973
U.T.



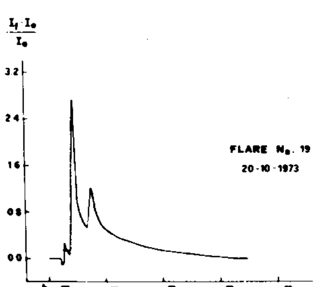
FLARE No. 16
30 - 9 - 1973
UT



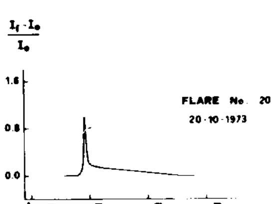
FLARE No. 17
2 - 10 - 1973
U.T.



FLARE No 18
3 10 1973
UT



FLARE No. 19
20 - 10 - 1973
U.T.



FLARE No. 20
20 - 10 - 1973
UT

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1505

Konkoly Observatory
Budapest
1978 November 17

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac IN 1973

Continuous photoelectric monitoring of the flare star EV Lac has been carried out at the Stephanion Observatory during the year 1973 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 and photometer will be described elsewhere. Here we mention only that the transformation of our instrumental ubv system to the international UBV system is given by the following equations:

for the time interval from 19-6-1973 to 1-9-1973

$$V = v_o + 0.031(b-v)_o + 1.383,$$
$$(B-V) = 0.770 + 1.046\ (b-v)_o,$$
$$(U-B) = -1.347 + 1.010\ (u-b)_o,$$

and for the time interval from 2-9-1973 to 31-10-1973

$$V = v_o + 0.030(b-v)_o + 1.756,$$
$$(B-V) = 0.845 + 1.042\ (b-v)_o,$$
$$(U-B) = -1.778 + 1.102\ (u-b)_o.$$

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. In the fourth column of Table I the standard deviation of random noice fluctuation $\sigma(\text{mag}) = 2.5 \log(I_o+\sigma)/I_o$ for different times (UT) of the corresponding monitoring intervals is given.

During the 80.7 hours of monitoring time 15 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

$(I_f - I_o)/I_o$ corresponding to flare maximum, where I_o is 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 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 noice fluctuation $\sigma(mag) = 2.5 \log(I_o + \sigma)/I_o$ 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 colour are shown in Figs. 1-15.

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Reference:

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

Table I

Date 1973	Monitoring intervals (U.T.)	Total Monitoring Time	σ(U.T.)
June			
22	00^h13^m-00^h40^m,0043-0109,0112-0135	1^h16^m	$0.04(00^h18^m)$,0.05 (01 03).0.05(01 15).
24-25	2312-2325,2329-2356,2400-0026, 0035-0057,0100-0138.	2 06	0.02(23 20),0.02 (23 48),0.02(00 18), 0.02(00 48),0.02 (01 16).
26	0128-0156,0159-0228,0232-0301, 0309-0337.	1 54	0.02(01 31),0.02 (02 04),0.02(02 36), 0.02(03 27).
26-27	2341-2350,2352-0028,0030-0038, 0040-0100,0102-0135.	1 46	0.02(23 54),0.02 (00 55),0.03(01 24).
27-28	2314-2339,2343-0012,0016-0049, 0057-0133.	2 03	0.02(23 36),0.02 (00 09),0.02(00 36), 0.02(01 17).
28-29	2314-2342,2345-0015,0018-0046, 0054-0135.	2 07	0.02(23 36),0.02 (00 07),0.02(00 42), 0.02(00 57).
29-30	2330-2355,2358-0032,0035-0103, 0110-0133.	1 50	0.02(23 34),0.02 (00 05),0.02(00 41), 0.02(01 29).
30	2256-2330,2332-2342.	44	0.02(23 02),0.02 (23 37).
July			
1	0001-0006,0008-0019,0028-0040, 0047-0119,0121-0134.	1 13	0.03(00 12),0.02 (01 09),0.02(01 26).
1-2	2303-2333,2335-0006,0009-0039, 0049-0115,0119-0136.	2 14	0.02(23 07),0.02 (23 56),0.02(00 32), 0.01(01 05),0.02 (01 23).
2-3	2318-2342,2345-0013,0017-0043, 0050-0114.	1 42	0.02(23 23),0.02 (23 48),0.02(00 23), 0.02(00 55).
August			
30-31	1951-2022,2024-2055,2058-2129, 2134-2204,2206-2225,2227-2256, 2301-2310,2312-2317,2320-2329, 2332-2341,2343-0002,0005-0032, 0036-0055.	4 28	0.02(20 03),0.02 (20 41),0.02(21 21), 0.02(21 54),0.02 (22 21),0.02(22 45), 0.02(23 26),0.02 (23 59),0.02(00 26), 0.04(00 51).
September			
3-4	2039-2107,2109-2133,2139-2211, 2243-2305,2308-2332,2335-0006, 0011-0040,0042-0113,0115-0142, 0147-0213,0216-0239.	4 57	0.02(21 04),0.02 (21 26),0.03(22 09), 0.02(22 55),0.02 (23 20),0.02(23 59), 0.02(00 34),0.02 (01 05),0.02(01 37), 0.04(02 06),0.04 (02 35).
5-6	1932-1959,2002-2028,2031-2059, 2105-2132,2135-2139,2142-2201, 2204-2242,2335-2359,0001-0029, 0031-0040,0042-0100.	4 08	0.03(19 40),0.03 (20 12),0.03(20 49), 0.02(21 15),0.02 (21 53),0.02(22 14), 0.02(23 50),0.02 (00 13),0.02(00 52).

Table I (cont.)

Date 1973 September	Monitoring intervals (U.T.)	Total Monitoring Time	σ(U.T.)
7-8	19^h54^m-20^h18^m,2021-2045,2048-2127,2133-2201,2258-2329,2333-2359,0002-0018,0019-0034,0042-0102,0106-0128,0131-0157,0207-0219.	04^h43^m	0.02(20^h09^m),0.03(20 33),0.03(21 12),0.02(21 55),0.02(23 20),0.02(23 53),0.02(00 31),0.02(00 58),0.02(01 23),0.02(01 44),0.02(02 09).
8-9	2009-2034,2037-2041,2043-2104,2107-2132,2139-2211,2313-2344,2347-0013,0017-0045,0053-0102,0107-0116,0119-0145,0148-0201,0204-0226.	04 31	0.05(20 22),0.04(20 55),0.06(21 26),0.05(21 47),0.04(23 37),0.04(23 59),0.03(00 34),0.03(01 09),0.02(01 52),0.03(02 15).
9-10	1934-1952,1954-2001,2004-2031,2034-2059,2108-2137,2140-2202,2255-2322,2324-2329,2332-2345,2347-2358,0001-0010,0013-0033,0053-0114,0118-0142,0146-0217.	04 49	0.04(19 46),0.06(20 16),0.05(20 44),0.04(21 21),0.05(21 42),0.04(23 04),0.04(23 51),0.03(00 19),0.02(01 06),0.02(01 31),0.04(01 57).
15-16	1842-1910,1913-1932,2017-2023,2025-2054,2057-2114,2124-2132,2136-2148,2253-2324,2327-2351,0000-0028,0037-0102,0105-0138,0144-0211.	4 47	0.06(18 54),0.04(19 15),0.05(20 28),0.05(21 08),0.04(21 39),0.05(22 59),0.03(23 49),0.05(00 15),0.06(00 45),0.06(01 12),0.05(01 48).
16-17	1840-1905,1909-1939,1943-2014,2020-2038,2041-2048,2051-2119,2222-2240,2244-2314,2317-2346,2353-0020,0023-0053,0056-0130,0141-0213.	5 39	0.03(18 50), 0.04(19 22),0.03(20 05),0.04(20 33),0.04(21 12),0.04(22 33),0.04(22 58),0.05(23 31),0.04(00 04),0.04(00 44),0.06(01 10),0.07(01 56).
17-18	1838-1902,1905-1939,1941-2009,2013-2040,2046-2109,2206-2235,2238-2310,2313-2352,2357-0005,0011-0028,0031-0059,0137-0156.	5 08	0.02(18 52),0.03(19 33),0.03(20 04) 0.03(20 35),0.02 21 04,0.03(22 29),0.04(23 02),0.03(23 44),0.03(00 24),0.03(00 51),0.03(01 39).
18	2037-2102,2104-2113,2115-2127,2129-2139,2141-2145,2149-2201.	1 12	0.02(20 50),0.03(21 17),0.03(21 42).
20	1854-1923,1927-1959,2001-2037,2040-2116.	2 13	0.02(19 13),0.02(19 42),0.02(20 22),0.02(21 07).

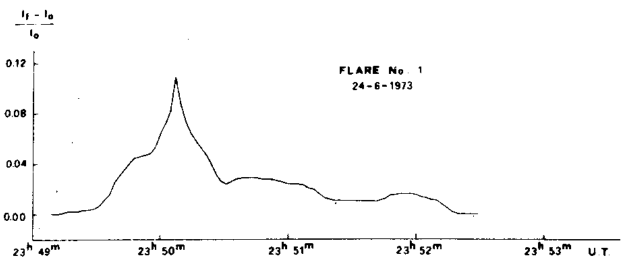
Table I (cont.)

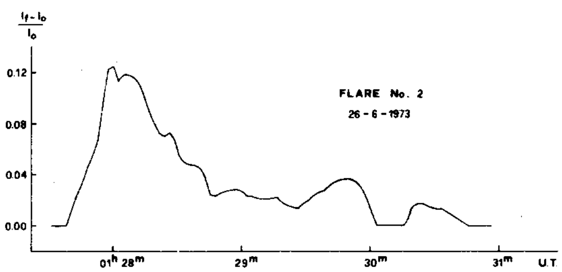
Date 1973	Monitoring intervals (U.T.)	Total Monitoring Time	σ(U.T.)
September			
22	19^h38^m–20^h09^m,2011-2041,2044-2104	1^h21^m	0.02(19^h55^m),0.02 (20 38),0.02(20 55).
24	1856-1928,1931-2014,2017-2043, 2130-2139,2144-2153.	1 59	0.02(19 08),0.02 (19 47),0.02(20 35), 0.02(21 49).
25	1926-1950,1953-2046,2050-2055, 2058-2103.	1 27	0.02(19 41),0.02 (19 58),0.01(20 53).
26	1859-1932,1933-1943,1946-2032, 2037-2050.	1 42	0.02(19 05),0.01 (19 25),0.02(20 30), 0.02(20 39).
27	1947-2009,2011-2026,2028-2101.	1 10	0.02(20 12),0.02 (20 42).
29	2105-2131,2135-2141,2142-2156, 2158-2203.	51	0.02(21 15),0.01 (21 51).
October			
1	1856-1923,1926-1959,2004-2037,	1 33	0.01(19 16),0.02 (19 50),0.02(20 29).
2	1918-1944,1947-2028,2032-2114.	1 49	0.01(19 39),0.01 (20 12),0.01(20 42).
7	1951-2028,2031-2111.	1 17	0.03(20 27),0.03 (21 07).
19	1854-1925,1928-1956,1959-2031	1 31	0.01(19 07),0.02 (19 41),0.02(19 19).
20	1854-1926.	32	0.02(19 05).
	Total	80^h42^m	

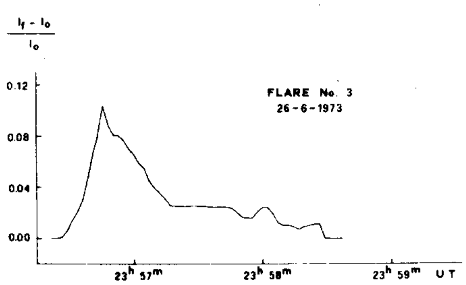
Table II

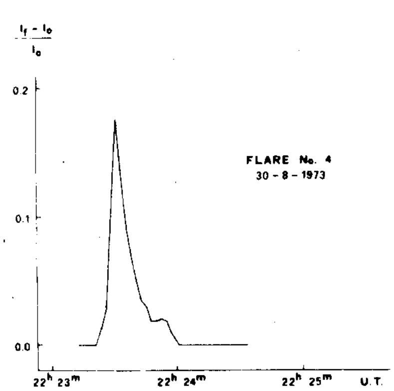
Characteristics of the Flares Observed

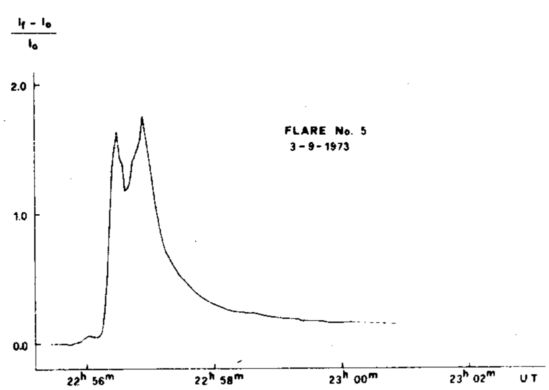
Flare No.	Date 1973	U.T. max.	t_b min.	t_a min.	Duration min.	I_f-I_o/I_o max.	P min.	Δm mag.	σ mag.	Air mass
	June									
1	24	$23^h50^m.1$	0.9	2.20	3.1	0.11	0.08	0.11	0.02	1.24
2	26	01 28.0	0.4	2.8	3.2	0.12	0.12	0.13	0.02	1.05
3	26	23 56.8	0.3	1.7	2.0	0.10	0.07	0.11	0.02	1.20
	Aug.									
4	30	22 23.6	0.2	0.5	0.7	0.18	0.03	0.18	0.02	1.01
	Sept.									
5	3	22 56.9	1.1	>3.3	>4.4	1.75	>2.00	1.10	0.02	1.01
6	7	20 36.65	0.3	7.45	7.75	1.62	2.39	1.05	0.03	1.05
7	7	21 18.9	0.5	2.8	3.3	0.23	0.22	0.23	0.03	1.02
8	8	02 12.0	0.6	6.1	6.7	1.10	1.31	0.81	0.02	1.43
9	17	19 35.6	0.3	1.7	2.0	0.31	0.11	0.29	0.03	1.38
10	18	21 31.3	1.3	5.4	6.7	0.14	0.26	0.15	0.03	1.01
11	18	21 52.1	1.1	2.3	3.4	0.11	0.05	0.11	0.03	1.01
12	25	20 01.9	2.1	42.1	44.2	2.86	13.85	1.47	0.02	1.02
13	26	19 07.5	0.2	0.6	0.8	0.06	0.01	0.06	0.02	1.07
	Oct.									
14	1	19 18.0	0.1	2.9	3.0	0.12	0.11	0.12	0.01	1.4
15	2	20 21.1	6.9	>6.8	>13.7	0.26	>0.54	0.25	0.01	1.01

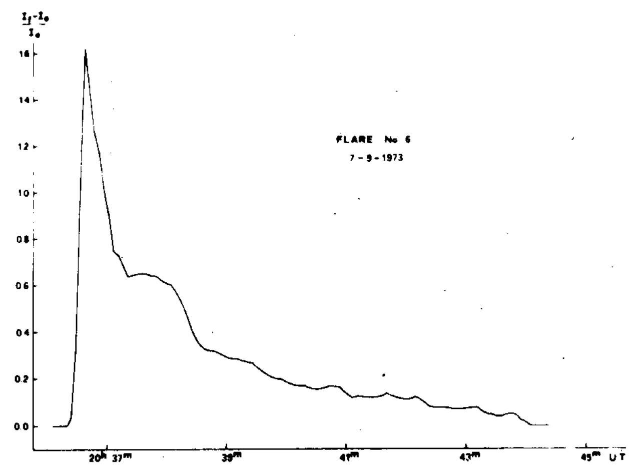

$\frac{I_f - I_o}{I_o}$
0.12
0.08
0.04
0.00
FLARE No. 1
24-6-1973
$23^h 49^m$
$23^h 50^m$
$23^h 51^m$
$23^h 52^m$
$23^h 53^m$
U.T.

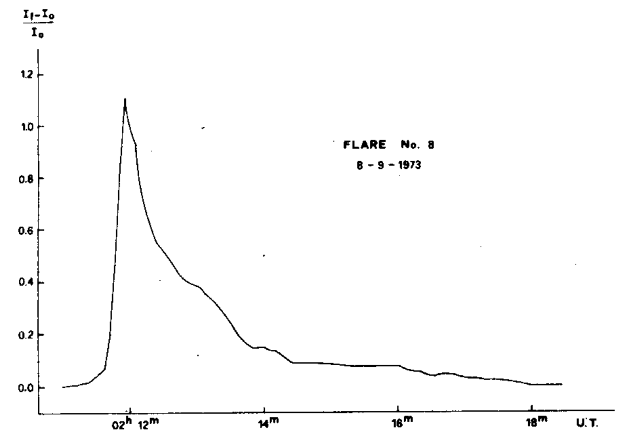

$\frac{I_f - I_o}{I_o}$
0.12
0.08
0.04
0.00
FLARE No. 2
26-6-1973
$01^h 28^m$
29^m
30^m
31^m
U.T.

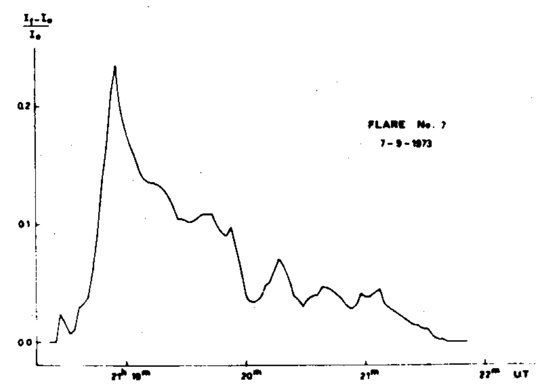

$\frac{I_f - I_o}{I_o}$
0.12
0.08
0.04
0.00
FLARE No. 3
26-6-1973
$23^h 57^m$
$23^h 58^m$
$23^h 59^m$
U.T.

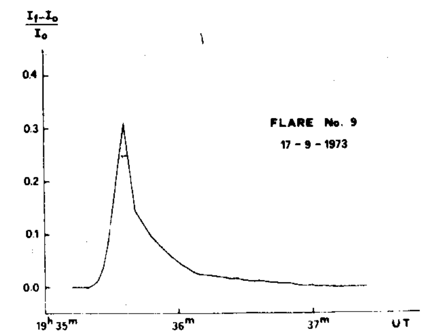

$\frac{I_f - I_o}{I_o}$
0.2
0.1
0.0
FLARE No. 4
30-8-1973
$22^h 23^m$
$22^h 24^m$
$22^h 25^m$
U.T.

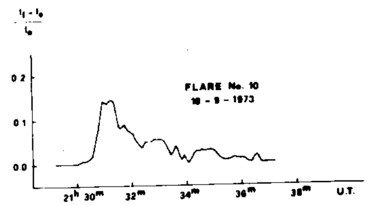

$\frac{I_f - I_o}{I_o}$
2.0
1.0
0.0
FLARE No. 5
3-9-1973
$22^h 56^m$
$22^h 58^m$
$23^h 00^m$
$23^h 02^m$
U.T.

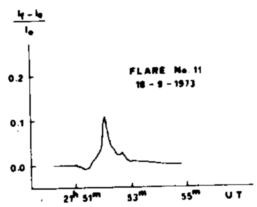

$\frac{I_f - I_o}{I_o}$
FLARE No 6
7 - 9 - 1973
20h 37m
39m
41m
43m
45m UT

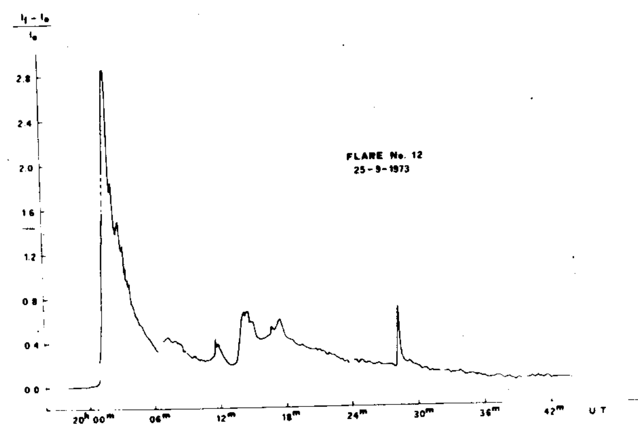

$\frac{I_f - I_o}{I_o}$
FLARE No. 8
8 - 9 - 1973
02h 12m
14m
16m
18m
U.T.

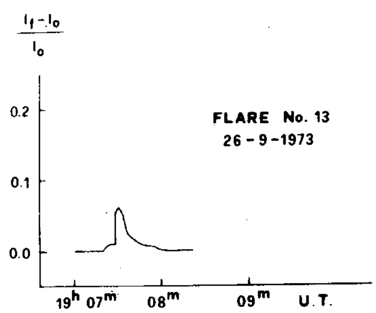

$\frac{I_f - I_o}{I_o}$
FLARE No. 7
7 - 9 - 1973
20m
21m
22m
UT

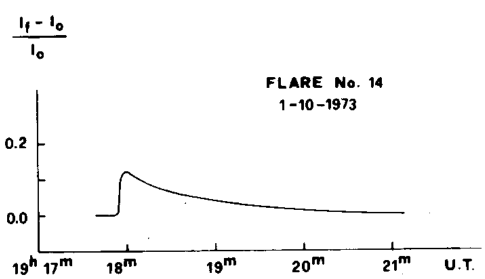

$\frac{I_f - I_o}{I_o}$
FLARE No. 9
17 - 9 - 1973
19h 35m
36m
37m
UT

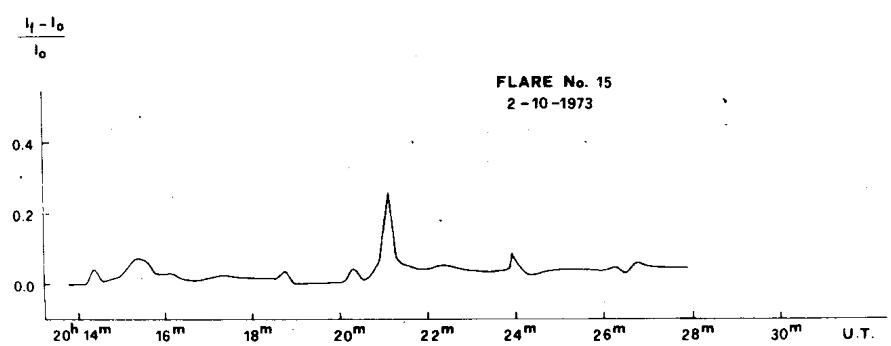

FLARE No. 10
U.T.


FLARE No. 11
U.T.


FLARE No. 12
25 - 9 - 1973
U.T.


$\frac{I_f - I_o}{I_o}$
FLARE No. 13
26 - 9 - 1973
0.2
0.1
0.0
19h 07m
08m
09m
U.T.


$\frac{I_f - I_o}{I_o}$
FLARE No. 14
1 - 10 - 1973
0.2
0.0
19h 17m
18m
19m
20m
21m
U.T.


$\frac{I_f - I_o}{I_o}$
FLARE No. 15
2 - 10 - 1973
0.4
0.2
0.0
20h 14m
16m
18m
20m
22m
24m
26m
28m
30m
U.T.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1506

Konkoly Observatory
Budapest
1978 November 17

PHOTOMETRIC HISTORY OF 24.1939 Aur = CSV 458

Independently Gyulbudagyan and Magakyan (Astron.Zhurn.Pis'ma 3, p.113) and Cohen (Monthly Not. RAS 184,p.695) detected the faint arc of nebulosity situated immediately south of the variable star 24.1939 during systematic surveys of the POSS photographs for unknown cometary nebula. The star's variability had been discovered by Morgenroth (Astr.Nachr. 268,p.273) long ago on Sonneberg plates. By comparing the two adjacent POSS prints 846 and 1309 which overlap at the position of the object, Cohen confirmed the variability.

I checked the star's region on roughly 150 blue sensitive plates of the Sonneberg collection, taken with the 14 cm camera (f:5). The object is mostly invisible, that means fainter than $15^{m}_{.}3$ to $15^{m}_{.}8$. At four occasions however it can be observed well above the plate limit; these maxima are :

1931 Nov.	15	$13^{m}_{.}5$ (confirmed by 2 plates of Nov.5 and 13)
1934 Nov.	3	13.1
1945 March	15	14.4
1967 Dec.	2	14.7

Of course the nebulous arc is invisible throughout.

If there were not the spectroscopic findings of Cohen (especially his determination of the luminosity class) one would indeed think the object to be a long period variable (as Morgenroth did), because those four maxima and the one which is indicated by the POSS print O 846 of 1953 Oct. 7/8 can easily be represented by a period of 346^{d}.

Another point of confusion is obvious: If the star is of spectral type M2 and suffers an interstellar extinction of at least A_V= 2.2 mag, then from the red magnitude of $15^{m}_{.}4$ (POSS E 846) (all these data according to Cohen l.c.) would follow a blue magnitude of about $18^{m}_{.}5$ (supposed R = 3) whereas at POSS O 846 the star appears not fainter than 16^m. Similar conclusions are valid for the pair POSS 1309 with $16\overset{m}{.}3$ as starting red magnitude. The strong Hα emission, if present at that time, even strengthens this contradiction.

The most important statement of the present paper probably concerns the existence of several maxima in the course of the time interval checked, instead of one single fading possibly assumed previously. Some further particulars of our photographic observations will appear in Mitt. Veränd. Sterne Sonneberg 8,No.5.

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PHOTOELECTRIC MINIMA OF U CrB, u Her AND U Oph

From 1969 till 1973 photoelectric observations were carried out on eclipsing binaries in B, V and R with a 40 cm reflector of the Utrecht Observatory operated during that time at the Astronomical Station at Stephanion, Peloponnesus, Greece (Heintze, Provoost, 1979).

We report here O-C values for primary minima of U CrB, u Her and U Oph. The C values were calculated with ephemeris formulae given by Kukarkin et al. (1969):

for U CrB with Hel. Min. J.D. = 2416747.964 + 3.45220416 . N
for u Her with Hel. Min. J.D. = 2427640.654 + 2.0510272 . N and
for U Oph with Hel. Min. J.D. = 2408279.641 + 1.6773460 . N

The results are:

Star	Hel. Min. J.D.	N	O-C (days)	Number of observations	Filter
U CrB	24 40364.4688	6841	- 0.0239 ± 0.0011	28	B, V
u Her	41468.6734	6742	- 0.0059 ± 0.0006	76	B, V, R
U Oph	40724.5330	19343	- 0.0117 ± 0.0015	16	B, V

Revised ephemeris formulae of U CrB and u Her are given by Van Gent (1979) and Heintze and Provoost (1979).

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References:

Van Gent, R.H.: 1979, Astron. & Astrophys., submitted
Heintze, J.R.W. and Provoost, P.: 1979. Astron.& Astrophys.submitted
Kukarkin, B.V.et al.: 1969,1970,1971,Gen.Cat.of Var.Stars 3rd ed.1,2,3
1971,1974,1976, 1st,2nd & 3rd suppl., Publishing House "Nauka", Moscow

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16 LACERTAE: A β CEPHEI VARIABLE IN AN ECLIPSING SYSTEM

Over one-quarter of a century ago Walker (1951) discovered that the single-line spectroscopic binary 16 Lacertae (Struve and Bobrovnikoff 1925) is also a β Cephei variable. Since then several extensive series of observations of the star, both photometric and spectrographic, were obtained by Walker (1952, 1954), Struve et al. (1952), and McNamara (1957). A detailed analysis of these data was performed by Fitch (1969). He found that the β Cephei-type light and radial velocity variations of 16 Lacertae consist of at least three sine-wave components. The frequencies, in order of decreasing amplitude of the corresponding components, amounted to 5.91134, 5.85286, and 5.49990 cycles per day. Moreover, from the night-to-night radial velocity variation Fitch (1969) determined the period of the orbital motion as equal to $12^{d}.097 \pm 0^{d}.001$ (i.e., the orbital frequency = 0.0826 ± 0.00001c/d), and somewhat improved the orbital elements, previously given by Struve et al. (1952). Unfortunately, the question whether there are any light variations correlated with the orbital motion could not be answered, because all photometric observations of 16 Lac available at the time have been obtained with the same comparison star, 14 Lacertae, which is variable on a time scale of the order of a few days (Walker, 1953).

16 Lacertae was observed by Jerzykiewicz on 31 nights in August, September, and October, 1965. The observations were taken at the Cassegrain focus of the Lowell Observatory's 21-inch reflecting telescope with a conventional UBV photometer and standard D.C. equipment. 2 Andromedae was used as a comparison star. The results of a preliminary periodogram analysis of the

B magnitude observations (Jerzykiewicz,1976) can be summarized as follows. The existence of the three sine-wave components in the light variation of the star is confirmed. The primary frequency turns out to be essentially the same as that determined previously by Fitch (1969), while the frequencies of the two fainter components both differ by about one cycle per year from the values obtained previously. Moreover, the mean brightness of the star appears to be very nearly constant on all nights, except on JD 2439054. This night is also the only one in 1965 during which the observations deviate significantly from the synthetic light-curve, computed as a sum of the three abovementioned sine-wave components.

A comparison of the B observations of 16 Lacertae on JD 2439054 with the synthetic light-curve is shown in Fig. 1. At the beginning of the night, around JD 2439054.59 the star appears to be about $0\overset{m}{.}040$ fainter than expected. Then the deviations gradually decrease, becoming insignificantly small at about JD 2439054.75.

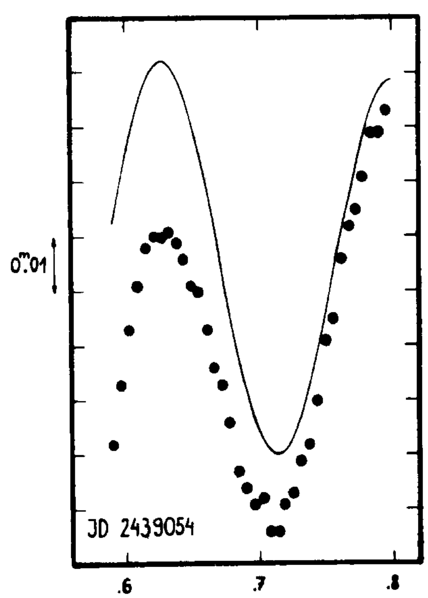

Fig.1. A comparison of the B magnitude observations of 16 Lacertae on JD 2439054 (points) with the 1965 synthetic light-curve (solid line). The observations were obtained at the Lowell Observatory.

In the autumn of 1977, between about the middle of September and the end of October, we secured nearly 470 photoelectric observations of 16 Lacertae on 18 nights. The observations were carried out at three different locations, two in Europe, viz., Białkóv station of the Wrocław University Observatory and the Mt. Chiran station of the Haute Provence Observatory, and one in Mexico, at San Pedro Mártir, Baja California (National University of Mexico Observatory). The observers were Jerzykiewicz and Musielok in Białków, Jerzykiewicz and Le Contel at the Mt.Chiran station (the night assistant was José Daguillon), and Jarzębowski in San Pedro Mártir. All observations were taken in blue light. 2 Andromedae was used as a comparison star.

A periodogram analysis of the 1977 photometry of 16 Lacertae has already been completed. The three sine-wave components were again found to be present in the light variation, but with the amplitudes considerably smaller than in 1965. The synthetic light-curve determined from all observations fits the data to within the observational errors on most nights. For the sake of illustration observations on two such nights are displayed in Fig.2 (top). However, on the night JD 2443433, shown in the bottom of Fig.2, the observations deviate from the synthetic light-curve in a similar way as they have done on JD 2439054 in 1965. The deviations are greatest for two points around JD 2443433.63, i.e. the first observations obtained on this night from San Pedro Mártir.

Now, the difference between the moments of the greatest deviations in 1977 and 1965, JD 2443433.63 minus JD 2439054.59, divided by the spectroscopic orbital period of $12^{d}.097$, turns out to be equal to 361.99, i.e., very nearly a whole number. Moreover, a comparison with the orbital-velocity variation, as determined by Fitch (1969), shows that the orbital phase corresponding to JD 2439054.59 falls on the descending branch of the velocity curve, at the point where it crosses the γ-axis. We conclude, therefore, that the deviations of the observed brightness of 16 Lacertae from the synthetic light-curves, seen on JD 2439054 and JD 2443433, are caused by an eclipse of the star by the companion, taking part in the $12^{d}.097$ orbital motion.

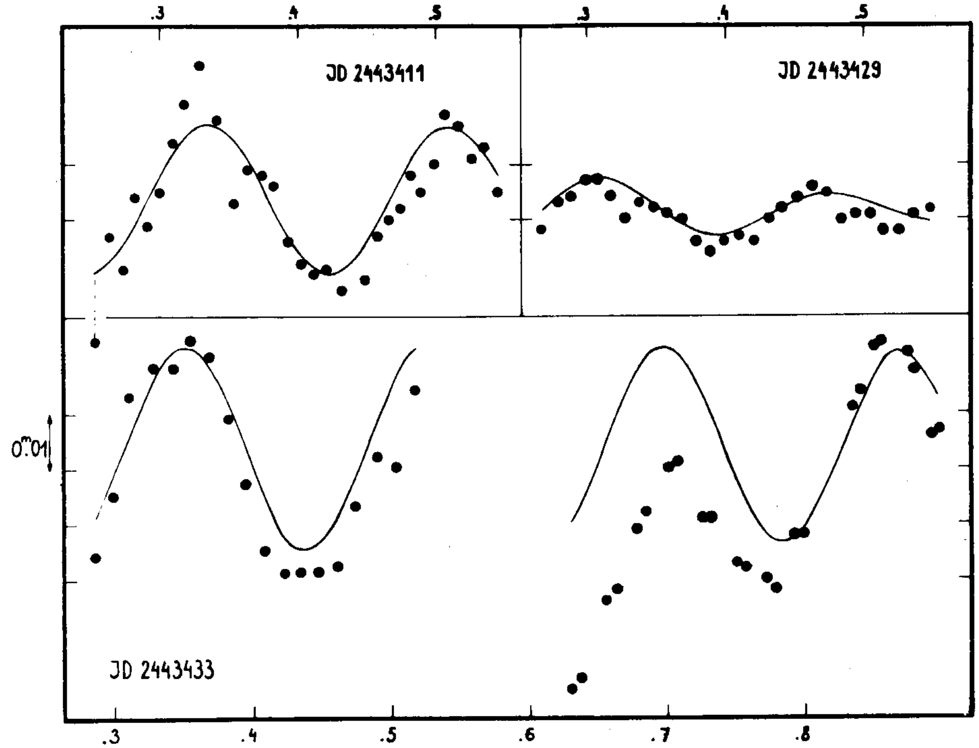

Fig.2. A comparison of the blue-light observations of 16 Lacertae on three nights in 1977 (points) with the 1977 synthetic light-curve (solid lines).The observations on JD 2443433 (bottom) were obtained at the Mt. Chiran station of the Haute Provence Observatory, France (left) and at San Pedro Mártir, National University of Mexico Observatory, Mexico (right).

The depth of the eclipse amounts to about $0^m.040$, and the duration of the eclipse can be estimated as equal to $0^d.4$.

As far as we are aware, 16 Lacertae is the first β Cephei variable found to be a component in an eclipsing system.

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References:

Fitch, W.S. 1969, Ap.J. 158, 269
Jerzykiewicz, M. 1976 in Multiple Periodic Variable Stars, W.S.Fitch ed. (Budapest, Academic Press), 2, 39
McNamara, D.H. 1957, Ap.J. 125, 684
Struve, O., and Bobrovnikoff, N.T. 1925, Ap.J. 62, 139
Struve, O., McNamara, D.H., Kraft, R.P., Kung, S.M., and Williams, A.D. 1952, Ap.J. 116, 81
Walker, M.F. 1951, P.A.S.P. 63, 35
Walker, M.F. 1952, Ap.J. 116, 106
Walker, M.F. 1953, Ap.J. 118, 481
Walker, M.F. 1954, Ap.J. 120, 58

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IS THE CEPHEID ZETA GEMINORUM A VISUAL BINARY ?

The $10^d.15$ classical Cepheid ζ Geminorum has three nearby companions which together form the system ADS 5742. The closest star to the Cepheid has remained relatively fixed over the years in position angle 84° at a separation of about 87 arcsec (Jeffers, van den Bos, and Greeby 1963), and one is naturally inclined to the possibility that it may be a physical companion to the Cepheid. For the purpose of investigating this possibility, Fernie (1969) obtained photoelectric UBV photometry for this star in February 1967. The results are retabulated below:

$$V = 11.46 \pm 0.02$$

$$B-V = 0.45 \pm 0.02$$

$$U-B = 0.06 \pm 0.02$$

If one makes the reasonable assumption that the star is a normal dwarf, the UBV data permit reddenings of $E_{B-V} = 0.06 \pm 0.02$ for an F star and 0.55 ± 0.03 for a B star. The former estimate agrees better with the field reddening found by Feltz and McNamara (1976) for stars near the Cepheid, and also with the fact that galaxies are easily detected on the POSS plates containing ζ Gem. Unfortunately, at the time of the original investigation, neither value appeared to coincide with the expected reddening of $E_{B-V} = 0.15$ for the Cepheid (Fernie 1967). In recent years, however, there has been a substantial revision of the colour excess scale for long period Cepheids, with the consequence that current estimates of E_{B-V} for ζ Gem, as derived from its observed colours by Parsons and Bouw (1971), Parsons and Bell (1975), and Dean et al. (1978), range from 0.03 to 0.07. This leads us to conclude that ADS 5742 A and B may indeed form a physical system, if the fainter star is an F dwarf.

The consequences of this conclusion are of interest. According to the Cepheid period-age relation of Kippenhahn and Smith (1969), the expected age for ζ Gem is about 3×10^7 years. An F dwarf of the same age should lie on the zero-age main sequence (ZAMS). Thus, if we make a reasonable estimate of $M_V = +3.46 \pm 0.10$ for ADS 5742 B based upon ZAMS fitting of the UBV data, we derive a corresponding intensity-mean value of $\langle M_V \rangle = -4.11 \pm 0.10$ for ζ Gem. This value is in excellent agreement with estimates derived from existing period-luminosity relations or from applications of the surface brightness technique (Barnes et al. 1977). Also, the corresponding distance of 366 ± 17 pc to the system results in a projected separation of about 0.15 pc for the two stars. If they are associated gravitationally, they must have an orbital period in excess of 10^6 years. Thus, the lack of any evident change in the location of B with respect to A over the period of past observations is a logical consequence of (although not evidence for) actual physical association.

The results are clearly encouraging and worthy of further investigation. We therefore urge observers with access to moderate-sized telescopes to make additional observational studies of the ζ Gem system. All stars in the system could be profitably studied, both by photometric and spectroscopic techniques.

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References:

Barnes, T.G., Dominy, J.F., Evans, D.S., Kelton, P.W., Parsons, S.B., and Stover, R.J. 1977, Monthly Notices Roy. Astron. Soc. 178, 661.

Dean, J.F., Warren, P.R., and Cousins, A.W.J. 1978, Monthly Notices Roy. Astron. Soc. 183, 569.

Feltz, K.A., Jr., and McNamara, D.H. 1976, Publ. Astron. Soc. Pacific 88, 699.

Fernie, J.D. 1967, Astron. J. 72, 422.

Fernie, J.D. 1969, J. Roy. Astron. Soc. Can. 63, 133.

Jeffers, H.M., van den Bos, W.H., and Greeby, F.M. 1963, Publ. Lick Obs. XXI.

Kippenhahn, R., and Smith, L. 1969, Astron. Astrophys. 1, 142.

Parsons, S.B., and Bouw, G.D. 1971, Monthly Notices Roy. Astron. Soc. 152, 133.

Parsons, S.B., and Bell, R.A. 1975, Dudley Obs. Rept. no. 9, p. 73.

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BVRI OBSERVATIONS OF SEMIREGULAR VARIABLES

Observations on the Johnson BVRI system are reported for three variables classified as SR in the General Catalogue of Variable Stars. The Purdue High Speed Photometer, described by Barnes et al. (1978), was used in obtaining the data. The instrumental system and reduction procedures are discussed by Moffett and Barnes (1979).

Most of the observations were obtained on the 91-cm and 76-cm reflectors at McDonald Observatory and a few were also made on the 61-cm reflector at the Table Mountain Observatory and the No. 2, 91-cm telescope at Kitt Peak National Observatory.

The results for the three SR variables; U Hya, V441 Her and R Lyr are given in Table I. The estimated uncertainties for a single observation are : V = ± 0.014, (B-V) = $\pm$ 0.009, (V-R) = ± 0.009, and (R-I) = ± 0.012.

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References:

Barnes, T.G., Evans, D.S., and Moffett, T.J., 1978, M.N.R.A.S., 183, 285
Moffett, T.J., and Barnes, T.G., 1979, P.A.S.P., (in press)

TABLE I

SEMIREGULAR VARIABLES

U Hya = BS4163

HJD	V	(B-V)	(V-R)	(R-I)
(2440000.+)				
3129.01	4.856	2.569	1.784	1.230
3130.00	4.860	2.519	1.775	1.207

V441 Her = BS6685

HJD	V	(B-V)	(V-R)	(R-I)
3248.97	5.418	0.328	0.318	0.164
3289.87	5.481	0.363	0.351	0.179
3290.83	5.502	0.361	0.355	0.196
3291.88	5.505	0.350	0.334	0.172
3296.90	5.487	0.348	0.349	0.190
3297.84	5.497	0.364	0.351	0.173
3301.82	5.452	0.352	0.322	0.207
3303.82	5.474	0.339	0.338	0.203
3303.85	5.451	0.336	0.325	0.176
3366.70	5.431	0.345	0.334	0.199
3427.57	5.479	0.377	0.351	0.199
3620.98	5.456	0.327	0.310	0.180
3645.88	5.450	0.338	0.314	0.169

R Lyr = BS7157

HJD	V	(B-V)	(V-R)	(R-I)
2920.77	4.149	1.490	2.237	1.851
2921.78	4.135	1.476	2.246	1.832
2921.91	4.127	1.479	2.231	1.855
2922.92	4.118	1.475	2.267	1.804
2924.78	4.073	1.486	2.244	1.825
2924.87	4.044	1.476	2.261	1.809
2924.96	4.051	1.511	2.256	1.801
2925.86	4.036	1.481	2.225	1.809
2926.81	4.025	1.476	2.235	1.792
2926.88	4.042	1.466	2.236	1.794
2928.73	4.006	1.499	2.215	1.795
2928.90	4.009	1.487	2.216	1.797
2928.96	4.015	1.516	2.224	1.798
2929.86	4.012	1.494	2.221	1.787
2929.95	4.015	1.498	2.230	1.782
2930.96	4.009	1.514	2.239	1.762
2931.75	3.991	1.511	2.188	1.810
2932.89	3.996	1.479	2.209	1.815
2932.96	4.000	1.521	2.213	1.815

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PHOTOELECTRIC TIMES OF MINIMA AND THE PERIOD OF UV Psc

We have observed the light curve of the eclipsing binary UV Psc photoelectrically in two colours on 16 nights in September and October of 1976 and 1977 with the 30 cm Maksutov telescope of the University Observatory at Ankara. An additional timing of the primary minimum was made in October 1978. The photomultiplier tube used was EMI 16256 S (uncooled) with standard B,V filters.

The observed times of minima are given in the following table, where $MJD_{\odot}$ stands for the heliocentric "Modified Julian Day".

$MJD_{\odot}$ s.e.	colour	E	O-C
43052.9928±0.0003	V	17438	+0.0176
.9923±0.0004	B	"	+0.0171
43399.9951±0.0006	V	17841	+0.0184
.9952±0.0008	B	"	+0.0185
43406.0226±0.0001	V	17848	+0.0186
.0224±0.0002	B	"	+0.0184
43424.9658±0.0002	V	17870	+0.0188
.9661±0.0002	B	"	+0.0191
43427.9804±0.0006	V	17873.5	+0.0197
.9809±0.0003	B	"	+0.0202
43784.8835±0.0003	V	18288	+0.0192
.8834±0.0002	B	"	+0.0191

The minima were timed by the method of Kwee and van Woerden (1). The O-C values were calculated using the formula

$$MJD_{\odot}(\text{Min I}) = 28038.055 + 0^{d}.861046 \cdot E \quad (1)$$

given by Huth (2). The present observations, excluding the secondary minimum, give $MJD_{\odot}$(Min I) = 43406.02254±0.00008 (s.e) as a best weighted mean.

The O-C diagram based on formula (1) is shown in Fig. 1. All of the observations available to us have been plotted. The plus signs are Huth's (2) photographic observations. The crosses refer to the visual observations (3,4,5,6). The present and previous (7,8,9,10) photoelectric timings are shown as large dots

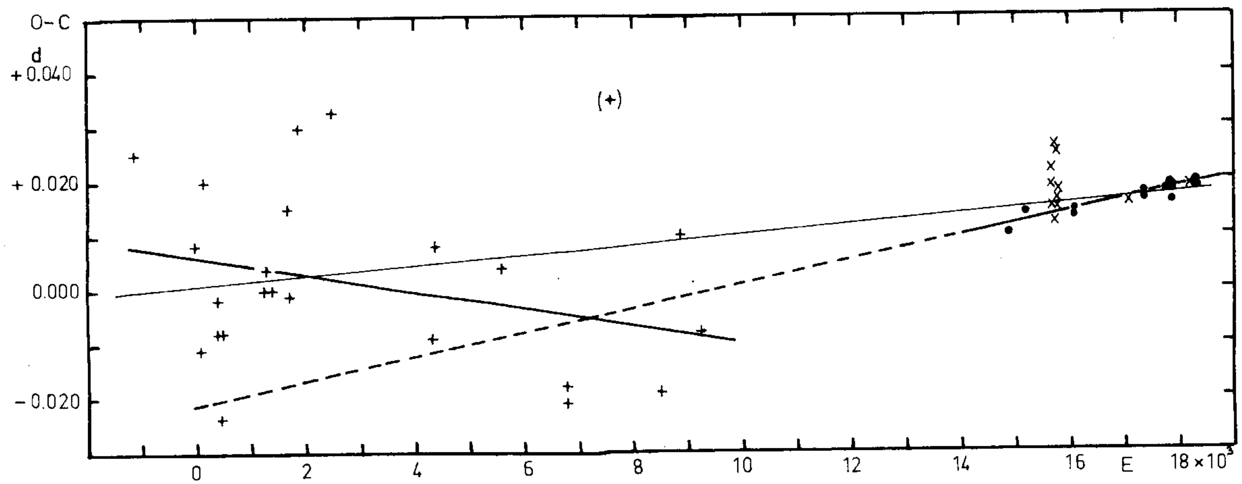

Fig. 1

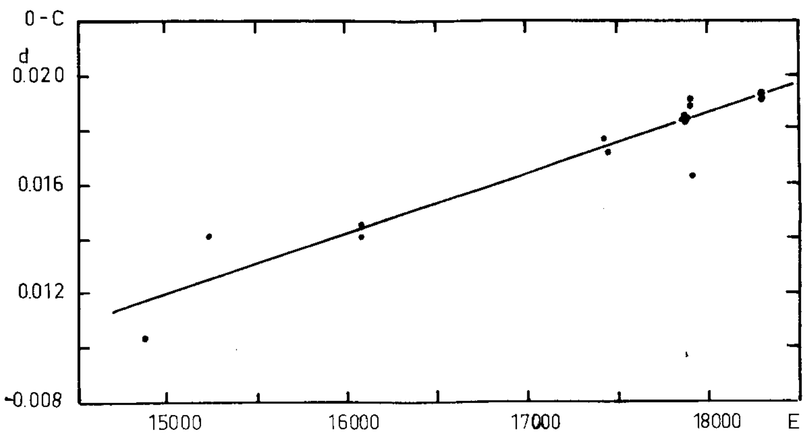

Fig.2

(secondary minimum not plotted). The photoelectric determinations are also plotted on a larger scale in Figure 2, where the straight line is a least squares fit through the points, and corresponds to

$$MJD_{\odot} = 28038.034 + 0.8610482 \cdot E. \quad \begin{matrix} \pm 4 & \pm 2 \text{ (s.e.)} \end{matrix}$$

The weak line in Fig.1 represents the formula

$$MJD_{\odot} = 28038.056 + 0.8610469 \cdot E. \quad \begin{matrix} \pm 3 & \pm 2 \end{matrix}$$

This has been calculated from all the points by assingning weights according to the precepts worded, for instance, by Binnendijk (11). It can be seen from Fig.1 that this fits the observations only approximately and that, although the more recent observations do indicate a longer period, no single linear formula can adequately represent all the observations, weighted or otherwise. In fact a slightly shorter period than that in formula (1) will fit the photographic observations equally well or even better if the deviant (bracketed) point is excluded as shown by the downsloping line in Fig.1, which corresponds to

$$MJD_{\odot} = 28038.061 + 0.8610444 \cdot E. \quad \begin{matrix} \pm 4 & \pm 10 \end{matrix}$$

It is also seen that the photographic minimum times with E>4000 fall, on the average, on the extention of the line through the photoelectric observations (dashed line).

We may therefore conclude that there is evidence that a change of period amounting to about $0^{s}.3$ occurred some time around E=7000 (MJD=34065). Such a change of period should have an important bearing on the evolution of RS CVn binaries, of which UV Psc is supposed to be one.

Finally the observed times of minima for MJD>40859 are well represented by

$$MJD_{\odot}\ (\text{Min I}) = \underset{\pm 1}{43406.0225} + \underset{\pm 2}{0.8610482} \cdot E. \quad \text{(s.e.)}$$

I wish to thank Prof.B. Cester for calling my attention to, and making available some of the literature on this star, and for advice.

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References:

(1) Kwee,K.K. and van Woerden, H.,Bull.Astron.Neth.12,327, 1956
(2) Huth, H., MVS No.424, 1959
(3) Locher, K.,B.B.S.A.G. Bulletin 5, 1972
(4) Locher, K.,B.B.S.A.G. Bulletin 6, 1972
(5) Peter, H., B.B.S.A.G. Bulletin 26,1976
(6) Locher, K.,B.B.S.A.G. Bulletin 38,1978
(7) Güdür,N. and Şengonca,H.,I.B.V.S. No.530, 1971
(8) Karacan, H. and Ibanoğlu,C., I.B.V.S. No.647, 1972
(9) Demircan,O.,Baygün,C.,and Ertükel, S.,I.B.V.S.No.937, 1974
(10) Al-Naimiy,H.,Budding,E.,Jassur,D.,and Sadik,A.R.,I.B.V.S. No.1415, 1978
(11) Binnendijk, L., "Vistas in Astronomy" 12, 217, 1970

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TIMES OF MINIMA OF SOME ECLIPSING VARIABLES

Times of minima of eclipsing variables RZ Cas, U Cep have been observed photoelectrically with a 45-cm reflector at the Observatory of the Urals State University in 1975-78.

All heliocentric minima are listed in the table, where (O-C) values of RZ Cas were computed with the help of the ephemerides by Parenago (1952), (O-C) values of U Cep were computed with the help of the ephemerides by Chudovichev (1939), N denotes the number of single observations obtained for the minimum. The filters used are given too.

Table

Star	J.D. Hel. 2442000+	(O-C)	N	filter	Observer
RZ Cas	863.2441	-0.0500	34	B,V	Orlov
"	869.2235	-0.0469	42	B,V	"
"	870.4177	-0.0509	44	B,V	"
"	1200.3063	-0.0488	36	B,V	"
U Cep	1574.2593	+0.5858	52	V	Polushina
"	1574.2597	+0.5862	52	B	"

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References:

Parenago, P.P., 1952, Peremennye Zvezdy 9, 125

Chudovichev, N.J.,1939, Bulleten Astronomicheskoj Observatorii Engelgardta N17.

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V-R COLOURS OF RED VARIABLE STARS

During the years 1973-1974 the authors observed the variable stars of late spectral classes photoelectrically with the 20-inch reflector of Urals University Observatory.

The colour-indices were determined with mean error $\pm 0\overset{m}{.}009$. Larger errors for some stars are produced by variability.

Results of observations are given in Table 1.

First column contains the stellar identification of Catalogue of Bright Stars (1964). The GCVS names (3rd edition, 1969 and its Supplements) or numbers of stars according to First (1951) and Second (1965) Catalogue of Suspected Variable Stars are listed in second column. Third, fourth and fifth column contain the heliocentric times J.D. of observations, colour-indices V-R, mean errors, respectively.

Table I

BS=HR	Name	J.D.hel 244 ...	V-R	me
46	AD Cet	2275.4229	$1\overset{m}{.}541$	$\pm 0\overset{m}{.}017$
		2277.4625	1.453	
		2277.4667	1.460	
		2310.3743	1.515	
		2310.3785	1.496	
80	100 017	2272.3403	0.972	0.013
		2272.3993	1.011	
		2277.2771	0.976	
		2324.1778	1.021	
		2324.2521	1.040	
103	TV Psc	1901.2854	1.588	0.028
		1901.3250	1.553	
		1901.3951	1.543	
		1958.2333	1.573	
		1958.3014	1.591	
		2077.1715	1.724	
		2077.2069	1.751	
		2104.1340	1.799	
		2307.2014	1.490	
		2276.3764	1.544	
		2277.4313	1.560	
		2309.1750	1.695	

Table I (cont.)

BS=HR	Name	J.D. hel 244 ...	V-R	me
211	88	1901.2917	$1^m.670$	$\pm 0^m.023$
		1901.3361	1.637	
		1901.4035	1.591	
		2077.2208	1.792	
		2078.2035	1.749	
		2274.3764	1.655	
		2307.1806	1.690	
		2307.2069	1.673	
		2319.4639	1.579	
587	AR Cet	2018.2090	2.051	0.052
		2018.2299	2.125	
		2056.1250	1.876	
		2318.4257	2.004	
631*	-	1900.3688	1.535	0.019
		2275.3354	1.565	
		2275.3903	1.597	
		2278.2729	1.602	
		2280.2674	1.503	
689*	-	2098.1181	1.453	0.025
		2098.1521	1.471	
		2333.3569	1.377	
		2356.2826	1.369	
		2357.3222	1.348	
750	230	2112.1917	1.522	0.022
		2114.2694	1.527	
		2277.3896	1.433	
		2277.2632	1.416	
		2278.3111	1.390	
		2319.3875	1.401	
		2322.3826	1.396	
758	R Tri	2142.1875	1.547	0.029
		2356.1146	1.390	
		2356.1382	1.400	
		2356.1479	1.405	
		2356.1785	1.416	
		2356.5583	1.336	
992	102 411	2309.4306	0.765	0.030
		2322.3729	0.838	
		2356.4556	0.686	
		2356.4597	0.704	
		2356.4736	0.683	
1009*	-	1801.3917	1.563	0.006
		1802.3833	1.569	
		1802.3056.	1.580	
		1804.3597	1.596	
		1809.3028	1.581	
		1813.3035	1.561	
		1815.3701	1.545	
1105	BD Cam	1803.3590	1.673	0.008
		1807.3972	1.670	
		1809.2931	1.668	
		1813.2979	1.640	
		1814.3771	1.634	

Table I (cont.)

BS=HR	Name	J.D. hel 244 ...	V-R	me
1335*	-	1803.3688	$1^{m}.178$	$\pm 0^{m}.004$
		1808.4181	1.201	
		1809.2840	1.198	
		1813.3118	1.200	
		1815.3854	1.188	
1451	DV Eri	1736.1118	1.540	0.019
		1736.1500	1.527	
		2050.2201	1.462	
		2050.2750	1.488	
		2056.2688	1.438	
		2098.1292	1.551	
1556	o^1 Ori	2079.3979	1.751	0.017
		2097.2944	1.756	
		2097.3194	1.773	
		2112.1986	1.694	
1562	100 421	1735.1715	1.394	0.026
		1735.2150	1.422	
		1735.2188	1.391	
		1736.1250	1.436	
		2356.5403	1.299	
1571	100 422	1735.1639	0.874	0.012
		1735.2243	0.840	
		2123.1965	0.847	
		2126.1840	0.892	
1709	100 461	1757.2417	1.017	0.010
		1758.1896	0.974	
		1758.2146	0.996	
		1758.2375	1.016	
1722	PU Aur	1734.3118	1.750	0.022
		2309.2590	1.838	
		2310.2243	1.844	
		2322.2701	1.786	
1802*	-	1801.3465	1.420	0.005
		1802.4014	1.406	
		1804.3340	1.408	
		1816.2778	1.397	
1834	CI Ori	1734.2306	1.182	0.009
		1735.1958	1.187	
		1735.2319	1.191	
		1953.4333	1.150	
2037	100 692	1761.1924	0.980	0.005
		1761.2063	1.004	
		2078.2743	0.986	
		2078.3409	0.997	
2063	U Ori	2322.2958	1.348	0.015
		2323.2979	1.394	
		2330.2792	1.408	
		2330.3083	1.348	
		2356.3472	1.334	
		2356.4159	1.282	
		2356.4993	1.307	
		2357.1965	1.394	
		2357.3354	1.265	

Table I (cont.)

BS=HR	Name	J.D. hel 244 ...	V-R	me
2215	UW Lyn	1802.4104	$1^m.698$	$\pm 0^m.018$
		1803.3396	1.700	
		1815.3021	1.698	
		2330.1444	1.635	
		2330.2215	1.619	
2275	100 729	1761.1688	1.332	0.013
		1761.1993	1.360	
		1761.2125	1.330	
		2104.1944	1.388	
2289	ψ^1 Aur	1734.3201	1.399	0.025
		1779.1917	1.384	
		1780.3951	1.484	
		1781.3125	1.483	
		1804.2569	1.431	
		2144.3750	1.462	
		2144.4264	1.492	
		2302.1611	1.541	
		2303.2535	1.591	
		2308.1854	1.304	
2480	100 761	2097.3618	1.099	0.002
		2112.3708	1.091	
		2113.3250	1.098	
		2114.2035	1.096	
2508*	-	2055.3340	1.407	0.031
		2097.2361	1.554	
		2104.1875	1.516	
		2114.1646	1.486	
2609	OV Cep	1780.4090	1.313	0.008
		1782.2159	1.287	
		1782.2778	1.312	
		1783.2715	1.310	
		2291.2632	1.252	
		2309.1659	1.297	
		2333.2813	1.275	
		2356.3549	1.280	
2639	100 794	1735.2778	1.324	0.014
		1736.2347	1.313	
		1736.2889	1.377	
		1761.1507	1.333	
2703	UY Lyn	1734.3722	1.562	0.012
		1815.3431	1.552	
		1822.3785	1.602	
		1823.3090	1.567	
		2153.4667	1.580	
		2160.4500	1.634	
2717	BQ Gem	1761.3278	1.763	0.008
		1761.3330	1.755	
		1780.1743	1.751	
		1780.2736	1.724	
2742	VZ Cam	1761.2917	1.606	0.014
		1782.2090	1.538	
		1782.2313	1.554	
		2124.4806	1.609	
		2148.4076	1.591	
		2333.2882	1.534	

Table I (cont.)

BS=HR	Name	J.D. hel 244 ...	V-R	me
2795*	-	2080.4646	1^m.240	±0^m.003
		2097.4215	1.242	
		2097.4563	1.250	
		2099.3438	1.236	
		2103.4375	1.231	
		2104.2361	1.219	
		2104.3486	1.237	
		2105.4243	1.225	
2938	100 883	1734.3528	1.254	0.008
		1802.2500	1.301	
		2049.4007	1.261	
		2097.4021	1.296	
		2097.4417	1.307	
		2103.4299	1.282	
		2104.4181	1.301	
2983*	-	1747.3361	1.218	0.007
		1747.3417	1.217	
		2079.3840	1.192	
		2097.4479	1.200	
		2098.4535	1.197	
		2112.2063	1.185	
		2112.4090	1.192	
		2114.1965	1.132	
		2317.4076	1.244	
2999*	-	1734.3840	1.392	0.005
		2056.3909	1.402	
		2112.2250	1.373	
		2148.3583	1.392	
		2155.3909	1.388	
		2158.3743	1.407	
		2159.3167	1.406	
3013*		1747.3535	1.332	0.005
		1747.4146	1.324	
		1747.4368	1.333	
		2112.2861	1.295	
		2112.3097	1.294	
		2112.3542	1.312	
		2157.3375	1.315	
		2159.3069	1.314	
3550	101 010	1734.2659	1.018	0.009
		1778.3521	1.047	
		1782.3188	1.052	
		2322.4979	1.016	
3639	RS Cnc	1779.3646	2.479	0.025
		1779.4035	2.367	
		1780.3431	2.455	
		1781.3590	2.480	
		1782.4181	2.511	
3769*	-	1779.4535	1.180	0.021
		1780.2563	1.216	
		1780.3701	1.306	
		1781.3646	1.225	
		2124.5104	1.254	

Table I (cont.)

BS=HR	Name	J.D. hel 244 ...	V-R	me
3820*	-	1803.2521	$1^m.300$	$\pm 0^m.010$
		1804.2208	1.265	
		1785.3264	1.282	
		1786.3049	1.288	
		2124.5028	1.325	
3866*	-	1802.2757	1.361	0.005
		1804.2347	1.351	
		1823.2868	1.354	
		2103.3681	1.358	
		2104.2639	1.382	
		2104.3576	1.381	
		2124.3903	1.357	
3870	CS UMa	1781.3917	1.563	0.015
		1782.3939	1.553	
		1786.4264	1.539	
		1800.4007	1.604	
		2103.5292	1.629	
		2310.2549	1.545	
3882	R Leo	2076.4715	3.598	0.053
		2356.4382	3.382	
		2356.4444	3.395	
		2356.4708	3.380	
4127	101 134	1787.3285	1.431	0.004
		1798.2472	1.452	
		1798.2778	1.447	
		1801.2931	1.444	
4483	ω Vir	1781.2153	1.848	0.015
		1783.2056	1.871	
		1783.2333	1.869	
		1787.2875	1.807	
4765	CQ Dra	1787.3882	1.487	0.007
		1787.4542	1.511	
		1788.3674	1.476	
		1788.3764	1.482	
		1825.3701	1.468	
4800	T UMa	2276.2813	1.545	0.229
		2277.2500	1.520	
		2308.1757	2.141	
		2308.2299	2.114	
		2330.1938	0.871	
		2330.2668	0.880	
5015	7013	1788.2951	1.366	0.015
		1788.4514	1.393	
		1798.3771	1.373	
		1799.3285	1.357	
		2124.5347	1.450	
		2155.4576	1.429	
5334*	-	1822.3236	1.302	0.006
		1823.3215	1.304	
		1916.2264	1.314	
		1916.2667	1.329	
5590*	-	1788.3278	1.323	0.009
		1788.4659	1.340	
		1798.3181	1.362	
		1798.3590	1.362	

Table I (cont.)

BS=HR	Name	J.D. hel 244 ...	V-R	me
5894	R Ser	2273.2986	$3^{m}.213$	$\pm 0^{m}.356$
		2280.2188	2.509	
		2323.2563	1.984	
6086	AT Dra	1786.3896	1.727	0.007
		1799.4243	1.750	
		1800.4306	1.757	
		1801.4243	1.766	
		2142.2417	1.777	
		2396.4347	1.743	
6107*	–	1813.3931	1.374	0.002
		1816.3806	1.360	
		1822.3417	1.372	
		1823.3938	1.366	
		2310.2951	1.368	
6200*	–	1816.3875	1.370	0.003
		1822.3917	1.362	
		1823.3708	1.366	
		1825.3382	1.381	
		2142.2542	1.371	
6227	101 605	1786.4701	1.538	0.022
		1788.4132	1.536	
		1797.4188	1.588	
		1799.3368	1.612	
		2280.2536	1.485	
6452	V 656 Her	1787.4326	1.331	0.014
		1788.4201	1.284	
		1797.4409	1.298	
		1798.3514	1.283	
		2291.2715	1.221	
		2291.3236	1.236	
		2299.2293	1.286	
6765*	–	1788.4264	1.514	0.004
		1797.4111	1.526	
		1797.3917	1.525	
		1798.3632	1.532	
6815	V 669 Her	1798.2931	1.447	0.029
		1799.2353	1.471	
		1801.2563	1.492	
		2098.4125	1.581	
7243	R Aql	2277.3111	3.930	0.172
		2291.2826	3.269	
		2309.2993	2.869	
		2310.2028	2.678	
		2310.2319	2.698	
		2310.3035	2.780	
		2330.2542	2.795	
7414	101 850	1798.4319	1.524	0.015
		1799.4069	1.462	
		1801.4146	1.473	
		1823.4021	1.463	
7566	V 1509 Cyg	2132.3938	1.401	0.013
		2341.3896	1.335	
		2356.3007	1.356	
		2356.3708	1.364	

Table I (cont.)

BS=HR	Name	J.D. hel 244 ...	V-R	me
7576	8468	1733.2938	$0^m.927$	$\pm0^m.011$
		1744.3396	0.930	
		1779.2069	0.895	
		1780.3159	0.950	
7645	VZ Sge	1793.4326	1.744	0.005
		1801.3694	1.764	
		1802.3778	1.742	
		1825.2889	1.754	
7798	102 998	1798.3028	0.762	0.008
		1804.2743	0.751	
		1802.2340	0.786	
		1814.2785	0.796	
		2143.3604	0.776	
7851	101 996	1802.2382	1.406	0.011
		1814.2840	1.367	
		1916.2730	1.340	
		1916.3438	1.342	
		1916.4472	1.335	
		2307.2556	1.343	
7956	T Cyg	1814.2889	0.942	0.005
		1824.3875	0.962	
		1916.3736	0.947	
		2104.5618	0.943	
		2357.3118	0.944	
		2396.2215	0.964	
		2396.2590	0.974	
8015	102 046	1907.3382	1.099	0.004
		1913.2743	1.082	
		1913.2938	1.095	
		1913.3550	1.108	
		1914.2736	1.104	
8016	102 045	2112.3188	0.812	0.003
		2113.3653	0.832	
		2114.3639	0.822	
		2124.3569	0.827	
		2124.3611	0.821	
8044*	-	1807.3632	1.494	0.009
		1826.3083	1.456	
		1916.2896	1.449	
		2149.4771	1.448	
		2158.4576	1.449	
8113	T Cep	1779.3396	3.320	0.098
		2104.3847	3.768	
		2112.2507	3.423	
		2112.3292	3.580	
8289*	-	1915.3021	1.380	0.009
		1917.3826	1.397	
		2302.2361	1.406	
		2303.2368	1.416	
		2322.3417	1.432	
8306	8683	2309.2486	1.352	0.004
		2310.2451	1.338	
		2322.4326	1.333	
		2323.4243	1.309	

Table I (cont.)

BS=HR	Name	J.D. hel. 244 ...	V-R	me
8306	8683	2343.2472	$1\overset{m}{.}332$	$\pm0\overset{m}{.}004$
		2356.1285	1.336	
		2356.2049	1.344	
		2356.2569	1.341	
8416	102 144	1782.4396	1.690	0.003
		1782.4611	1.702	
		1786.4583	1.697	
		1787.3576	1.701	
8594	8775	1733.2951	0.682	0.024
		1733.3153	0.673	
		1786.3409	0.707	
		1787.2368	0.776	
8621	102 195	1787.3424	1.774	0.033
		1803.3306	1.710	
		1804.3847	1.708	
		2132.2382	1.848	
8703*	-	1914.3236	0.837	0.007
		1916.2465	0.860	
		1916.3184	0.861	
		2309.1972	0.858	
		2330.3236	0.828	
8815	GZ Peg	2077.1313	1.868	0.051
		2079.1215	2.006	
		2098.1021	1.969	
		2395.2264	1.779	
8850	χ Aqr	1914.3111	1.751	0.011
		1916.3049	1.714	
		1916.3604	1.702	
		1916.4250	1.741	
8904*	-	1787.1965	1.416	0.008
		2103.3806	1.400	
		2104.2785	1.434	
		2114.2424	1.400	
8940	5749	2078.1764	1.886	0.030
		2275.3484	1.800	
		2309.1875	1.809	
		2322.3250	1.731	
		2330.2368	1.722	
8943	103 124	2280.2743	1.047	0.009
		2310.3104	1.059	
		2318.4701	1.009	
		2330.2424	1.056	
		2330.3097	1.049	
8991	102 279	1958.2826	1.325	0.018
		2077.1174	1.364	
		2078.1409	1.400	
		2307.1667	1.434	
		2322.2159	1.386	
9036*	-	2274.3576	1.379	0.011
		2301.3431	1.424	
		2302.2194	1.418	
		2309.2194	1.386	
9047	XZ Psc	1916.3347	1.872	0.025
		2077.1090	1.844	

Table I (cont.)

BS=HR	Name	J.D. hel 244 ...	V-R	me
9047	XZ Psc	2275.4159	$1^{m}.979$	$\pm 0^{m}.025$
		2322.2333	1.922	
		2357.2521	1.859	
9066	R Cas	2309.3597	3.076	0.423
		2322.1674	3.098	
		2322.3917	2.984	
		2393.1229	4.977	
		2393.1368	4.913	
		2396.3500	4.937	
9103	102 299	1916.3889	1.113	0.007
		2275.4319	1.119	
		2275.4361	1.117	
		2383.1424	1.112	
		2383.1722	1.081	

*) - Data on variability of these stars are included in Card-Catalogue of variable stars of the Sternberg State Astronomical Institute.

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POSSIBLE ECLIPSES OF BETA CAPRICORNI

Beta Capricorni (HR7776, V = 3.07, B8V+KO II-III, $\alpha=20^h15^m24^s$, $\delta=-15^{\circ}06'$ (1900)) is a triple system with a late B star and unseen companion of period 8.68 days orbiting a late type giant in 1374 days (Sanford 1939). Recently Evans and Fekel* have derived a visual orbit for the long period system by combining occultation, speckle, and spectroscopic observations. With the speckle observation excluded, the derived long period orbital inclination is 90°. The best compromise with the inclusion of the lone speckle point is an inclination of 84°. From occultation observations the limb darkened angular diameter of the KO II-III star is 3 arc milliseconds. The minimum separations of the components of the long period orbit on the sky are of the same order with the exact values depending on the true value of the inclination. The possibility of eclipses, perhaps only grazing or coronal, arises and Table I gives the predictions for $i = 84^{\circ}$.

Table I

Predicted Eclipse Circumstances

Eclipsed components	Date	ρ (arc ms)	θ (degrees)
short period pair	1979 Mar 30	6.5	122.8
KO II-III	1981 Aug 20	3.0	302.8

The former event should best be observed at short wavelengths ($\lambda < 4200$ Å). Complications may arise because of the duplicity of the visual secondary, B8V star, which should have an orbital angular diameter of 0.7 arc milliseconds, though in which relative direction this pair will be elongated at the time of the eclipses it is impossible to say.

From occultation observations the visual components have equal magnitudes at about 4230Å. The magnitude difference

$\Delta m = m_{B8} - m_{KO}$ in Strömgren b = 1.1 and in y = 1.8.

We suggest that photometric observers, particularly those in the southern hemisphere, should search for eclipses. The first possible eclipse occurs early in the observing season for β Cap and will be difficult for northern observers.

The solution of Evans and Fekel has position angles decreasing with time. Radick has made an independent solution which is closely similar to this in which he finds an inclination of $89^{\circ} \pm 6^{\circ}$ using the spectroscopic, occultation and speckle data and $89^{\circ} \pm 1\overset{\circ}{.}4$ if the single speckle observation is omitted. Both give a very elongated orbit with only small changes in position angle but he prefers a solution in which position angles increase with time. Of course if the inclination is exactly 90° the two solutions coalesce and the eclipses should be the more striking.

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Reference:

*Evans, D.S. and Fekel, F.C., in press, Astrophysical Journal 1979

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Budapest
1978 December 18

MAXIMUM TIMES OF BW VULPECULAE

The β Canis Majoris type variable BW Vul (HD 199140, $M_V=-4^m.35$, B2 III) was observed photoelectrically at EGE University Observatory during the summer of 1977 and 1978. The observations were obtained with the 48 cm Cassegrain telescope equipped with an unrefrigerated 1P21 photomultiplier. HD 198820 was used as the comparison star.

While the observations in 1977 were obtained in uvby system those in 1978 were secured in UBV system. The observations in (u) and (U) colours were used for the maximum times.

Four maximum times were obtained in 1977 and used for recalculation of the period of BW Vul. The new light element is given by Tunca (1978) as:

$$\text{Max.J.D.hel} = 2441537.7724 + 0^d.20104071 \cdot E.$$

All maximum times and the (O-C) values obtained with the help of the equation above are given in the following table.

J.D. hel.	E	(O-C)
2443371.4660	9121	$0^d.0014$
382.3215	9175	.0007
385.3328	9190	- .0036
422.3297	9374	.0018
745.3959	10981	- .0044
750.4264	11006	.0001
753.4416	11021	- .0004
764.2976	11075	- .0006
770.3275	11105	- .0019
776.3590	11135	- .0016

Z. TUNCA
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Reference:

Tunca, Z., 1978. I.B.V.S. No. 1386

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Konkoly Observatory
Budapest
1978 December 18

PHOTOELECTRIC OBSERVATIONS OF NOVA Vul 1976 (NQ Vul)

38 magnitudes in V light of Nova Vul 1976 (NQ Vul) obtained from October 22, 1976 to October 4, 1977 are reported. The observations have been performed with the photoelectric photometer attached to the 40-cm refractor of the Teramo Observatory; BD + 19°4039 with magnitude V=6.29 (Ljunggren and Oja, 1964), has been utilized as comparison star and its constancy has been checked by comparison with BD + 20°4165. The internal mean error of a magnitude in the table (each averaged from 2 to 6 measures) does not exceed ±0.01; a few less accurate values are indicated by a colon.

A. DI PAOLANTONIO, R. PATRIARCA
Osservatorio Astronomico di
Collurania-Teramo, Italy

Reference:
Ljunggren, B., Oja, T. 1964, Arkiv for Astronomi 3, 439

MAGNITUDES OF NOVA VUL 1976 (NQ Vul)

Date (J.D. geoc.) 2443000+	V	Date (J.D. geoc.) 2443000+	V
074.344	6.83	286.526	12.09
080.250	7.00	302.431	12.17
106.250	8.14	307.400	12.31
107.220	8.10	309.401	12.36
109.225	8.37	311.427	12.21
110.248	8.34	313.390	12.37
125.214	8.59	334.398	12.59
194.663	11.53	335.385	12.62
198.688	11.54	337.413	12.53
200.640	11.55	373.322	12.84
201.644	11.81	375.335	12.77
217.592	11.50	390.313	12.98
219.604	11.48	392.382	12.89
224.597	11.52	393.310	12.80
228.602	11.57	400.361	12.92 :
229.610	11.54	402.305	13.02 :
255.610	11.73	417.269	13.07 :
260.551	11.84	421.260	12.98 :
279.509	11.92		
285.528	11.94		

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Konkoly Observaotry
Budapest
1978 December 19

INTERMEDIATE BAND AND Hβ PHOTOMETRY
OF ULTRASHORT PERIOD CEPHEIDS

For a discussion published elsewhere (Eggen 1979) of ultrashort period cepheids (USPC) observations of several such objects south of declination +30° were obtained with the 0.6, 0.9, 1.0 and 1.5 m reflectors at Cerro Tololo. These results are listed in Table 1 and the ephemerides used in computing phases are discussed in the notes to the table. Figures 1-6 show the run of magnitude and color indices with phase for representative stars. The rise from minimum to maximum light of GP And was followed in V on 11 August 1978 with the results shown in Figure 1. This segment of the light curve is shown as a continuous curve in Figure 2. The mean light curve in V for V 567 Oph in Figure 3 is from Clube et al. (1969) after shifting phase by -0.345 periods. The mean visual light curve of TV Lib in Figure 4 is also from Clube et al. SX Phe was also followed in V during the rising branch of the light curve on 15 September 1978 and all of the visual magnitude determined on that date are shown in Figure 5.

The observations of most of these stars have been already been discussed (Eggen 1979) but those of BS Aqr were made subsequent to that discussion because of inconsistencies in the then available data. The present observations are shown in Figure 6. The difficulties encountered in the previous discussion were (1) the values of (b-y), β, and M_1 were inconsistent and (2) the path traced by the variable in the (β, [C_1]) plane was more representative of a low mass, halo cepheid such as RR Lyr, then of a high mass, old disk cepheid such as GP And. However the new observations, between phase 0.1 and 0.65 days, in Figure 7 lie on a path parallel to the main sequence relation and to the path of GP And. From the calibration discussed in the previous paper this leads to a median M_V = +0.35 mag, giving (U, V, W) = (+35, -58, -73) km sec^{-1} and the variable is a high mass, old disk population cepheid. The values of (β, b-y) indicate little or no reddening and δM_1 = 0.015 mag, compared with the Hyades stars.

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References:

Clube, S.V.M.,Evans, D.S., and Jones, D.H.P. 1969, Mem.Roy. Astr.Soc., 72, 201
Eggen, O.J. 1971, Pub.A.S.P., 83, 762
Eggen, O.J. 1977, Pub.A.S.P., 89, 205
Eggen, O.J. 1979, Ap.J., (in press)

* Cerro Tololo Inter-American Observatory is supported by the National Science Foundation under contract No. AST 74-04128.

TABLE 1

Observations of USPC

Var	V	b-y	M_1	C_1	β	J.D. 244	Phase
GN And*	$5^m.20$	$0^m.170$	$0^m.165$	$0^m.863$	$2^m.752$	2 obs.	
GP And*	10.65	0.098	0.168	1.003	2.848	3727.858	0.137
	10.98	0.214	0.145	0.790	2.727	3728.833	0.529
	10.82	0.172	0.139	0.914	2.789	3729.864	0.323
	10.82	0.162	0.138	0.913	2.806	3730.858	0.265
	11.03	0.201	0.160	0.705	2.712	3731.830	0.618
	10.53	0.093	0.178	1.012	2.862	3731.864	0.051
GP And B	12.50	0.364	0.141	0.439		3 Obs.	
V1208 Aql	5.55	0.158	0.190	0.990	2.795	3734.	
	5.53	0.157	0.190	0.990	2.796	3735.	
V 1208 Aql B	9.06	0.245	0.195	0.600		2 Obs.	
BS Aqr*	9.57	0.219	0.160	0.846	2.696	3774.672	0.605
	9.57	0.245	0.151	0.846	2.691	3774.679	0.641
	9.60	0.245	0.157	0.829	2.697	3774.686	0.676
	9.62	0.258	0.145	0.822	2.687	3774.696	0.727
	9.28	0.150	0.195	0.925	2.765	3774.740	0.949
	9.19	0.146	0.170	1.049	2.797	3774.754	0.020
	9.23	0.149	0.173	1.032	2.789	3774.767	0.086
	9.29	0.145	0.182	0.999	2.758	3774.778	0.141
	9.33	0.163	0.169	0.984	2.756	3774.788	0.192
- Ari*	6.73	0.168	0.210	0.890	2.771	3727.875	
	6.71	0.184	0.195	0.895	2.778	3728.885	
- Ari* A	6.74	0.187	0.113	0.871	2.738	3727.910	
	6.69	0.183	0.119	0.876	2.726	3728.910	
- Ari B	8.35	0.192	0.160	0.710	2.744	2 obs.	
YZ Cap*	11.36	0.201	0.144	1.075	2.779	3727.754	0.583
	11.41	0.222	0.089	1.157	2.750	3729.733	0.164
	11.09	0.150	0.131	1.203	2.942	3729.722	0.780
	11.60	0.238	0.111	1.020	2.746	3730.743	0.514
	11.49	0.221	0.092	1.106	2.740	3731.757	0.222
V 743 Cen	8.71	0.195	0.159	0.862	2.765	3727.525	
	8.71	0.180	0.168	0.858	2.770	3728.548	
	8.80	0.192	0.164	0.844	2.758	3729.524	
V 753 Cen*	10.64	0.216	0.147	1.034	2.728	3727.510	0.693
	10.29	0.110	0.176	1.187	2.815	3730.469	0.061
	10.65	0.220	0.121	1.038	2.769	3731.476	0.610

TABLE 1 (Continued)

Var	V	b-y	M_1	C_1	β	J.D. 244	Phase
V 668 Cr A*	8.70	0.118	0.212	1.002	2.885	3727.625	
	8.71	0.112	0.206	1.011	2.878	3728.663	
	8.71	0.111	0.210	1.011	2.875	3729.670	
	8.71	0.101	0.216	1.010	2.870	3730.719	
V 648 Her	6.86	0.096	0.218	0.869	2.844	3727.555	
	6.86	0.109	0.215	0.855	2.846	3728.555	
	6.86	0.103	0.213	0.870	2.833	3729.503	
TV Lib*	11.66	0.123	0.132	1.036	2.833	3727.525	0.094
	12.39	0.316	0.141	0.775	2.662	3729.538	0.560
	12.13	0.237	0.138	0.926	2.764	3730.555	0.332
	11.26	0.070	0.121	1.196	2.862	3731.545	0.004
V 747 Mon	6.11	0.200	0.190	0.800	2.738	2 Obs.	
ZZ Mic*	9.38	0.133	0.189	0.893	2.814	3728.767	0.668
	9.30	0.109	0.165	1.002	2.864	3729.788	0.865
	9.31	0.109	0.171	0.979	2.842	3730.795	0.854
	9.57	0.157	0.161	0.868	2.762	3731.778	0.486
BP Oct	6.46	0.190	0.205	0.722	2.780	3 Obs.	
V 567 Oph*	11.38	0.439	0.140	0.833	2.757	3727.566	0.830
	11.19	0.395	0.103	1.030	2.817	3728.569	0.544
	11.31	0.434	0.113	0.914	2.757	3729.552	0.103
	11.41	0.450	0.125	0.934	2.762	3730.566	0.902
	11.24	0.408	0.115	0.978	2.811	3731.569	0.616
NZ Pav	6.05	0.185	0.185	0.800	2.745	3 Obs.	
DH Peg*	9.75	0.248	0.101	1.095	2.756	3702.830	0.388
	9.31	0.163	0.121	1.277	2.837	3719.778	0.804
	9.70	0.212	0.110	1.218	2.794	3727.796	0.098
	9.34	0.158	0.119	1.321	2.826	3728.750	0.831
	9.35	0.163	0.131	1.248	2.844	3729.775	0.843
	9.30	0.174	0.109	1.255	2.857	3730.778	0.768
	9.37	0.166	0.129	1.256	2.842	3731.764	0.627
DY Peg	10.58	0.251	0.110	0.793	2.750	3728.803	0.560
	10.05	0.130	0.164	1.027	2.893	3729.778	0.930
	10.27	0.153	0.143	0.991	2.862	3730.810	0.081
	10.62	0.235	0.130	0.803	2.762	3731.792	0.547

TABLE I (Continued)

Var	V	b-y	M_1	C_1	β	J.D. 244	Phase
SX Phe*	7.42	0.169	0.142	0.756	2.754	3766.705	0.691
	7.15	0.086	0.178	0.921	2.858	3766.726	0.073
	7.20	0.101	0.160	0.911	2.827	3766.731	0.164
	7.20	0.130	0.151	0.853	2.800	3766.734	0.218
	7.33	0.132	0.152	0.848	2.787	3766.736	0.255
	7.36	0.149	0.144	0.821	2.763	3766.740	0.327
	7.40	0.155	0.238	0.807	2.758	3766.742	0.370
	7.44	0.163	0.133	0.774	2.746	3766.747	0.455
	7.05	0.081	0.168	0.948	2.863	3773.705	0.046
	7.25	0.120	0.155	0.868	2.800	3773.712	0.173
	7.35	0.148	0.136	0.829	2.776	3773.715	0.228
	7.36	0.155	0.141	0.806	2.762	3773.717	0.264
	7.40	0.165	0.132	0.800	2.744	3773.719	0.301
	7.43	0.170	0.135	0.779	2.740	3773.722	0.355
	7.45	0.184	0.122	0.771	2.740	3773.724	0.392
	7.46	0.181	0.135	0.739	2.739	3773.727	0.446
V 703 Sco*	7.88	0.248	0.165	0.793	2.738	3727.618	
	7.84	0.222	0.161	0.888	2.747	3728.597	
	7.86	0.228	0.157	0.858	2.741	3729.635	
	7.91	0.225	0.165	0.836	2.738	3730.680	
	7.91	0.243	0.150	0.848	2.739	3731.608	
- Sco	7.41	0.090	0.171	1.033	2.867	3727.611	
(HD 153747)	7.43	0.091	0.161	1.044	2.879	3728.590	
	7.42	0.093	0.163	1.029	2.851	3729.583	
	7.64	0.102	0.160	1.029	2.862	3730.594	
XX Scl	8.92	0.130	0.201	0.944	2.815	3727.924	
	8.92	0.140	0.180	0.958	2.824	3728.851	
	8.93	0.144	0.180	0.942	2.820	3729.903	
	8.93	0.124	0.202	0.929	2.808	3730.910	
V 369 Sct	9.38	0.311	0.153	0.868	2.730	3728.625	
	9.39	0.324	0.144	0.826	2.718	3729.639	
	9.42	0.312	0.160	0.848	2.712	3730.691	
	9.43	0.327	0.156	0.825	2.740	3731.614	
AP Ser A*	11.38	0.219	0.111	0.961	2.742	3727.465	0.953
	11.41	0.252	0.084	0.924	2.691	3728.479	0.943
	11.41	0.228	0.086	0.967	2.702	3729.476	0.867
	11.38	0.216	0.092	0.982	2.717	3730.479	0.814
	11.37	0.227	0.093	0.999	2.685	3731.496	0.816

TABLE 1 (Continued)

Var	V	b-y	M_1	C_1	β	J.D. 244	Phase
CW Ser*	11.95	0.206	0.180	0.852	2.720	3727.496	0.387
	12.08	0.265	0.142	0.861	2.714	3729.496	0.674
	11.75	0.207	0.153	0.934	2.789	3729.489	0.923
	11.89	0.192	0.193	0.878	2.796:	3730.507	0.305
	12.15	0.242	0.178	0.846	2.707	3731.510	0.608
V 479 Tau A	7.39	0.239	0.193	0.846	2.730	3 Obs.	
BC	8.88	0.205	0.199	0.800	2.807	3 Obs.	
BS Tuc	7.50	0.150	0.144	0.814	2.750	2 Obs.	
FG Vir	6.55	0.160	0.175	0.855	2.755	1 Obs.	

Notes to Table 1

GN And — Replaces the misprinted results in Eggen (1977)

GP And — Max=J.D.2433861.430+0^d.07868270. Epoch modified to fit present maximum.

BS Aqr — Max=J.D.2443774.750+0^d.197822776. Present epoch of max.

- Ari — HD11285

- Ari B — HD1516514. Cpm companion, 74 arcsec.

YZ Cap — Max=J.D.2439025.749+0^d.2734585.The period needs correction.

V 753 Cen — Max= J.D. 2441386.144+0^d.221349.

V 668 CrA — Replaces less accurate photometry with an 0.4 m reflector (Eggen 1971).

TV Lib — Max= J.D. 2420017.3015+0^d.269624031.

ZZ Mic — Max= J.D. 2440442.8443+0^d.0671835.

V 567 Oph — Max= J.D. 2438641.315 +0^d.1300305.

SX Phe — Max= J.D. 2443766.722 +0^d.054964379.

DH Peg — Max= J.D. 2427695. +0^d.25551267.

V 703 Sco — The light amplitude is strongly variable and evidently near minimum at the time of the observation.

AP Ser A — Max= J.D. 2428334.279 +0^d.254118.

CW Ser — Max= J.D. 2431212.280 +0^d.1891505.

BS Tuc — Replaces less accurate photometry with an 0.4 m reflector (Eggen 1971).

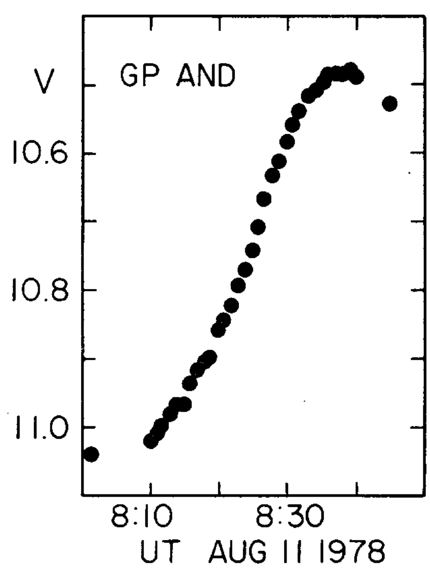

Fig. 1 - The rise to maximum light of GP And on 11 August 1978.

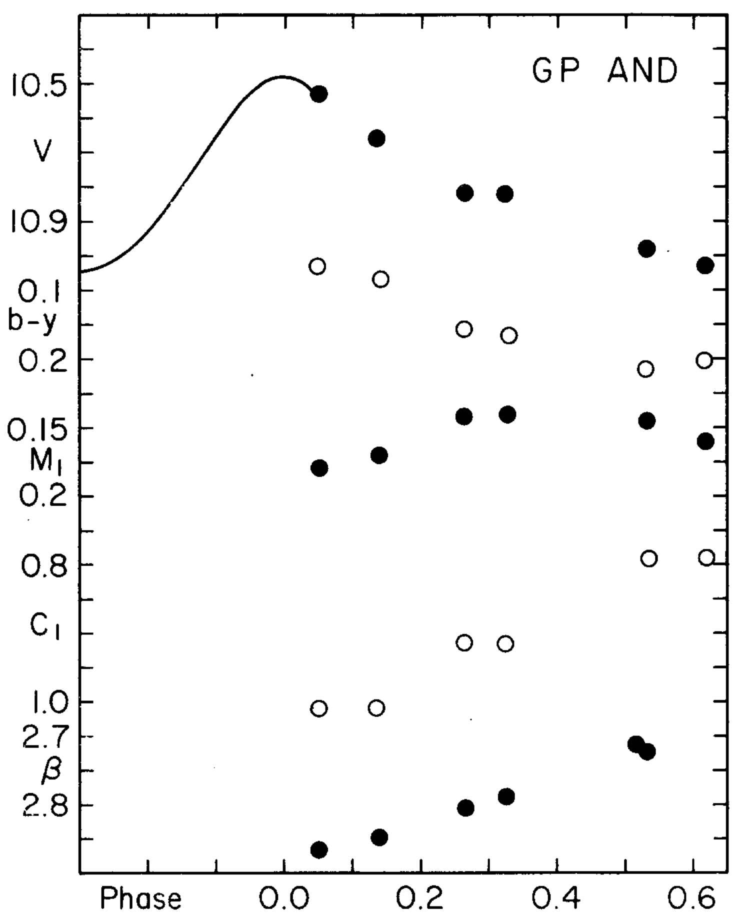

Fig. 2 - The light and color curves of GP And. The continuous curve represents the observations in Figure 1.

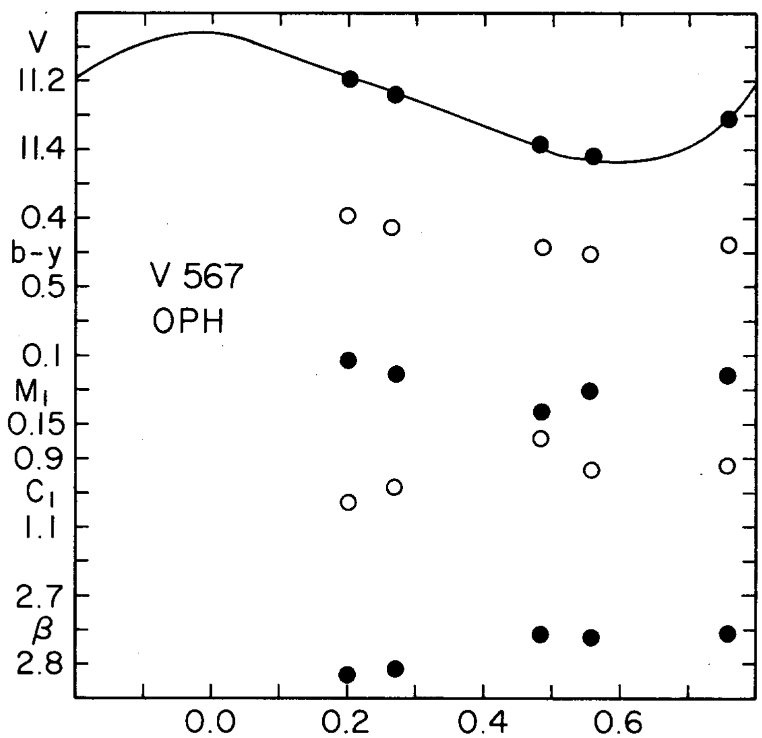

Fig. 3 - The light and color curves for V 567 Oph. The continuous curve represents the mean light curve by Clube _et al_. (1969) shifted by -0.345 periods.

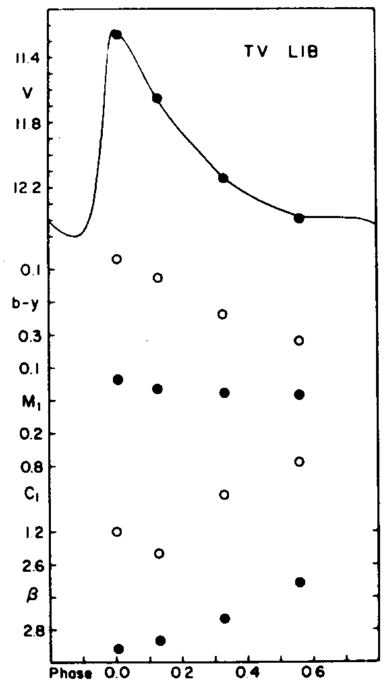

Fig. 4 - The light and color curves for TV Lib. The continuous curve is the mean light curve by Clube <u>et al</u>. (1969).

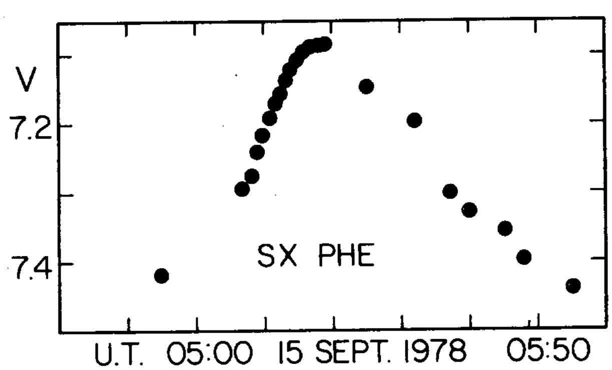

Fig. 5 - Visual magnitudes of SX Phe on 15 September 1978.

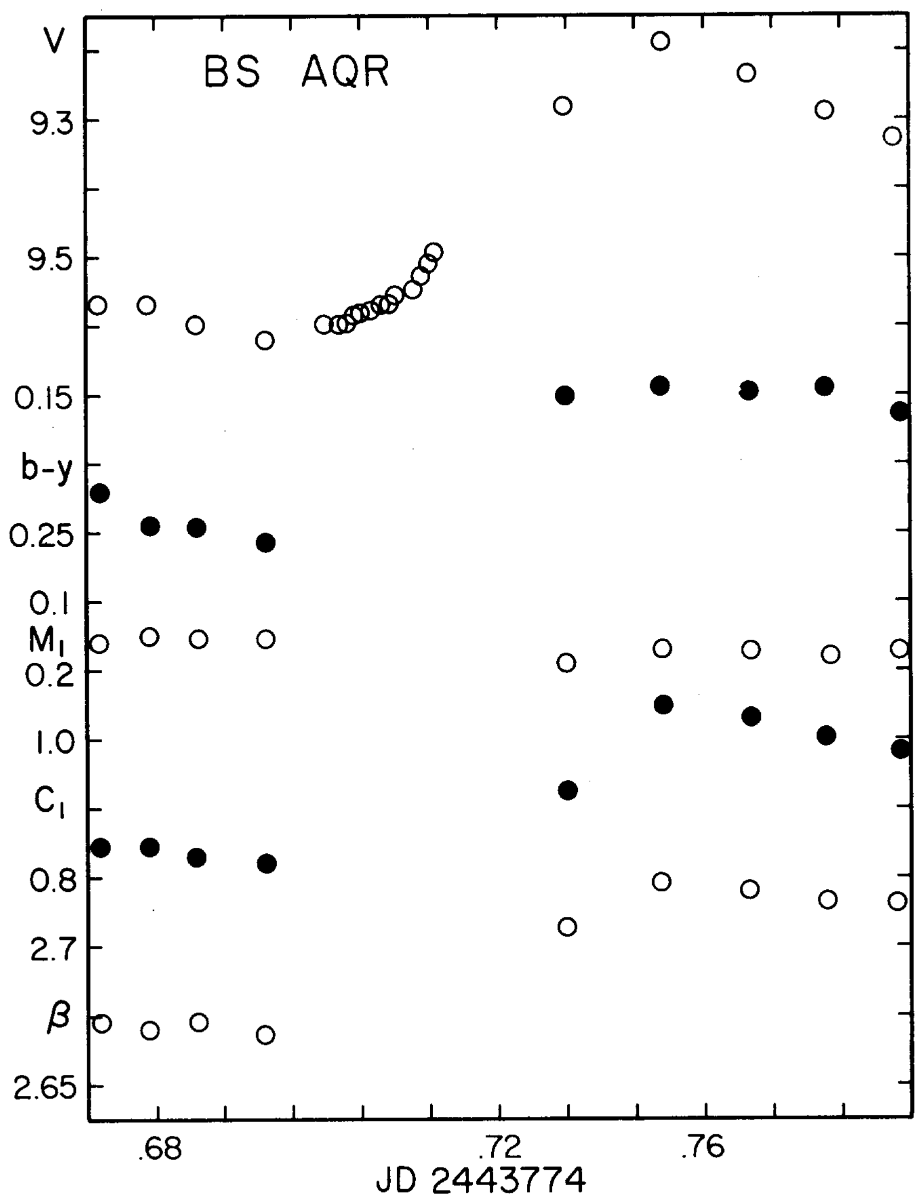

Fig. 6 - Light and color curves for BS Aqr.

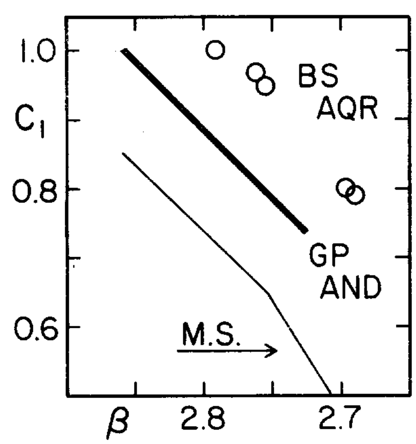

Fig. 7 - BS Aqr and the known, high mass cepheid GP And (Eggen 1979) in the (β, $[c_1]$) plane; the main sequence is also indicated.

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BVRI OBSERVATIONS OF RED IRREGULAR VARIABLES

Observations on the Johnson BVRI system are reported for four variables classified as Lb in the General Catalogue of Variable Stars. The Purdue High Speed Photometer, described by Barnes et al. (1978), was used in obtaining the data. The instrumental system and reduction procedures are discussed by Moffett and Barnes (1979).

Most of the observations were obtained on the 91-cm and 76-cm reflectors at McDonald Observatory and a few were also made on the 61-cm reflector at the Table Mountain Observatory and the No. 2, 91-cm telescope at Kitt Peak National Observatory.

The results for the four Lb variables; BL Ori, ψ Vir, BY Boo and σ Lib are given in Table I. The estimated uncertainties for a single observation are: V = ±0.014, (B-V) = ±0.009, (V-R) = ±0.009 and (R-I) = ±0.012.

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References:

Barnes, T.G., Evans, D.S., and Moffett, T.J., 1978, M.N.R.A.S., 183, 285

Moffett, T.J., and Barnes, T.G., 1979, P.A.S.P., (submitted)

TABLE I.

Irregular Variables

BL Ori = BS2308

HJD	V	(B-V)	(V-R)	(R-I)
(2440000+)				
3128.79	6.110	2.391	1.744	1.260
3129.70	6.131	2.435	1.765	1.259
3130.83	6.169	2.382	1.764	1.144
3132.73	6.191	2.396	1.772	1.161
3135.87	6.192	2.404	1.782	1.149
3138.86	6.212	2.396	1.792	1.137
3144.78	6.226	2.438	1.794	1.139
3429.96	6.071	2.439	1.711	1.081
3508.83	6.352	2.493	1.878	1.090
3516.80	6.429	2.502	1.909	1.110
3517.77	6.442	2.502	1.917	1.096

ψ Vir = BS4902

HJD	V	(B-V)	(V-R)	(R-I)
3248.80	4.785	1.631	1.479	1.317
3248.82	4.796	1.628	1.482	1.314
3251.78	4.964	1.614	1.499	1.316
3517.04	4.821	1.577	1.489	1.275
3620.80	4.748	1.598	1.492	1.237
3621.79	4.734	1.589	1.475	1.257
3664.73	4.794	1.614	1.508	1.286
3669.68	4.784	1.615	1.498	1.272
3671.70	4.732	1.625	1.496	1.270
3672.68	4.762	1.623	1.493	1.292

BY Boo = BS5299

HJD	V	(B-V)	(V-R)	(R-I)
2921.66	5.279	1.533	1.957	1.698
2921.75	5.258	1.540	1.954	1.723
2922.74	5.258	1.523	1.979	1.737
2922.84	5.251	1.546	1.968	1.729
2922.91	5.276	1.540	2.003	1.706
3287.80	4.975	1.548	1.752	1.615
3291.67	5.100	1.540	1.751	1.687
3292.69	5.117	1.545	1.770	1.680
3297.69	5.238	1.540	1.805	1.740
3300.75	5.329	1.513	1.829	1.749
3621.81	5.216	1.541	1.833	1.648
3622.81	5.238	1.535	1.839	1.662
3663.73	5.141	1.551	1.813	1.651
3667.68	5.106	1.574	1.787	1.626
3668.68	5.107	1.558	1.800	1.632
3669.76	5.104	1.562	1.807	1.629
3672.70	5.129	1.567	1.800	1.667

σ Vir = BS5603

HJD	V	(B-V)	(V-R)	(R-I)
2921.76	3.364	1.638	1.583	1.265
2922.85	3.344	1.664	1.594	1.256

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Budapest
1978 December 20

UBVRI OBSERVATIONS OF NOVA CYGNI 1978

Photoelectric observations of Nova Cygni 1978 (α_{1950}= $21^h40^m.6$, δ_{1950}=$43^o48'$) were obtained during seven nights in September and October, 1978, with the 61-cm reflecting telescope at the David Dunlap Observatory, Richmond Hill. Observations were made with a dry-ice cooled S20 photomultiplier and Schott glass filters to reproduce the Johnson UBVRI system, as described by Fernie (1974) HR 8252 was used as a comparison star for all observations. The results are presented in Table I. Errors are believed to be about $\pm$0.02 magnitudes.

Table I

J.D.	V	U-V	B-V	V-R	V-I
2443764.73	6.31	+0.51	+0.68	+0.64	+1.11
64.79	6.33	+0.46	0.66	0.64	1.10
68.73	7.02	-0.08	0.36	0.93	1.49
74.53	8.02	-0.30	0.34	0.99	1.24
77.55	8.33	-0.32	0.25	1.08	1.27
80.69	8.68	-0.33	0.27	1.22	1.32
86.52	9.00	-0.41	0.21	1.26	1.33
92.70	9.71	-0.57	0.11	1.91	1.72

JAMES K. deROUX

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Richmond Hill
Canada

Reference:

Fernie, J.D. 1974 P.A.S.P., 86, 837

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Budapest
1978 December 27

PROGRAMME OF COOPERATIVE FLARE STAR OBSERVATIONS FOR 1979

The Working Group on Flare Stars announces the following programme of cooperative observations for the year 1979:

YZ CMi	21 January - 4 February
AD Leo	19 February - 5 March
V 1216 Sgr	17 - 31 July
EV Lac	14 - 28 September
UV Cet	14 - 28 October

L.N. MAVRIDIS
Chairman
Working Group on Flare Stars

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Konkoly Observatory
Budapest
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NOTES ON FOUR VARIABLE STARS

YY Del

This well observed star was discovered by Hoffmeister, C. and announced as an eclipsing binary ($11^m.1$ - $11^m.9$ ph). The star was suspected to have a variable period. Using 436 sky-patrol plates (Sonneberg Observatory) I could derive linear elements for two intervals:

J.D. 2425000 - 2436100
Min.(hel.)= J.D.2427685.391+$0^d.79330882$·E (EA)

and J.D. 2436100 - 2443700
Min.(hel.)= J.D.2438210.391+$0^d.79330935$·E (EA)
($11^m.31$ - $12^m.02$/$11^m.35$ ph; D = $0^P.19$)

AL Del

Hoffmeister, C. discovered this variable star in 1931. There are not many observations of this star, only Jensch, A. (1938) and Whitney, B.S. (1951) have published some times of minima. Observations on 131 plates of the Sonneberg 40 cm-astrograph (1940 to 1973) confirm the elements of the GCVS 1969. The star is fainter than given in GCVS.

DM Del

This bright star was find to be variable by Hoffmeister, C. in 1935. Visual and photographic observations (Hartha Sky-Patrol) were carried out in 1978.
From 12 newly observed minima I obtained the following improved elements:

Min.(hel.) = J.D. 2442685.302+0.8446733·E (E)
($8^m.7$ - $8^m.90$/$8^m.86$ ph)

Note that this elements satisfy all the observations published except some minima of BBSAG.

Diethelm, R. derived new elements (BBSAG Bull. 27.5.1976) which are clearly erroneous (see also for example Schneller's photoelectric observations in AN 285.265,1960).

BH Ser

This RR Lyrae-variable was discovered by Vyssotsky in 1941. Investigations of this star were carried out on Sonneberg Sky Patrol plates from 1930 to 1977.
There has been a period-jump from $0\overset{d}{.}434545$ to $0\overset{d}{.}4345527$ in 1955.
The present elements are:

$$\text{Max.(hel.)} = \text{J.D. } 2441482.427 + 0\overset{d}{.}4345527 \cdot E.$$

Further particulars will be published in "Mitteilungen der Bruno-H.-Bürgel-Sternwarte Hartha".

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THE HD 133029 - IS IT A "BONA FIDE" IRREGULAR MAGNETIC VARIABLE?

After the Babcock's first work on magnetic stars it became evident that by more detailed investigation the magnetic variables, classified as irregular, proved to be periodic. Preston (1970) put forward the idea that all magnetic variables should be periodic. This idea is implied from the rotator model of magnetic stars, which explaines the variations in magnetic field, spectral lines and light as due to the changes of aspect of a rotating star, the surface of the star assumed inhomogeneous.

The HD 133029 is the last star from the Babcock's list (1958), classified as irregular, for which no reliable period up to now has been found. The existence though of only one irregular magnetic variable would be critical for the rotator model. Much effort has been concentrated, but also much controversy awakened between the works, devoted to this subject. We shall quote them briefly.

In an attempt to find the period of the star Renson (1969) determined with the Babcock's data a period of about 1^d, slightly variable. With the same data Steinitz and Pyper (1971) found a period of about 4 hours.

The photometric variability of HD 133029 with a period of $2\overset{d}{.}89$ was found by Winzer (1974). This period was later confirmed by Wolff and Morrison (1975) and by Rakosch and Fiedler (1978) on the ground of their own photometry.

Another investigation of the light variability in U, B, V was made by Panov and Schöneich (1976), who determined a period of $0\overset{d}{.}741285$. The two photometric periods found are correlated with each other via the observational period (the sidereal day).

In fact there is a whole series of correlated periods, which is given by:

$$\frac{1}{P_s} = \frac{1}{P} \pm \frac{1}{0.997}$$

where P is the true period and P_s - spurious period. When P is substituted by the P_s, one obtaines a second spurious period and so on. The series of correlated periods of HD 133029, constructed with the period of $0^d.741285$ in this way is :

$0^d.741285$;	$2^d.890173$;	$1^d.522049$	
0.425167		0.602403	(1)
0.298060		0.375513	
and so on		and so on	

We think that one of them should be the real period. Unfortunately, none of the two photometric periods proposed fits the Babcock's data for the magnetic field variations. The work of Bonsack (1977) showed that his magnetic field measurements could not be fitted with the $2^d.89$ period and the search for another period was unsuccessful. Thus Bonsack believes HD 133029 would be the first magnetic variable, proved to be irregular.

It could be shown that the period of $0^d.741285$ does not fit Bonsack's magnetic field data either (though it fits the Bonsack's radial velocity data).

In this situation it seems that both $2^d.89$ and $0^d.74$ periods were spurious. In the hope that the rotational period could still be found, we made another attempt for period searching. The values greater than 0.74 in the series (1) seem already to be excluded. From the values less than 0.74, only the period of about $0^d.6$ is great enough to secure rotational stability. In the vicinity of the value 0.6 we made a computer searching with the method of Lafler-Kinman (1965) (small deviations form the series - values are to be expected, when the observational period deviates from $0^d.997$), both with Bonsack's data and with our photometric data. Four possible periods were found for the magnetic variation : $0^d.6080772$, $0^d.6080722$, $0^d.6079971$, $0^d.6079907$ - but on the ground of the photometry the last two are to be excluded. The periods of $0^d.6080772$ and $0^d.6080722$ give very similar patterns and we are not able for the present to choose between them. We have chosen arbitrarily the second one:

JD(Min.light=Min.mag.field) = $2440767^d.26 + 0^d.6080722 \cdot E$.

Figure 1 shows the pattern of light in V, B, U (data from Panov and Schöneich, 1976), radial velocity and magnetic field variation (data from Bonsack, 1977). The magnetic field varies in phase with the light from about 1500 to 2500 gauss. The scattering on the magnetic field curve is greater than usual and could possibly be due to instrinsic magnetic field variations, superposed to the rotational variation. The Babcock's magnetic field data cannot be fitted with the accepted period and the problem with his measurements remains. From other photometric work only the data from Rakosch and Fiedler (1978) is available but the fit is not so good. There is an indication of a secondary light minimum around the phase 0.5.

With v.sini=21 km.sec^{-1} (Bonsack, 1977), $R=3R_{\odot}$ (Preston, 1970) and $P=0\overset{d}{.}6$ the angle between rotational axis and the line of sight (i) would be about 5°. Hence, the star would be seen almost from the pole.

With: $tg\beta = (1-\tau)(1+\tau)$ cotgi and $\tau = H_e(min)/H_e(max)$ we have $\beta \approx 82^{\circ}$, i.e. the magnetic axis lies near the rotational equator. The radial velocity variation (in phase with the magnetic field) could perhaps be explained as spurious in the sense proposed by Bora (1974). The change in the surface aspect (by the star's rotation) would be only about 10% and this has to account for changes in the magnetic field up to 50%. Thus, if the 0.6 period is real, it implies strong magnetic field inhomogeneitis.

The predominant positive polarity could be interpreted within the proposed model, if the positive magnetic pole is stronger than the negative one. Thus the proposed model of HD 133029 is consistent with the off-center dipole model of magnetic stars.

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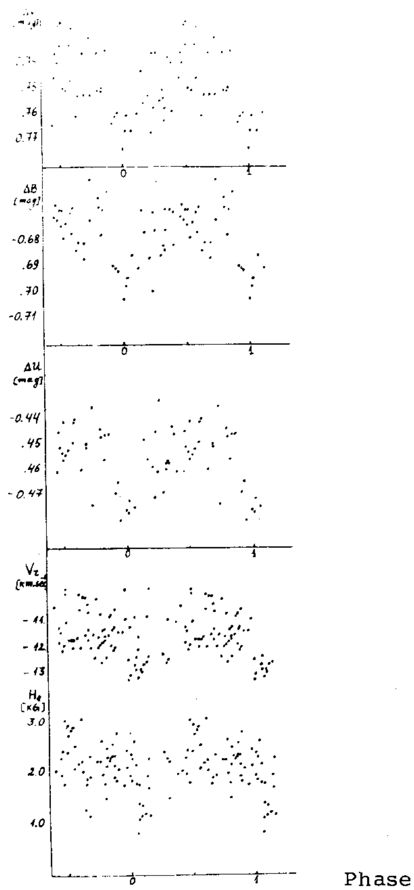

Figure 1

References:

Babcock, H.W., 1958, Astrophys.J. Suppl., 3, 141
Bonsack, W.K., 1977, Astron.Astrophys., 59, 195
Bora, E.F., 1974, Astrophys. J., 193, 699
Lafler, J.,Kinman, T.D.,1965,Astrophys.J.Suppl., 11, 216
Panov, K.,Schöneich, W., 1976,Astron.Nachr., 297, 33
Preston, G.W., 1970, in Stellar Rotation,D.Reidel Publ.Co., Dordrecht, p254
Rakosch, K.D., Fiedler, W., 1978, Astron.Astrophys., 31, 83
Renson, P., 1969, Variation du champ magnetique d'etoiles Ap periodique, Brüssel, p 29
Steinitz, R., Pyper, D.M., 1971, Astrophys.Space Sci.,11, 232
Winzer, J.E., 1974, Doctoral Thesis, Univ. Toronto
Wolff, S.C., Morrison, N.D., 1975, Publ.Astron.Soc.Pacific, 87, 231

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PERIOD OF THE ECLIPSING VARIABLE NY Cep

A minimum of the large-mass eclipsing binary NY Cep (HD 217312) was measured at Hvar Observatory on J.D. 2443813. The measurements are sparse and of lower accuracy, nevertheless according to them the minimum certainly occurred considerably sooner than would follow from the period $15\overset{d}{.}2767$ by Heard and Fernie (1968). The measurements are given in Table I as differences variable minus comparison. The comparison star was HD 217035. The measurements are in instrumental b and v colours, which are close to the B and V colours of the UBV system. The equipment of the Hvar Observatory has been described by Harmanec et al. (1977).

Observations of minima of NY Cep have been published by Rao (1972), Madore and Percy (1973) and Scarfe and Barlow (1974). It is not easy to compare these data, since: 1. all are on instrumental systems, 2. measurements by Rao are presented only in a figure and his comparison star HD 218537 differs from the comparison star used in other observations (HD 217035), and 3, the out-of-minimum levels of the present data differ from those of other observations.

Rao's data will not be considered in the following discussion of the period of NY Cep. Measurements by Madore and Percy are in b colour, and our b data may be compared with them. Only the rising branch of the minimum is covered in both sets of data. The average values of the measurements out of minimum are $-0\overset{m}{.}474$ (Madore and Percy) and $-0\overset{m}{.}405$ (this paper). When the data are shifted to a common level, then the best fit is obtained for a period of $15\overset{d}{.}27569$ (difference in epochs is 173).

Measurements by Scarfe and Barlow cover a whole minimum, and no observation out of minimum is given. The data are in v colour. Since the first two of our measurements seem to fall shortly before the middle of a minimum, it is possible to overlap our v data and the data by Scarfe and Barlow. The best fit is for a period of $15^{d}_{\cdot}27575$ (difference in epochs is 125). Levels out of minima are $-0^{m}_{\cdot}332$ (Scarfe and Barlow) and $-0^{m}_{\cdot}324$ (this paper).

The main sources of error are the unaccuracy of measurements and possible variation of the minimum shape. One can estimate that each of these effects may produce an error in range of $0^{d}_{\cdot}01$ to $0^{d}_{\cdot}02$, so the resulting period should be accurate to about $0^{d}_{\cdot}0001$. The differences in colour systems cannot matter, since the spectral types of both components are identical (BO IV + BO IV) and the depth of minimum may depend on wavelength only very little.

A period may be computed also from the time of minimum by Scarfe and Barlow and the time of conjunction computed by Heard and Fernie. The result is $15^{d}_{\cdot}27616 \pm 0^{d}_{\cdot}00033$. Heard and Fernie have given a table of photoelectric measurements of NY Cep, Where they consider two of the measurements erroneous. Both are good, only the phase of the J.D. 2437901 measurement should read 12.300. A measurement by Heard and Fernie on J.D. 2437962 falls close to a minimum; in order to keep it out of minimum, the period should be $15^{d}_{\cdot}27575$ or shorter (a possible deviation about $\pm 0^{d}_{\cdot}0001$).

Using the minimum observed by Scarfe and Barlow as the zero epoch, and the period which is a kind of weighted mean of above given values, we have the elements

$$\text{Time of Minimum} = \text{J.D. } 2441903.8136 + 15^{d}_{\cdot}27575 \cdot E.$$
$$\pm \; 7 \quad \pm \; 10$$

This period as well as the corresponding time of the periastron passage are in the range of mean errors given by Heard and Fernie.

Table I

Observations of NY Cep (Var-Comp)

J.D. hel. 2443000+	v	b	Phase
813.241	-.200	-.292	.9973
.244	-.205	-.291	.9975
.363	-.242	-.339	.0053
.422	-.286	-.379	.0055

Table I (cont.)

J.D. hel. 2443000+	v	b	Phase
813.425	-.311	-.396	.0091
.463	-.290	-.384	.0118
.467	-.319	-.400	.0121
.493	-.320	-.404	.0138
.497	-.339	-.409	.0141
.545	-.324	-.404	.0172
.547	-.333	-.410	.0173
.591	-.324	-.396	.0202
.595	-.327	-.397	.0205
819.263	-.318	-.409	.3915
.267	-.323	-.403	.3918
.340	-.321	-.411	.3966
.343	-.322	-.406	.3967
822.258	-.323	-.407	.5876
.261	-.323	-.407	.5878

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References:

Harmanec, P. **et** al., 1977, Bull.Astr.Czechoslovakia,28, 133

Heard, J.F. and Fernie, J.D., 1968, J.R.A.S. Canada, 62, 99

Madore, K. and Percy, J.R., 1973, PASP 85, 319

Rao, N.K., 1972 PASP 84, 563

Scarfe, C.D. and Barlow, D.J., 1974, J.R.A.S. Canada, 68, 96

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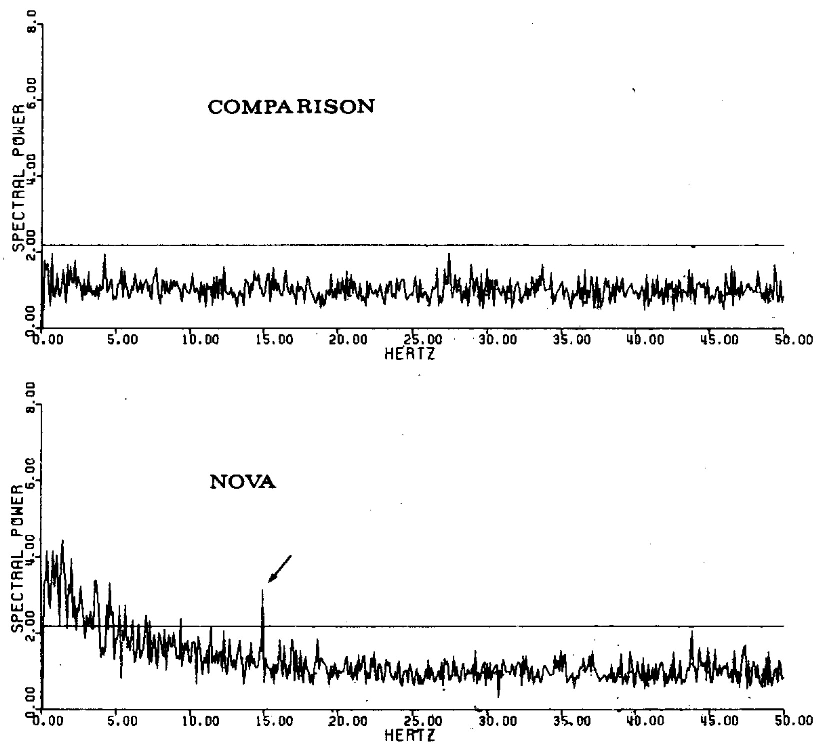
NOVA CYGNI 1978

High speed (sampling time of 0.01 seconds) unfiltered photoelectric observations of Nova Cygni 1978 have been carried out on five nights (13,14,15, 20,21) of September 1978, near its maximum brightness, with the 1-meter Cassegrain telescope of the Astronomical Observatory of Trieste, equipped with a twin-beam photoelectric photometer bearing EMI 6256SA photomultipliers. The star BD+43^{0}4012 (m_{pg} = 8.7) was adopted as the comparison star.

The nova showed flickering (up to frequencies of about 5 Hz), characterized by a percent standard deviation ranging from 0.1 to 0.5, variable within every single night as well as from night to night.

Power spectrum analysis revealed no stable periodic brightness variations. However, short living quasi monochromatic oscillations have been observed. On September 14 a ∿15 Hz (starting time JD 2443766.4555) and a ∿81 Hz or higher order harmonic (starting time JD 2443766.4862) oscillations lasting 100÷200 seconds were observed. On September 15 oscillations of ∿0.19 Hz (starting time JD 2443767.37265) monotonically decreasing in amplitude with time and lasting ∿500 seconds have also been detected.

The figure is representative for the spectra of the comparison star and of the nova during the night of September 14. The time interval starts at JD 2443766.4555 and lasts for ∿154 seconds. The range below ∿5 Hz shows clearly a power excess which can be attributed to the flickering of the nova. The figure also evidences a



peak at ∿15 Hz, which is well above the 99% upper confidence level represented by the horizontal line, whilst simultaneous spectrum of the comparison star does not show evidence of lines at the same frequency.

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THE EVIDENCE FOR THE BINARY NATURE OF THE SYMBIOTIC OBJECT V 1329 CYGNI (= HBV 475)

Stienon et al. (1974) suggested that the object V 1329 Cyg is an eclipsing binary with the ephemeris:

$$(1)\quad JD_{hel}(\text{pri.min.}) = \underset{\pm 10}{2432480} + \underset{\pm 2}{959^d} x\ E\ ,$$

where the primary minimum lasts about 0.1 of the orbital period. These parameters were derived from the photographic magnitudes of the object obtained from the Harvard plate collection in the years 1891 - 1966. The same period is seen also in the photoelectric data obtained by Arhipova (1977) in the years 1973 - 1976, after the major outburst in the year 1964.

Grygar et al. (1977) searched for periodicities in the Harvard data and found several values around 578^d, 729^d and 953^d, which are, however, mathematically interrelated.

We have reanalyzed the Harvard data prior to the year 1963 by formally using the code for the determination of the orbital elements of spectroscopic binaries written by Dr. J. Horn (1978). In this way we have found the following parameters of the pre-outburst light curve:

$$(2)\quad JD_{hel}\ (\text{pri.min.}) = \underset{\pm 27.4}{2424869.9} + \underset{\pm 4.37}{950\overset{d}{.}07} \times E\ ,$$

where the photographic amplitude of the "mean" light curve was $0\overset{m}{.}63$ and the mean magnitude of the object was $15\overset{m}{.}1$.

More evidence about the binary nature of the object can be found from spectroscopy. We have obtained 14 spectrograms of the object V 1329 Cyg between May 30, 1970 and November 28, 1976 at the observatories Victoria - D.A.O. (V; 1.2 m telescope), Ondřejov (O; 2 m telescope), Asiago (A; 1.2 m telescope with the image intensifier) in various spectral regions covering the interval 370 - 867 nm.

All plates were measured by one of us (L.H.) on the Abbé comparators of the Ondřejov and Skalnaté Pleso Observatories. Radial velocities were determined by using the code written by Dr. P. Harmanec (1978), who also provided us with the codes for period searching. The average values of the radial velocities of the emission lines of H I, He I, He II, Fe I, Fe II, O I, [O III] and [Ne III] are given in Table I. No significant differences between the radial velocities as determined for various ions were detected.

Table I

Radial velocities of the emission lines in V 1329 Cyg

Plate No.	Dispersion $\times 10^{-7}$	Date d,m,y	JD_{hel} 2400000.0+	Phase	RV_{obs} kms^{-1}	O-C kms^{-1}	No. of lines	Weight
V 5790	6.40	30.05.70	40736.9249	.696	23.0±3.3	4.8	3	14
V 5916	6.39	07.07.70	40774.8651	.736	6.4±10.8	-15.0	4	12
A 745	73.1	13.08.71	41176.5453	.159	-115.0±17.8	-24.4	8	5
O 1274	17.0	06.10.72	41597.4061	.602	-6.4±5.2	-3.4	8	13
A 1411	83.9	18.11.72	41640.3377	.647	29.7±12.3	20.4	7	4
A 1809	127	29.11.72	41651.3050	.658	41.8±9.6	-53.6	5	3
A 1690	379	06.11.73	41993.2815	.018	-53.0±23.7	-6.7	5	1
A 2192	127	01.12.73	42018.4369	.045	-56.7±17.4	-0.4	6	3
A 2404	125	13.09.74	42303.5104	.345	-84.7±38.0	5.1	7	3
A 2405	125	13.09.74	42303.5729	.345	-69.7±13.3	20.1	7	3
A 2414	127	18.09.74	42309.3811	.351	-87.9±62.1	0.6	2	1
A 2415	127	18.09.74	42309.4498	.351	-72.3±7.9	16.1	4	3
A 2070	76.8	21.11.75	42738.3612	.803	57.0±11.4	38.6	13	6
A 2723	127	28.11.76	43111.3377	.195	-91.9±9.9	4.8	3	2

Phases were calculated on the basis of the ephemeris:

$$JD_{hel}\ (\text{pri.min.}) = \underset{\pm 20.0}{2442926.0} + \underset{\pm 4.37}{950^{d}.07} \times E\ , \qquad (3)$$

which was derived from the solution of the spectroscopic elements using Dr. Horn's code. It is encouraging to note that by comparing T_o (pri.min.) from the ephemeris (2) and (3) we arrive to the period of $950^{d}.32$, in excellent agreement with the assumed value. The spectroscopic elements and their r.m.s. errors were determined as follows:

$$\begin{array}{ll} e = 0 \text{ (assumed)} & K_1 = (61.0 \pm 5.4)\ \text{km s}^{-1} \\ P = 950^{d}.07 \text{ (assumed from (2))} & f(M) = 22.3\ M_{\odot} \\ \gamma = (-39.3 \pm 4.7)\ \text{km s}^{-1} & a_1 \sin i = 1140\ R_{\odot} \end{array} \qquad (4)$$

From the set of elements (4) we have calculated the O-C values in Table I.

By combining the present photometric and spectroscopic evidence we can estimate the radius of the eclipsing component (i.e. of the late-type star) being close to 350 $R_\odot$. Assuming that the inclination is close to 90^o (as inferred from the probable presence of rather long photometric eclipses) we may determine some plausible combinations of the masses of the components that correspond to the calculated mass function:

M_1 ($M_\odot$ = 1) (emission-line component)	M_2 ($M_\odot$ = 1) (late-type component)
0.4	23
0.9	24
1.5	25

If the hot component is a degenerate star with $M_1 \approx 1\ M_\odot$, then the late-type star is a red giant ($M_2 \approx 24\ M_\odot$) of the approximate luminosity class II. The system then strongly resembles a model recently proposed by Paczynski and Rudak (1978) for the type II symbiotic stars.

The observing material used in this note was obtained by J.G. and D.C. during their stays at the Asiago and D.A.O. Observatories. Part of the Asiago plates were kindly given to our disposal by Dr. A. Mammano. We are also indebted to Drs. P. Harmanec and J. Horn for the permission of using their computing codes and for consultations.

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References:

Arhipova, V.P., 1977: Peremennyje Zvezdy 20, 345
Grygar, J.,Hric, L., Chochol, D., 1977: IAU Colloq.No. 42 (eds. R.Kippenhahn, J.Rahe, W.Strohmeier),Bamberg,383
Harmanec, P., 1978: private communication
Horn, J., 1978: private communication
Paczynski, B., Rudak, B., 1978: N.Copernicus Astron.Center Preprint, Warsaw, October
Stienon, F.M., Chartrand, M.R., Shao, C.Y.,1974: Astron.J.79,47

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1978 December 29

HR 5492: A NON-RADIAL PULSATING DELTA SCUTI STAR ?

HR 5492 is a F2IV star which was classified as a Delta Scuti star by Percy (1973) on the ground of five hours of photoelectric observations. We observed the star for three nights in the spring of 1978 with the 1 m reflector of the Merate Observatory. The comparison star was HD 130173 and the check stars were HD 129226 and HD 129865. The results are represented in the Figure, where each point is the mean of about nine individual observations (comparison minus variable) and the bars represent two standard deviations.

These data were then analysed to search multiple periodicity with the Vanicek method (1971). From this analysis two sinusoidal components were found unambiguously. Their periods are $P_1=0\overset{d}{.}0825$ and $P_2=0\overset{d}{.}0837$ and the semi-amplitudes are $A_1=0\overset{m}{.}014\pm0.003$ and $A_2=0\overset{m}{.}013\pm0.003$, respectively. The synthesized light curve, which was computed with this solution, is represented with the full line in the Figure.

The ratio between the two periods is $P_1/P_2=0.986$. Such value would suggest that non-radial pulsational modes are working in this star, as no low-order radial modes in a Delta Scuti star would agree with the above ratio (Petersen et al., 1972). A similar ratio was found by Shobbrook and Stobie (1974) for 1 Mon.

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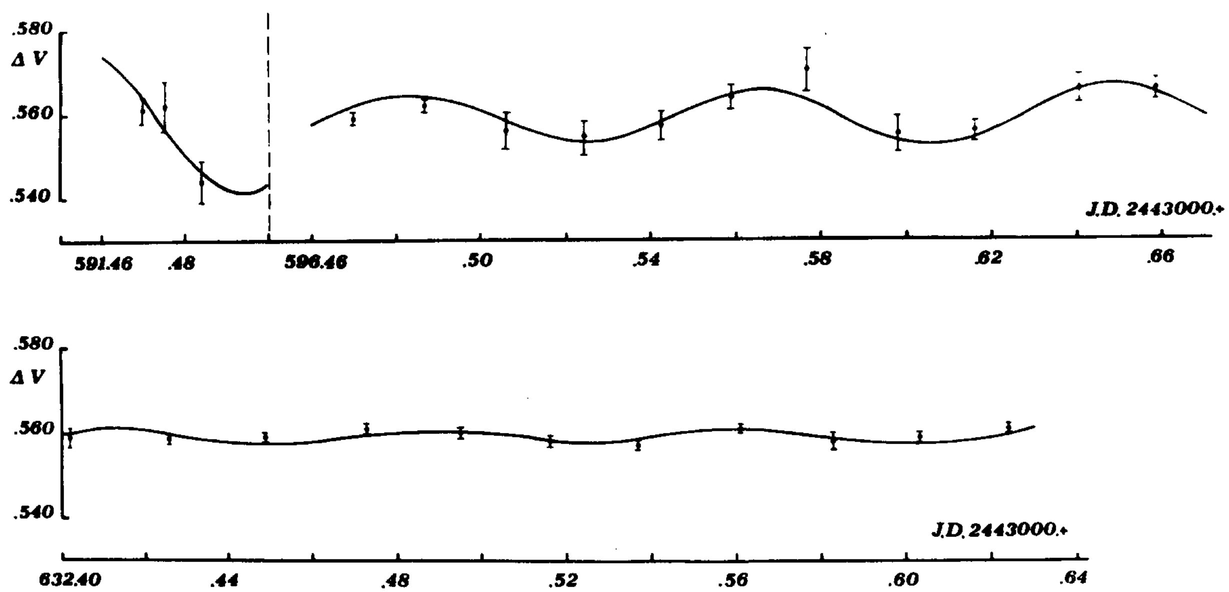
References:

Percy,J.R., 1973. Journ.Roy.Astron.Soc.Can., 67, 139
Petersen, J.O.,Jorgensen, H.E., 1972.Astron.& Astrophys.,17,367
Shobbrook,R.R.,Stobie,R.S.,1974."Stellar Instability and Evolution", I.A.U. Symp.No.59,67
Vanicek, P., 1971, Astrophys.Spa.Sci.,12,10


.580
ΔV
.560
.540
591.46
.48
596.46
.50
.54
.58
.62
.66
J.D. 2443000.+
632.40
.44
.48
.52
.56
.60
.64
J.D. 2443000.+

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INFORMATION BULLETIN ON VARIABLE STARS
Number 1527

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AN ECLIPSING BINARY IN THE FIELD OF ω CEN

Niss, Jørgensen and Laustsen (1978) have recently published a list of new variables in the region of the globular cluster NGC 5139 (ω Centauri). Of these stars, one (their number 5, hereafter called NJL 5) was classed as a definite eclipsing binary.

A search through the Harvard Observatory plate collection by the undersigned has located approximately 250 plates with images of NJL 5 from 1893 to 1950, and 14 definite minima from JD 2,413,409.5 (1895) to 2,430,171.2 (1941). The resulting period is $1^d.376162$, with epoch of minimum at JD $2,429,787^d.22$. Fig. 1 shows a light curve of NJL 5 derived from 39 plates (blue emulsion without filter) taken with the Harvard 60-inch Rockefeller Reflector at Bloemfontein, South Africa between 1933 and 1941. Comparison stars were taken from the photometry of Cannon and Stobie (1973).

Although a detailed solution of the light curve for elements has not been made, the shape suggests that the primary may have a radius appropriate to a main sequence star. Therefore, at the magnitude derived, NJL 5 is probably not a member of NGC 5139.

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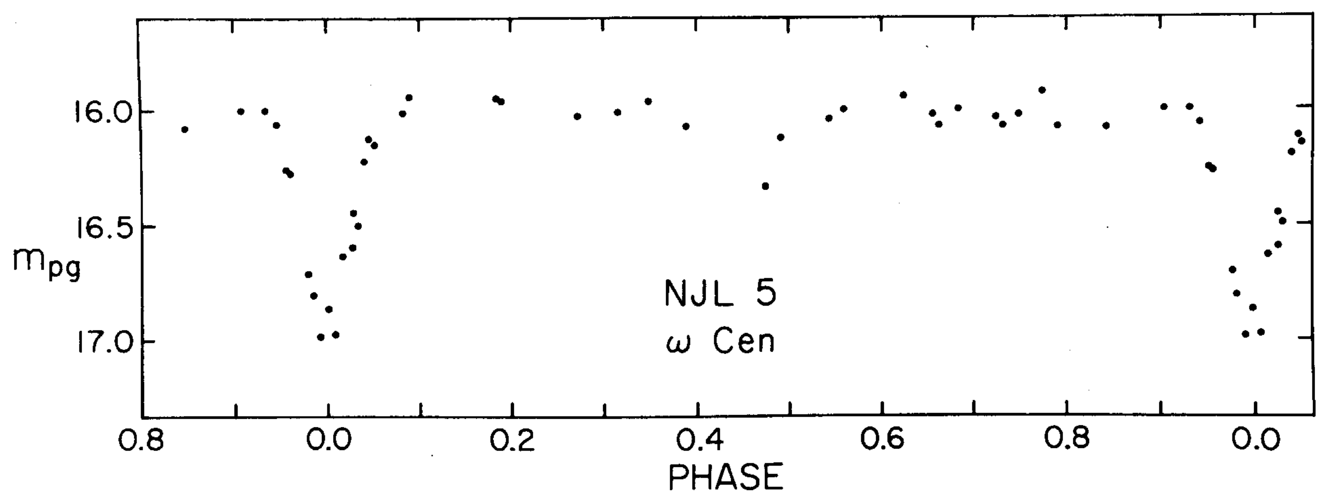
References:

Cannon, R. D. and Stobie, R. S. 1973, Mon. Not. Roy. Astr. Soc. 162, 211.

Niss, B., Jørgensen, H. E., and Lausten, S. 1978, Astron. Astrophys. Suppl. 32, 387.



16.0
16.5
17.0
m_{pg}
NJL 5
ω Cen
0.8
0.0
0.2
0.4
0.6
0.8
0.0
PHASE

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FLARE STARS AND FLARE-UPS IN THE PLEIADES REGION

By the program of flare star observations in stellar clusters and aggregates systematic investigations of the Pleiades field were continued on during the past years. The method of the observations was the same, as it was published earlier (1,2,3,4). In Asiago the plates were taken by the 67/90 cm Schmidt-telescope, at the Konkoly Observatory by the 60/90 cm Schmidt (on the Mt. Mátra, at Piszkéstető).

Here we bring the results of our survey as follows: first column - designation/s/ of the object (A=Asiago, B=Byurakan, K=Konkoly and T=Tonantzintla); second column - coordinates for 1900.0; third column - minimum brightness of the object; 4th column - amplitude of the observed flare; 5th column - date of the phenomenon.

Table I

1	2		3		4	5		
Object	α	δ	minimum		ampl.	date	of	flare-up
A 151	$3^h39^m58^s$	$23^o9'.2$	17^m	pg	$1^m.3$	17	12	1973
A 152	46 09	26 4.4	17.1	pg	1.6	18	12	1973
A 153=A 104= = H II 1485	41 40	24 35.0	15.3	pg	1.0	26	12	1973
A 154=T 79	39 37	24 54.8	16.6	pg	1.8	28	12	1973
A 155	42 32	22 41.1	16.9	pg	0.9	29	12	1973
A 156=T 63	34 07	24 10.6	17.0	pg	1.3	21	01	1974
K 36	38 00	25 32	16.9	U	3.3	24	11	1975
K 37=B 178	47 12	25 14	18.7	U	2.8	24	11	1975
K 38	50 00	22 49	16.5	U	1.3	24	11	1975
K 39	39 00	24 27	17.9	U	5.4	24	11	1975
K 40=T 12b	47 24	25 38	18.3	U	2.3	24	11	1975
K 41=B 118	37 21	24 20	18.5	U	4.2	25	11	1975
K 42	42 42	23 28	16.5	U	1.6	25	11	1975
K 43=A 95= =B 115=T 159	46 24	24 17	17.2	U	1.9	26	11	1975

Table I (cont.)

K 44	37 00	23 12	18.5 U	4.0	26	11	1975
K 45	46 00	23 58	18.0 U	1.5	26	11	1975
K 46	45 00	21 36	17.2 U	1.2	26	11	1975
K 47	44 30	24 05	17.5 U	1.3	18	02	1976
K 48	38 42	25 28	17.9 U	1.2	18	02	1976
K 49=A 85= =T 86	42 36	22 07	18.7 U	2.7	18	02	1976
K 50	44 36	24 35	16.6 U	1.5	18	01	1977

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References:

(1) Rosino, L.,Contr. di Asiago No. 189,1966

(2) Balázs, L.G., Kun, M., Szécsényi-Nagy, G., I.B.V.S. No.803, 1973

(3) Szécsényi-Nagy, G., I.B.V.S. No. 898, 1974

(4) Szécsényi-Nagy, G., I.B.V.S. No. 996, 1975

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σ^2 CrB: A NEW VARIABLE STAR, SHOWING POSSIBLE RS CVn-TYPE AND δ Sct-TYPE VARIABILITY

The bright star σ CrB = HR 6063 + 6064 = ADS 9979AB was observed photoelectrically to search for variability. It appears as CSV 101569 in the (First) Catalogue of Stars Suspected of Variability. The brighter component (σ^2 CrB = HR 6063 = ADS 9979A) is a non-eclipsing SB2 RS CVn-type binary and we suspected the characteristic distortion wave may be present in its light curve.

Tanner (1949) redetermined the spectroscopic orbit with the correct orbital period of $1^d.14$. According to Petrie (1950) the two stars in the SB2 system are comparable in luminosity, with $\Delta m = 0^m.2$. Young and Koniges (1977) found strong H and K emission from both. Spangler et al. (1977) have detected radio emission from σ CrB. The spectral classification of σ^2CrB, apparently a composite of the SB2 system, appears in the literature as dF6 or F8.

We compute phases with the ephemeris

$$JD(hel.) = 2423869.105 + 1^d.139789\ n$$

of Tanner, where the initial epoch is his T_O, an epoch of maximum radial velocity for the more massive star. The accumulated effect of the $\pm 0^d.000007$ uncertainty in Tanner's period generates an uncertainty of $\pm 0^P.1$ in our computed phases.

Altogether 62 differential magnitudes were obtained on nine different nights between JD 2443696.6 and 2443758.6. The telescope was a 12-inch Cassegrain reflector and an unrefrigerated 1P21 photomultiplier at -700 Volts was used with a filter chosen to approximate V of the UBV system. The diaphragm, about 1 arc-minute in diameter, included σ^1 CrB and also ADS 9979D ($m_V \sim 12^m.5$) but not ADS 9979C ($m_V \sim 10^m.0$). The comparison star was HR 6043= ADS 9958AB and the diaphragm included both components of that visual system also. The necessary corrections for differential atmospheric extinction were applied but were very small.

There is indication of a sinusoidal variation with an amplitude of approximately $\Delta V = 0\overset{m}{.}05$ and a minimum at approximately $0\overset{P}{.}4$, although there is considerable scatter about such a sine wave, moreso than would be expected from observational uncertainty. On six of the nine nights observations were obtained in the following sequence: about 4 observations made within an interval of ~5 minutes followed by 4 more observations made ~1 hour later. The scatter within each group of 4 suggests an uncertainty of only about $\pm 0\overset{m}{.}005$ for the mean. (Comparable precision was characteristic of photometry of HR 7275 and HR 8575 which we obtained on most of those same nights). The difference between two means, however, ranged between $0\overset{m}{.}013$ and $0\overset{m}{.}040$. Also we note that the maximum deviation of the means from the sine wave was $0\overset{m}{.}025$. We conclude that this short timescale variability, if real, could be described as resulting from a cyclical variation having a period of $\sim 0\overset{d}{.}1$ and a total amplitude of $\sim 0\overset{m}{.}05$. The simplest explanation would be δ Scuti-type variability in one star of the SB2 system. The period is quite typical of known δ Scuti variables. If one removes the light of σ^1CrB (about 1^m fainter in V than σ^2 CrB) and also the light of the comparably bright companion star in the SB2 pair, one finds an intrinsic amplitude of $0\overset{m}{.}12$ for the suspected δ Scuti-type variability. Although it is possible that the comparison star HR 6043 or σ^1 CrB could be variable, neither is likely to be a δ Scuti variable. HR 6043 is spectral type gK2 and σ^1CrB is dG1 whereas σ^2CrB is F-type.

Returning to the $1\overset{d}{.}14$ sinusoidal variation, we feel this is most likely a result of the distortion wave characteristic of other RS CVn variables. Clearly this is not the ellipticity effect, because the light varies as a function of θ, not 2 θ. We can also show, by computing an upper limit, that this is not the differential reflection effect. A total mass of about 2.5 $M_\odot$ for the SB2 system would imply $i = 30^\circ$. We recall that the two stars are roughly comparable in luminosity. The maximum differential reflection effect would occur if one star had the smallest possible radius (main-sequence) and the other star had the largest possible radius (filling its Roche lobe). With these assumptions, reflection would produce a variation of total amplitude $\Delta V \leq 0^m.017$. The inclusion of σ^1CrB (about 1^m fainter than σ^2CrB) in our photometry reduces this limit to $\Delta V \leq 0^m.012$. This is considerably smaller than our observed amplitude of $\Delta V = 0^m.05$. The reflection effect should produce a minimum of light at one of the two conjunctions: either $0^P.25$ or $0^P.75$ based on Tanner's ephemeris. This is apparently not consistent with our minimum at $0^P.4$, although the $\pm 0^P.1$ uncertainty in our phases prevents a firm conclusion in this respect.

The proposed δ Scuti variability would be easier to understand if one component of the SB2 pair were somewhat earlier than the composite type (which is F6 or F8). Likewise, the RS CVn-type distortion wave would be easier to understand if the other component were later than the composite type.

The time is ripe for more observational work on σ CrB, none of it difficult for such a bright star. (1) Photometry of σ CrB should be repeated with continuous observation over intervals longer than the suspected $0^d.1$ period of the suspected δ Scuti variability, not only to confirm the reality and nature of that variation but also to remove that effect and thus define better the distortion wave. (2) A check star should be observed to exclude with certainty the possibility that our comparison star HD 6043 is variable. (3) A classification spectrum should be obtained at quadrature in order to determine separate spectral types for the two components of the SB2 system. (4) An up-to-date spectroscopic orbit should be obtained in order to remove the $\pm 0^P.1$ uncertainty in computed orbital phases and thereby make it possible for subsequent photometry to ascertain whether the distortion wave is migrating with respect to the orbital period.

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References:

Petrie, R.M. 1950, P.D.A.O. 8, 319

Spangler, S.R., Owen, F.N., and Hulse, R.A. 1977, A.J. 82, 989

Tanner, R.W. 1949, P.D.A.O. 1, 473

Young, A. and Koniges, A. 1977, Ap.J. 211, 473

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THE LIGHT VARIATIONS OF HR 9070

It is sobering to realize that even among the stars in the Yale Catalogue of Bright Stars (YCBS), there are probably several hundred variable stars yet to be discovered, and several hundred more whose variability is not well understood. One example is HR 9070 (HD 224559, R.A. (1900) = $23^h53^m41^s$, Dec. (1900) = +45°51'). This star has been variously classified as B3 IV, B3:nne and B4 V nnne; the B3 IV classification (which appears in the YCBS) is not necessarily an indication that the emission is variable, but may simply be due to the different plate material used. Recent plates taken with the 1.9 m reflector at the David Dunlap Observatory show emission at Hβ quite clearly (Fraquelli, private communication).

The star is listed as VAR? in the YCBS, probably on the basis of the extensive observations by Provin (1953), who used it as a comparison star for HR 9080. Provin found variations of $0\overset{m}{.}03$ in a few hours, when comparing HR 9070 with HR 1. The star was reobserved by Percy and Lane (1977), who also found variations of about $0\overset{m}{.}03$ in a few hours.

Further photometric observations have now been made, using the 0.4 m reflector at Kitt Peak National Observatory (Percy and Lane 1977) and, on one night only, the 0.4 m reflector on the campus of the University of Toronto. The observations are shown in Figure 1, which indicates the filters (Strömgren b or y or Johnson B) and the comparison star used. A table of the observations can be obtained by writing to the author.

On each night, the star varies with a quasi-period of about 6^h and a range of $0\overset{m}{.}02$ to $0\overset{m}{.}06$. In this sense, the star mimics the light variations of a β Cephei star exactly. Perhaps the star is a β Cephei star; if so, it would be the first β Cephei star with Be star characteristics. The period

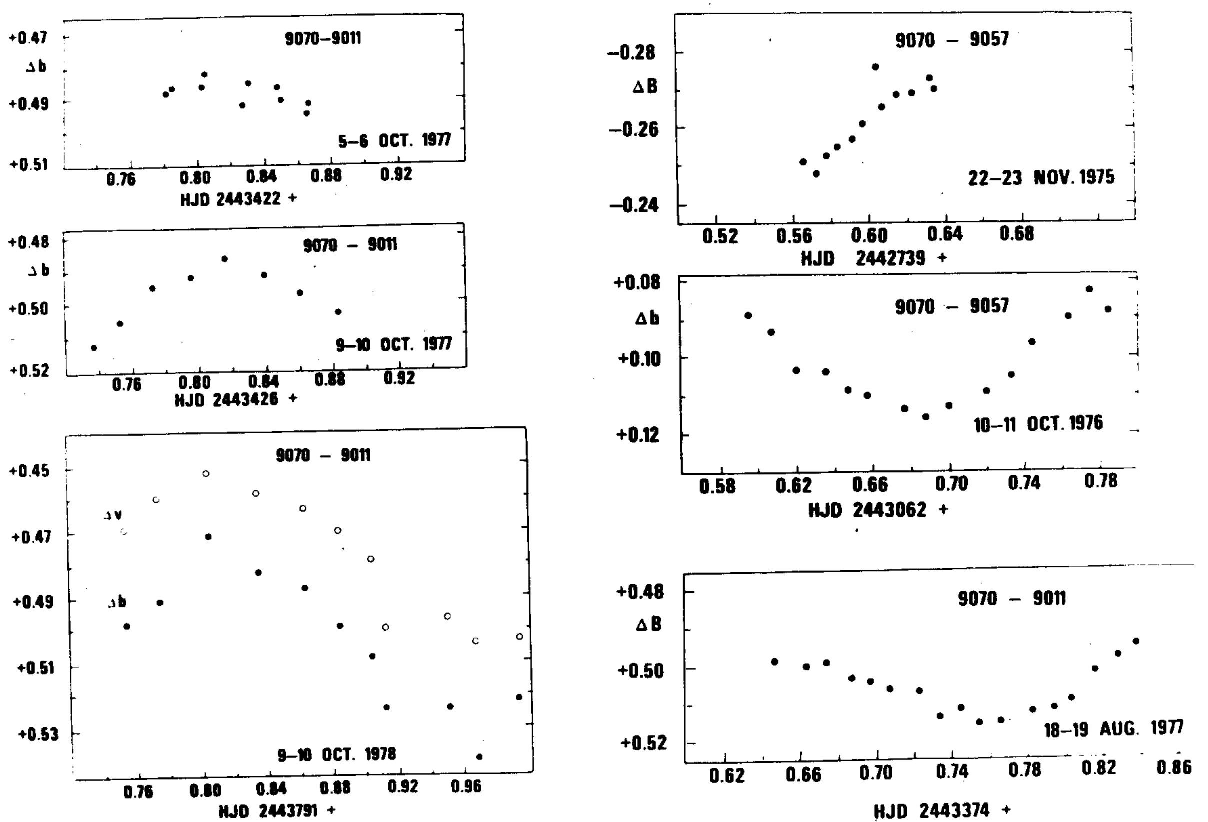

Figure 1. Photometric observations of HR 9070 on six nights. The filter and comparison star are indicated.

(6^h) is longer than would be expected for a β Cephei star of this luminosity, although the luminosity of HR 9070 is difficult to determine because of the nature of the spectrum.

On the other hand, it is well known that the Be stars tend to be variable in light, and it is becoming increasingly evident that the major light variations of Be stars occur on a time scale of hours rather than a time scale of days or weeks as previously believed (Percy and Lane 1977, Jakate 1979); the cause of these short-period variations is not known. Yet another kind of variable star has recently been discovered in this same part of the HR diagram: the non-radial pulsators of which 53 Per is the prototype (Percy and Lane 1977; Buta and Smith, preprint).

Spectroscopic observations would obviously shed some further light on the nature of HR 9070. The radial velocity is marginally variable according to Petrie (1958) but probably constant according to Wilson and Joy (1950). With such a difficult spectrum, small velocity variations due to pulsation might well go unnoticed.

The purpose of this paper, then, is to point out that (i) the identification of specific types of variables among the early B stars is no longer simple, so that searches for β Cephei stars (for instance) must be conducted with great care and (ii) at least one Be star shows quasi-regular light variations with a short period. There may in fact be some relationship between the classical β Cephei stars and the Be star variables.

I am grateful to Dorothy A. Fraquelli for obtaining and examining the spectrograms of HR 9070, to Alan H. Batten for providing the individual velocities obtained by Petrie (1958), and to Kitt Peak National Observatory for providing observing time. This work was supported by an operating grant from

the National Research Council of Canada.

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References:

Wilson, R.E. and Joy, A.H. 1950, Ap. J. 111, 99.

Jakate, S.M. 1979, Ph.D. thesis, University of Toronto.

Percy, J.R. and Lane, M.C. 1977, A.J. 82, 353.

Petrie, R.M. 1958, M.N.R.A.S. 118, 80.

Provin, S.S. 1953, Ap.J. 118, 489.

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ON THE VARIABILITY OF UPSILON AURIGAE

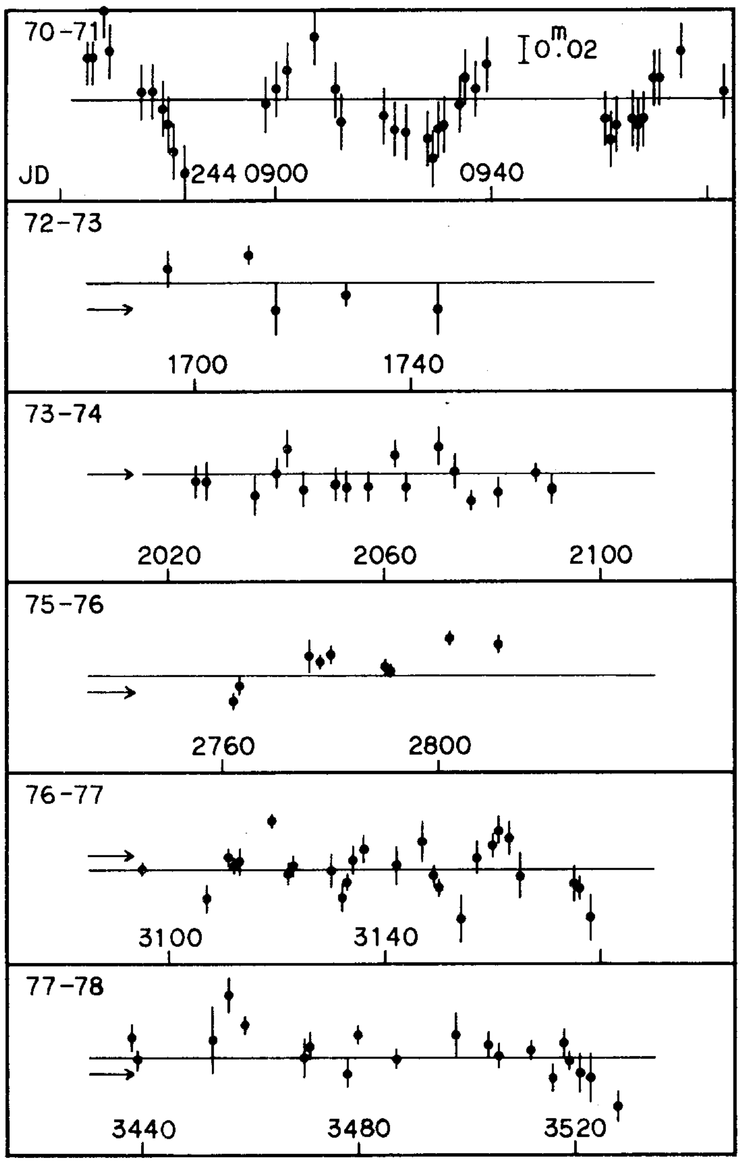
We have made photoelectric photometry of υ Aur (gM1) which is assigned as suspected variable in the Yale Bright Star Catalogue [1]. All observations were made in the visual band. Observed seasons, comparison stars (all in Auriga), and observers are listed in the following table. The telescopes we used were the

Season	Observer	Comparison Stars
1970-71	Hamada	ν τ φ
1972-73	Tamura	ν τ φ
1973-74	Mizuno	η λ μ ν τ φ
1975-76	Nitou	λ μ ν τ φ
1976-77	Inagoya	λ μ ν τ φ
1977-78	Nitou	λ μ ν ρ τ φ2

20 cm reflector in the 70-71 season, and the 40 cm reflector diaphragmed to 30 cm in other seasons. Normally, each star was measured 4 or 5 times on one night. Almost all measurements were made with zenith distance less than 45°, none more than 52°.

Except for the 70-71 season, extinction correction and transformation to the Johnson system were applied for all stars. For the observation in the 70-71 season neither extinction correction nor transformation was made, but the result has significance because the comparison stars are relatively near and the measurement was not made at large zenith distance and our instrumental system is reasonably close to the Johnson system. In fact, the range of variation of the magnitude difference between τ and φ which is 3 times distant compared with the angular distance between τ and υ, is up to 0.02-0.03 mag and no correlation was found between the variation of τ-φ with that of υ.

Results are shown in the Figure. Dots are observed values. υ-τ values and V magnitudes are plotted for the 70-71 and other seasons, respectively. Attached bars give seasonal mean of nightly mean standard errors for the 70-71 season and nightly mean of standard errors for other seasons (both including errors in ob-


70-71
I 0.m02
JD
244 0900
0940
72-73
1700
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73-74
2020
2060
2100
75-76
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2800
76-77
3100
3140
77-78
3440
3480
3520

servation of comparison stars). Horizontal straight lines are mean lines and arrows indicate Arizona-Tonantzintla Catalogue[2] magnitude. Magnitude scale is also given. It should be remarked that errors here given are internal ones. Unfortunately our photometric equipment is not of high quality and the external error up to about 0.02 mag may have crept into our results.

From this Figure and the variation of comparison stars which is presumably due to the observational errors, υ Aur appears to vary in the 70-71 and 76-77 seasons. The result in the 70-71 season seems to indicate regular variation with $P=35\text{-}36^d$ and the range of 0.1 mag while in the 76-77 season suggests rather irregular variation. On the other hand, the observation in the 73-74 season indicates no significant variation, because the variation in this season is similar to that of comparison stars. The result in the 72-73 season also suggests no significant variation. Observations in the 75-76 and 77-78 seasons seem to suggest irregular variation, but the number of the points appreciably deviating from the mean lines are rather small.

We feel that υ Aur is probably variable but the evidence is not so strong. Further observation is necessary. Detailed results will be published later in the Science Report of our University.

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References:

1) Hoffleit, D., Catalogue of Bright Stars, Yale University Observatory, 1964

2) Iriarte, B., Johnson, H.L., Mitchell, R.I., and Wisniewski, W.K., Sky and Telescope 30, 1, 1965

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A NEW ECLIPSING BINARY IN VELA

In April 1978 a new eclipsing binary was found among early-type stars in the field of planetary nebula NGC 3132. The UBV measurements were made using the 50 cm telescope and a pulse counting photometer (EMI 6256A photomultiplier) of the European Southern Observatory at La Silla, Chile. Stars in the E-regions (Cousins, 1973) served as photoelectric standards.

The finding chart shows the new variable as well as two comparison stars. The coordinates of these stars (Table 1) were measured on a Schmidt plate (ESO 1 m Schmidt camera) and calculated using 9 SAO stars. Table 1 also contains the average UBV data together with their r.m.s. errors; n denotes the number of observations. In case of the variable star the magnitudes refer to observations outside eclipse.

Table 1

Positions and mean UBV magnitudes

Star	A.R. (1950)	Decl.	V	B-V	U-B	n
Var Vela	$10^h02^m06^s.94$	$-40°31'52''.8$	12.825 ±6	0.294 ±6	0.172 ±4	15 m.e.
Comp. 1	02 04.99	31 05.7	12.393 ±5	0.531 ±6	0.059 ±6	9 m.e.
Comp. 2	01 57.86	30 35.2	12.74 ±1	0.57 ±1	0.08 ±2	3 m.e.

The star appeared to be variable on April 15/16 when a difference of about 0.4 mag between two measurements was noticed. On April 17/18 a secondary minimum and on April 19/20 a primary minimum were observed. In addition another primary minimum was measured on April 23/24 in one colour using the Bochum 60 cm photoelectric telescope at La Silla. The times of minima were determined graphically. A brief description of the eclipses is given in Table 2.

Table 2

Observed minima

Min.hel. JD	Min.	Eclipse depth V	B	U	Eclipse duration
2443616.6331 ±7 m.e.	II	$0^m.117$	$0^m.093$	$0^m.089$	$0^d.241$
3618.5908 ±2 m.e.	I	0.863	1.024	0.919	0.242
3622.5166 ±10 m.e.	I	-	1.02	-	-

A preliminary period of $P = 3^d.9258$ has been derived from the two primary minima. Two other possible periods P/2 and P/4 could be excluded due to our observations on April 17/18. The period P/3 has been ruled out by Surdej (1978) who observed no eclipse on May 10/11 using the 1 m and Bochum 60 cm telescopes.

Predictions of times of primary minima for the near future are given by the formula:

$$\text{Min.hel.I} = \text{JD } 2443618.5908 + 3^d.9258 \cdot E$$
$$\pm 2 \qquad \pm 11 \text{ m.e.}$$

The secondary minimum is placed at phase 0.501, thus indicating a circular orbit of the binary. The data suggest no light variation outside eclipses and show an Algol type light curve.

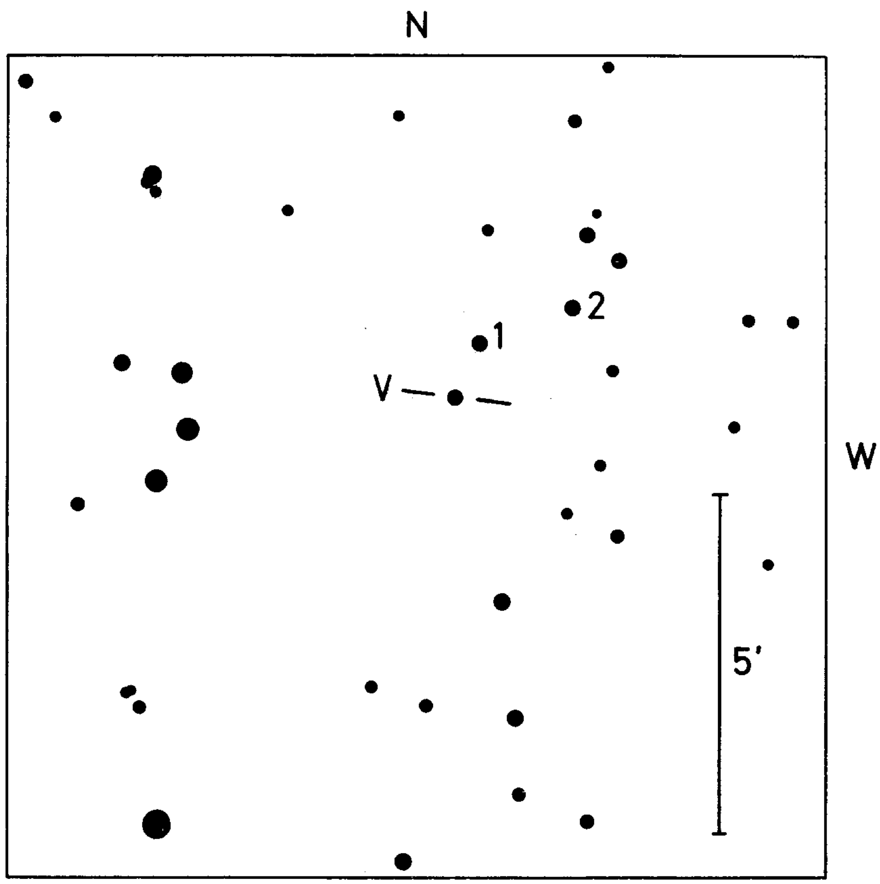
The eclipses seem to be partial but it is also possible that totality was just reached. Assuming totality we estimated some photometric parameters and the spectral types of the two components (Table 3). The value of $k = r_2/r_1$ is 0.45. The system is slightly reddened and lies at a distance of about 1.7 kpc (mean abs. magnitudes corresponding to the spectral types given in Table 3 were adopted).

Table 3

Preliminary parameters of the binary system

	Component A	Component B
V	13.69	13.48
B-V	0.45	0.18
U-B	0.07	0.24
A_V=3.2E(B-V)	0.20	0.25
Spectrum	F4 IV :	A3-4 V

Two objective-prism plates (1 m Schmidt, dispersion 450 A/mm at Hγ, Kodak IIa-O and IIIa-J, March 1978) show the spectrum of the binary outside eclipses. Only strong Balmer absorption lines


N
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5'

and a Ca II K line are visible. The resulting spectral class of A 2-5 is identical with that of the brighter component B (see Table 3).

Further observations would be necessary to analyse in more detail the light curve of this newly-discovered system.

The author wishes to thank J. Surdej for his additional observations of the variable, H.-E. Schuster for taking the Schmidt camera plates, Miss M. Klutz for assistance at the Bochum 60 cm telescope, and H.F. Henrichs, M.Klutz and I.Semeniuk who left to us some of their telescope time. 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.Astron.Soc. 77, 223
Surdej, J., 1978, private communication

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BVRI OBSERVATIONS OF TWO IRREGULAR VARIABLES

Observations on the Johnson BVRI system are reported for two irregular variables, V509 Cas and FX Lib. The Purdue High Speed Photometer, described by Barnes *et al*. (1978), was used for the observations. The instrumental system and reduction procedures are discussed by Moffett and Barnes (1979).

Most of the observations were obtained on the 91-cm and 76-cm reflectors at McDonald Observatory and a few were also made on the 61-cm reflector at the Table Mountain Observatory and the No. 2, 91-cm telescope at Kitt Peak National Observatory.

The star, FX Lib, is classified as a γ Cas variable in the GCVS. It is a member of the Sco-Cen association and has a circumstellar envelope. The star, V509 Cas, is a variable similar to ρ Cas. The photoelectric observations of these two variables are given in Table I. The estimated uncertainties for a single observation are: V = ±0.014, (B-V) = ±0.009, (V-R) = ±0.009, and (R-I) = ±0.012.

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References;

Barnes, T.G., Evans, D.S., and Moffett, T. J., 1978, M.N.R.A.S., 183, 285.
Moffett, T.J., and Barnes, T.G., 1979, P.A.S.P., (in press).

TABLE I

V509 Cas = BS8752

HJD (2440000+)	V	(B-V)	(V-R)	(R-I)
3367.00	4.873	1.590	1.171	.826
3368.95	4.914	1.582	1.192	.833
3371.00	4.869	1.574	1.182	.822
3374.87	4.887	1.581	1.163	.831
3377.00	4.874	1.592	1.175	.829
3377.88	4.899	1.586	1.183	.839
3393.85	4.904	1.583	1.195	.816
3397.86	4.873	1.586	1.188	.791
3398.85	4.885	1.583	1.186	.801
3427.68	4.850	1.590	1.168	.802
3495.60	4.854	1.567	1.208	.788
3496.61	4.844	1.587	1.184	.810
3508.56	4.893	1.595	1.222	.795

FX Lib = BS5941

HJD (2440000+)	V	(B-V)	(V-R)	(R-I)
3621.88	4.773	-.086	.003	-.101
3626.82	4.799	-.093	.007	-.088
3645.78	4.777	-.077	.005	-.104
3662.80	4.779	-.080	-.012	-.083

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INFORMATION BULLETIN ON VARIABLE STARS

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RED VARIABLE STAR L973 IN M13

Recently it was shown by Fuenmayer and Osborn (IBVS 952 , 1974) that one of the brightest and reddest stars in M13 = NGC 6205, no. 973 in Ludendorff's catalogue (Publ. Potsdam Obs., 15, no. 50. 1905), which as it was suggested by Russev (Astr. Zr., 51, 122, 1974) to vary in brightness, is indeed a variable star. It is a member of M13 according to radial velocity measurements (Noris and Zinn, 1977, ApJ, 215, 74).

We have investigated the variability of the star L 973 on 43 blue plates of M13 taken with the 60-cm reflector of the Belogradchik Astronomical Station (Bulgaria) during four years, from 1974 to 1978 (JD 24 42 294 - 43 724). The plates were ORWO - ZU2 emulsion in combination with ultraviolet filter (Panchromar UVII) which give a system close to the B one. Using the photometry of Cathey (AJ, 79, 1370, 1974) we have measured the magnitudes of the star with a MF - 2 photometer. The average error of the measures was $\pm 0\overset{m}{.}07$. In addition to the present observational material we have utilized 19 blue plates from the collection of the State Astr. Inst. Sternberg in Moscow obtained with the 70-cm reflector AZT-2, during 1961 - 1972 (JD 24 37 790-41 092).The accuracy of the Moscow magnitudes, which have been measured with an automatic iris-photometer, is close to our measurements. Moreover we have used the observations of Fuenmayer and Osborn (IBVS 952, 1974).

The available observational data covering about sixteen years have permitted us to obtain confidently seven season maxima of the brightness, which indicated that the period of variability was approximately 43.3 days and that this one itself is probably not constant. Applying the usual method we have derived the following elements of the light curve:

$$\text{Max} = \text{JD } 24\ 38\ 246.4 + 43\overset{d}{.}49.E \text{ (to JD } 24\ 40\ 716.6)$$

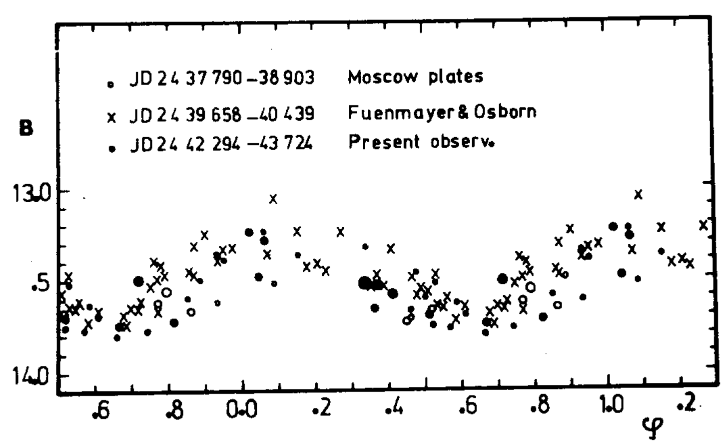
$$\text{Max} = \text{JD } 24\ 41\ 069.6 + 43\overset{d}{.}04.E \text{ (after JD } 24\ 40\ 716.6)$$

The light curve of L 973 in M13 constructed by the upper elements is shown in the Figure. The symbols are indicated in the Figure. Their size depends on the number of observations per night.

Besides we have attempted to explain the season maxima with a continuously changeable period and the result is:

$$\text{Max} = \text{JD } 24\ 38\ 248.53 + 43\overset{d}{.}515.E - 0.00225.E^2$$

The light curve constructed with this ephemeris is quite similar to the one presented in the Figure, but the residuals O - C, in general, are larger compared to those obtained with the first elements.



In general it follows from both interpretations that the period of the star during the last sixteen years has probably decreased with 0.45 days.

From the average light curve we have obtained for L 973 $\overline{B} = 13\overset{m}{.}53$ and the average amplitude of the variation $A_B = 0\overset{m}{.}45$. Since $\overline{V} = 12\overset{m}{.}04$ (from 5 Moscow plates, this magnitude has been also given by Osborn 1971, Ph.D. Thesis, Yale Univ.) the colour index of the star is $\overline{B - V} = +1\overset{m}{.}49$.

Finally, it is important to point out that red variables with periods about 43.3 days are met very rarely in the globular clusters. Our attempt to compare L 973 with similar objects in other globular clusters shows that the number of this kind of variables discovered up to now is not more than four - five. These are first of all V53 ($P = 32\overset{d}{.}7$) and V164 ($P = 37\overset{d}{.}2$) in ω Cen, V13 ($P \sim 40\overset{d}{:}$) in NGC 6121 and V6 ($P = 47^d$) and V18 ($P \sim 49\overset{d}{:}$) in 47 Tuc.

The details of our studies of L 973 together with other red variables in M13 will be published elsewhere.

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THE ULTRAVIOLET SPECTRUM OF β LYRAE OBSERVED WITH THE IUE

We have obtained several sets of exposures of the interacting binary system β Lyrae with the IUE satellite observatory. The observations were made in 1978 June and September at the high resolution mode ($\lambda/\Delta\lambda \sim 10^4$) in the far-ultraviolet (1200-2000 A) and the mid-ultraviolet (1900-3200 A) regions.

The spectral region between about 1500 and 2100 A was not covered in the previous Copernicus high resolution (0.2 and 0.4 A) observations of this binary reported by Hack et al. (1975, 1976 and 1977). In addition, signal-to-noise ratio in the mid-ultraviolet region of the current IUE data is superior to that attained by the Copernicus V2 spectrometer. The spectral range between about 1500 and 2100 A was also observed at much lower resolution with TD1 S2/68 spectrometer (Hack 1974) and Skylab S019 sky survey camera (Kondo et al.1976). The resolution of the S2/68 spectrometer was about 35 A in this range; the S019 camera had resolutions of 2 A, 12 A and 42 A at 1400 A, 2000 A and 2800 A, respectively.

Hundreds of lines have been observed with the IUE. These observational results are being prepared for publication in a full journal article. We wish to report here the following preliminary findings from the IUE data.

The strong spectral features reported by Hack (1974) near 2000 A and Kondo et al. (1976) in the 1500-2100 A range appear to be in reasonable accord with the current results, except that a number of new lines were observed at the higher resolution of the IUE. One notable revision of the Skylab results is the identification of the feature near 1910 A, for which C III] intercombination line was tentatively suggested. From the IUE spectra, it is now clearly identified as one of the three Fe III multiplet (No. 34) lines. All of the multiplet have been observed as P Cygni features at 1895, 1914 and 1926 A.

We shall now attempt to draw a broad-brush picture of the IUE results: In the 1100-1600 A region, numerous emission lines dominate over P Cygni features. In the 1600-2200 A range, strong P Cygni lines are dominant; weak and moderate absorption lines of Fe II, Fe III and other ionized metals observed in this regime do not appear to be entirely photospheric. Between 2200 and 2400 A, very weak absorption lines are seen; identification of these lines is underway. In the 2400-3000 A region, absorption lines observed can largely be attributed to Fe II and Fe III photospheric lines except the resonance lines of Fe II and Mg II. The Fe II line at 2599 A shows strong shortward-shifted absorption indicative of mass flow. The Mg II resonance doublet at 2795 and 2802 A are seen as P Cygni features as previously reported by Kondo et al. (1972) and Hack et al. (1977).

We are pleased to acknowledge the competent assistance of the U.S. IUE project team led by Dr. A. Boggess in the acquisition and reduction of the data.

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References:

Hack, M. 1974, Astr.Ap., 36, 321
Hack, M.,Hutchings, J.B., Kondo, Y.,McCluskey, G.E.,Plavec, M., and Polidan, R.S. 1975, Ap.J., 198, 453
Hack, M.Hutchings,J.B.,Kondo,Y., McCluskey, G.E., and Tullock,M.K., 1976, Ap.J., 206, 777
Hack, M., Hutchings, J.B., Kondo, Y., and McCluskey, G.E. 1977, Ap.J. Suppl. 34, 565
Kondo, Y.,Giuli, R.T., Modisette, J.L.,and Rydgren, R.E. 1972, Ap.J., 176, 153
Kondo, Y.,Parsons,S.B.,Henize,K.G.,Wray,J.D.,Benedict,G.F., and McCluskey, G.E. 1976, Ap.J., 208, 468

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ON THE PHOTOMETRIC VARIABILITY OF o Vel AND OF THE He-WEAK STAR HR 3448

Introduction:

A systematic survey for He-weak stars conducted by Jaschek et al. (1969) resulted in eight new objects including HR 3448. He-weak stars are known to show periodic spectrum and light variability (Pedersen and Thomsen 1977). However, Pedersen and Thomsen (1977) did not find variability in the strength of the HeI 4026A line of HR 3448 or in its light.

HR 3448 was on the present observing program of a search for Beta Cephei stars, as a comparison star to o Vel, a suspected Beta Cephei star (van Hoof 1972); variability in HR 3448 was suspected and it was therefore observed independently against HR 3466 (B9III). o Vel is a suspected Beta Cephei star on the basis of its RV variations reported by van Hoof (1972). However, its light variability has yet to be confirmed (Balona 1977). The observations reported here suggest that HR 3448 is photometrically variable with a small amplitude of .01 mag in 'b' and o Vel is constant.

Observations:

The photometric observations were made through the Strömgren 'b' filter during an observing run in March 1977. The University of Toronto 61 cm telescope situated at Las Campanas, Chile, was used. It was equipped with a 1P21 photometer and pulse counting electronics.

Table 1 gives observations of HR 3448 and o Vel against HR 3466 obtained on three nights. These are means of two observations. The differential extinction correction was found to be negligible. These observations clearly indicate that variations in o Vel are not more than .005 mag , supporting Balona's (1977)

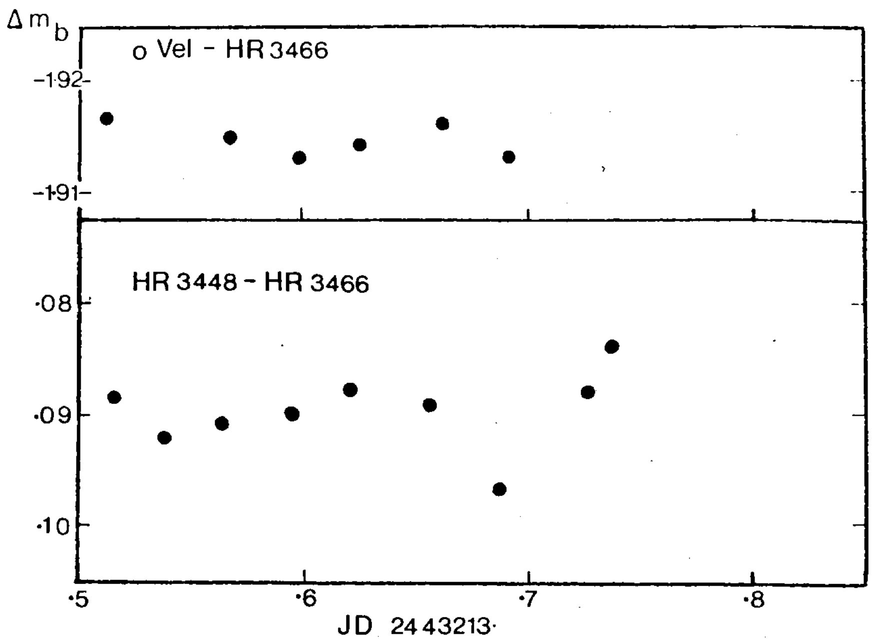

Figure 1: Plots of Δm_b (o Vel-HR 3466, and HR 3448-HR 3466) versus JD.

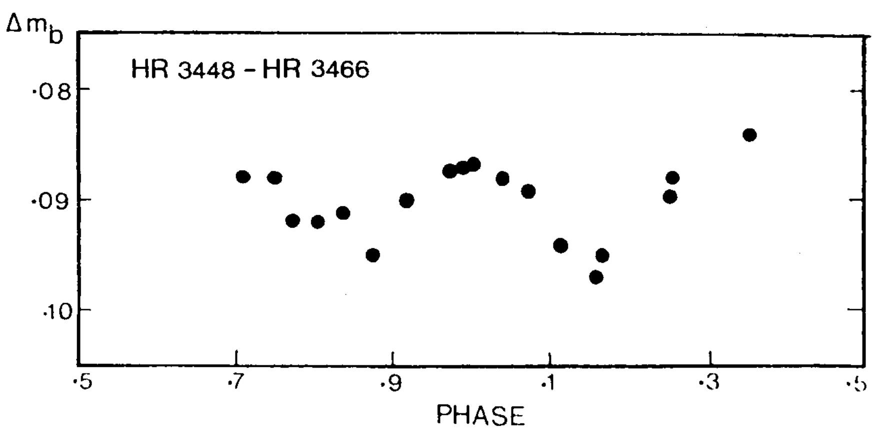

Figure 2: A phase diagram of HR 3448 with $P=.3880^d$.

conclusion, whereas HR 3448 shows variations of about .01 mag.

The observations of HR 3448 and o Vel, obtained on JD 2443213 are plotted in Figure 1. Constancy of HR 3466 is well demonstrated against o Vel. The light curve of HR 3448 shows a characteristic double minimum similar to the light curve of σ Ori E (Pedersen and Thomsen 1977). Although the observations are not sufficient to determine the period accurately, a period of $P=.388^d$ resulted from a statistical technique of period search; it was found to fit very well to all the observations of HR 3448 listed in the Table 1. This period is also supported by the two times of minima observed: JD_{min} 2443210.5861 and 2443213.6896. This phase diagram is shown in the Figure 2. If this period is right then HR 3448 will be the shortest period He-weak variable.

The He-weak variability being a surface phenomenon, in general the period can be accounted for by the rotational velocity of the variable (Pedersen and Thomsen 1977). We could not find in the literature a $v_* \sin i$ value for HR 3448, which would have provided some kind of indirect check on this proposed period. From the published uvbyβ values for HR 3448 (Crawford et al.1978) one can estimate its luminosity (Mv=-.42, Crawford 1978) and temperature (log Te=4.164, Shaw 1975) and hence its radius ($R=3R_\odot$). Thus to account for a period of $P=.388^d$, a v.sin i value for HR 3448 is estimated to be of the order of 250 km/s which is slightly large for a normal B8 star. It should be noted that the uvbyβ indices used here are not averaged over a cycle and relations used are applicable to normal stars.

Another feature of HR 3448 which it shares with σ Ori E is the fact that HR 3448 also lies away from the zero age main sequence on the $[c_1]$, β plane (Pedersen and Thomsen 1977).

More observations are needed to confirm the period and to obtain a complete light curve for HR 3448. The possibility of it being the shortest period He-weak variable and the similarity of the light curve with that of σ Ori E, a He-rich star, should make this object important.

TABLE 1

Observations of HR 3448 and o Vel Against HR 3466

HR 3448-HR 3466

JD 2443200+	Δm_b
10.5208	.087
10.5368	.088
10.5653	.094
10.5861	.095
10.6201	.090
13.5157	.088
13.5402	.092
13.5659	.091
13.5965	.089
13.6215	.087
13.6576	.089
13.6896	.097
13.7285	.088
13.7646	.084
20.5229	.088
20.5444	.091
20.5736	.095
20.6166	.087

o Vel-HR 3466

JD 2443200+	Δm_b
10.5444	-1.913
10.5659	-1.913
10.5882	-1.913
10.6076	-1.914
10.6146	-1.917
10.6271	-1.913
10.6493	-1.914
10.6569	-1.913
10.6618	-1.915
10.6680	-1.914
10.6771	-1.915
10.7097	-1.914
10.7146	-1.916
10.7194	-1.915
13.5135	-1.917
13.5694	-1.915
13.5986	-1.913
13.6257	-1.914
13.6618	-1.916
13.6924	-1.913

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References:

Balona, L.A. 1977, Mem. R. Astron. Soc. 84, 101

Crawford, D.L. 1978, Astron. J. 83, 48

Crawford, D.L., Barnes, J.V., and Golson, J.C. 1971, Astron. J. 76, 621

Jaschek, M., Jaschek, C. and Arnal, M. 1969, Publ. Astron. Soc. Pacific 81, 650

Pedersen, H., and Thomsen, B. 1977, Astron. Astrophys. Suppl. 30, 11

Shaw, J.S. 1975, Astron. Astrophys. 41, 367

van Hoof, A. 1972, Astron. Astrophys 18, 51

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EH Lib - STAR WITH BLAZHKO EFFECT

In 1974 through 1978 over 700 photoelectric observations of the supershortperiodic cepheid EH Lib were obtained in BV colours at the Astronomical Observatory, Odessa University. The moments of maxima for 1974-1976 have been published in IBVS No.1310,1977. Six moments of maxima determined in 1978 are as follows:

Table 1

Max.J.D.hel	*	E	O-C
2443695.4285	B	116010	-0.0029
695.4303	V	116010	-0.0011
696.4051	B	116021	+0.0010
696.4008	V	116021	-0.0032
698.3454	B	116043	-0.0037
698.3456	V	116043	-0.0035

Epochs and deviations have been calculated with the elements given in the third supplement to the General Catalogue of Variable Stars, 1969:

$$\text{Max.J.D.hel.} = 2433438.6073 + 0^{d}.088413276 \cdot E.$$

We could determine stellar magnitudes of the variable in all the 28 light maxima. These data are given in Table 2.

Table 2

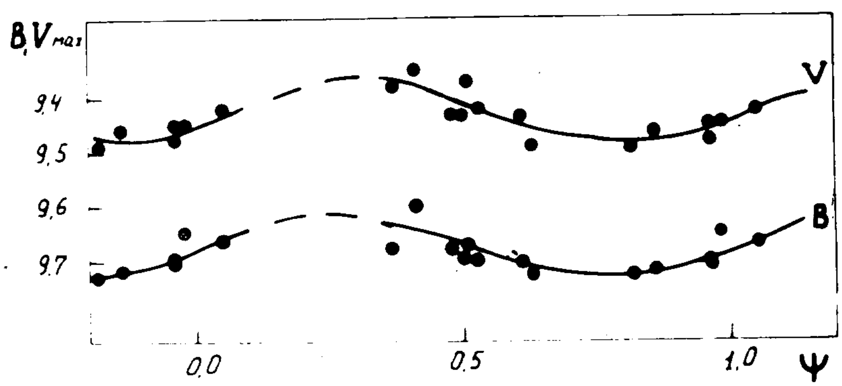
Max.J.D.hel.	B_{max}	V_{max}	ψ
2442162.5181	9.72	9.46	0.86
2182.4134	9.70	9.42	0.53
2541.4588	9.65	9.45	0.98
2544.3758	9.73	9.49	0.63
2544.4653	9.70	9.48	0.96
2577.4438	9.60	9.35	0.41
2871.5070	9.67	9.37	0.51
2871.5932	9.73	9.49	0.82
2872.4772	9.67	9.42	0.05
2872.5658	9.68	9.38	0.37
2874.5107	9.68	9.43	0.48
3695.4291	9.71	9.45	0.96
3696.4000	9.70	9.43	0.50
3698.3457	9.70	9.43	0.61

Light variations in maxima amount to $0^m.13-0^m.14$ that is to one order more than the errors of observations. Suppose these variations are caused by the Blazhko-effect, then we find the formula below

$$M = 2442162.556 + 0^d.273778 \cdot E$$

with the help of which phases ψ given in the last column of Table 2 have been calculated.

Figure 1



The graphs of light variations in maxima are illustrated in Figure 1.

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PHOTOELECTRIC PHOTOMETRY OF UZ LEONIS

The W Ursae Majoris system, UZ Leo, was observed photoelectrically in 1975. The 24-inch Morehead telescope of the University of North Carolina (Chapel Hill) was equipped with an uncooled photomultiplier tube and a DC amplifier. An RCA 1P21 tube was used on seven nights and an EMI 9789 on two nights. A one minute deflection was defined as a single observation. The BD numbers and coordinates of UZ Leo, comparison and check star are given below:

Star	BD No.	R.A. (1900)	Dec. (1900)
UZ Leonis	$+14^{\circ}2280$	$10^h35^m14^s$	$+14^{\circ}05.3'$
Comparison	+14 2284	10 36 37	+14 18.3
Check	+14 2275	10 33 06	+14 29.7

Standard stars were observed so that all observations could be converted to the UBV system. Differential extinction corrections were also included. The comparison star was found to have the following values:

$$V = 8.95 \pm .03 \text{ p.e.}$$
$$(B-V) = 0.29 \pm .01$$
$$(U-B) = 0.04 \pm .03$$

The B and V observations of UZ Leo appear plotted in Figure 1. The phases were computed from the light elements of Binnendijk (1972). UZ Leo was found to have the following magnitudes and color.

	Maximum	Secondary Minimum
V =	9.58 ± .04 p.e.	10.12 ± .05 p.e.
B =	9.91 ± .04	10.43 ± .05
B-V =	0.33 ± .01	0.32 ± .02

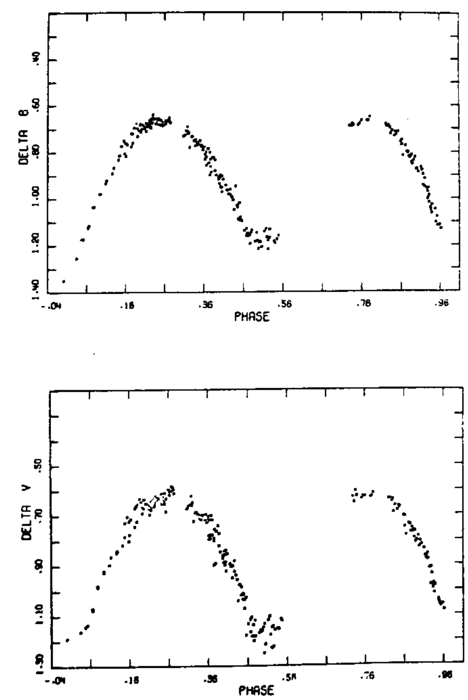

FIG. 1 UZ LEO

The bottom of primary minimum was poorly covered by the present observations, but it is approximately $0^{m}.03$ deeper than the secondary minimum. The amplitude of the light variations agrees very closely with that found by Binnendijk.

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Binnendijk, L. 1972, Astron. J. 77, 246

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PHOTOMETRY OF WZ SAGITTAE DURING ITS 1978 OUTBURST

Photoelectric photometry of the recurrent nova and eclipsing binary WZ Sagittae reveals that a 0.8 minute, or 1% change in its photometric period took place during its recent outburst. Whereas the premaximum period given by Robinson et al. (1978) is 81.63 minutes, outburst observations since December 10,1978 are more consistent with an 82.42 minute period.

Observations were made on seven evenings between December 10 and December 23, 1978, using the 36 cm Schmidt-Cassegrain telescope of Brown University. The photometer employs an RCA 1P21 tube (uncooled) and the standard U,B,V filters. All measurements were made through the V filter. BD+17°4224 [V=8.76 (Krzeminski and Kraft, 1964)] was the comparison star.

The slowly changing features of the light curves are sometimes masked by sudden fluctuations in brightness. These fluctuations are partly intrinsic to WZ Sge and partly related to the poor photometric conditions at Sagitta's low altitude. The most distinct minima observed during this period are listed in column one of Table 1.

Table 1

O Obs.Minima (JD$_{\odot}$2443800.0+)	E Eclipse Number	C Calc.Minima (JD$_{\odot}$2443800.0+)	O-C Residuals (Days)	C' Revised Calc.Min. (JD$_{\odot}$2443800.0+)	O-C' Revised Residuals (Days)
57.4621	111307	57.4825	-0.0203	57.46298	-0.0009
58.4382	111324	57.4462	-0.0080	58.4360	0.0022
62.4397	111394	62.4143	0.0254	62.4423	-0.0026
66.4499	111464	66.3825	0.0674	66.4487	0.0012

The predicted times of minima, T (column three), were calculated using the premaximum elements: $T = JD_{\odot}2437547.72845 + 0^{d}.0566878455 \cdot E$ (errors ±3, ±7) (Robinson et al. 1978).

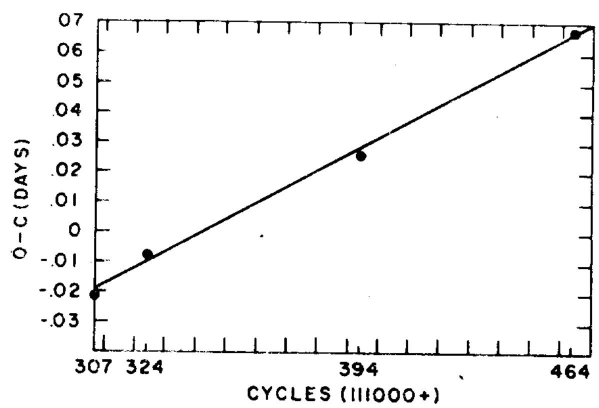

FIGURE 1

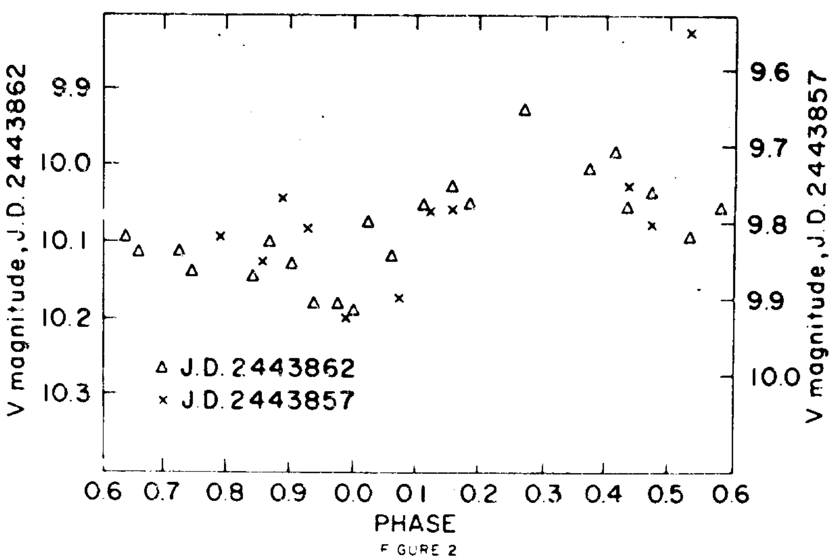

FIGURE 2

The residuals are plotted in Figure 1. The revised elements that give the best fit for our data are $T = JD_{\odot} 2443857.46298 + 0^{d}.057234 \cdot E$.

The values in the fifth column and the residuals in the sixth column of Table 1 are based upon these revised elements.

Observers at the University of Texas McDonald Observatory found it easier to discern the maxima during the outburst, and their observations conform to the elements: $T_{max} = JD_{\odot} 2443852.552 + 0^{d}.057250 \cdot E$ (Patterson 1979).

Table 2 shows that their elements do predict this author's observations of maxima within observational error. The maxima were obtained by selecting what appeared to be well defined primary maxima, and neglecting occasional isolated high readings as well as a secondary hump separated from the primary by half the orbital period, which was occasionally observed.

Table 2

O	C	O-C
Observed Maxima ($JD_{\odot}$2443800.0+)	Calculated Maxima ($JD_{\odot}$2443800.0+)	(Days)
57.4767	57.4755	0.0012
58.4496	58.4488	0.0008
62.4575	62.4563	0.0012

A magnitude versus phase diagram combining the observations of JD 2443857 and JD 2443862 shows the general form of the $0^{m}.3$ amplitude variation in V, while providing further evidence that the assumed new period is correct. (See Figure 2). The phase was computed by using the revised ephemeris. Allowance was made for gradual variation in brightness as the nova faded.

It should be noted that observations by E. Bogusz and A.Udalski of the Warsaw University Observatory indicate that WZ retained its normal periodicity through December 8-9 (Kruszewski and Krzeminski, 1979). Apparently the period change occurred somewhere between December 8-9 and December 10, when the new period was first observed.

In conclusion, observations from December 10, 1978 indicate that the photometric period of WZ Sagittae has increased by 0.8 minutes. Observations of WZ Sge upon its reappearance from behind the sun would be of importance in understanding the nature of such changes in period.

The author thanks all of those who assisted in the observations, and gratefully acknowledges valuable discussions with Richard Bates, Joseph Patterson, and Adam Schultz.

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References:

Kruszewski, A., and Krzeminski, W., IAU Circular 3318, Jan.3,1979
Krzeminski, W., and Kraft, R.P., 1964, Ap.J. 140, 921
Patterson, J., 1979 Private communication
Robinson, E.L., Nather, R.E., and Patterson, J., 1978, Ap.J. 219, 168

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1540

Konkoly Observatory
Budapest
1979 January 31

HD 61429, A POSSIBLE NEW W UMa ECLIPSING BINARY SYSTEM

Photoelectric observations of HD 61429 have been obtained with the Bochum University 61 cm telescope at La Silla, Chile. Used as a comparison for HD 63462 and HD 62623 it turned out to be variable itself.

Of spectral type B9, HD 61429 is a visual double stars (ADS 6246) with a companion of similar spectral type and magnitude at 0.1 arcseconds distance. Radial velocity variations of the order of 70 km/sec have been reported in the Publ. Lick Obs. (1928). They might be due to the presence of a third, unseen companion.

Between January 3 and January 31, 1977 observations relative to HD 60863 were made on 23 nights. Reduction procedures were the same as those described by Stift (1978). The combination of the observations of each night yields an internal precision of $\sim 0\overset{m}{.}002$. The observations were analyzed with the help of a period search program using a five component Fourier least squares fit. The final period retained of 2.57895 days yields by far the smallest scatter and the resulting light curve in V is shown in Fig. 1. Colour variations are marginal. Despite the imperfect phase coverage a W UMa or ß Lyr type eclipsing binary nature of HD 61429 appears very likely. This would account for the observed variations in radial velocity; most unfortunately the RV data are too few and of low precision to derive a curve of RV variations.

We shall mention two alternative periods which give considerable scatter but cannot be ruled out completely. A period of 0.56371 days suggests non-radial pulsations of a star related to ß Cep variable (Smith, 1977).

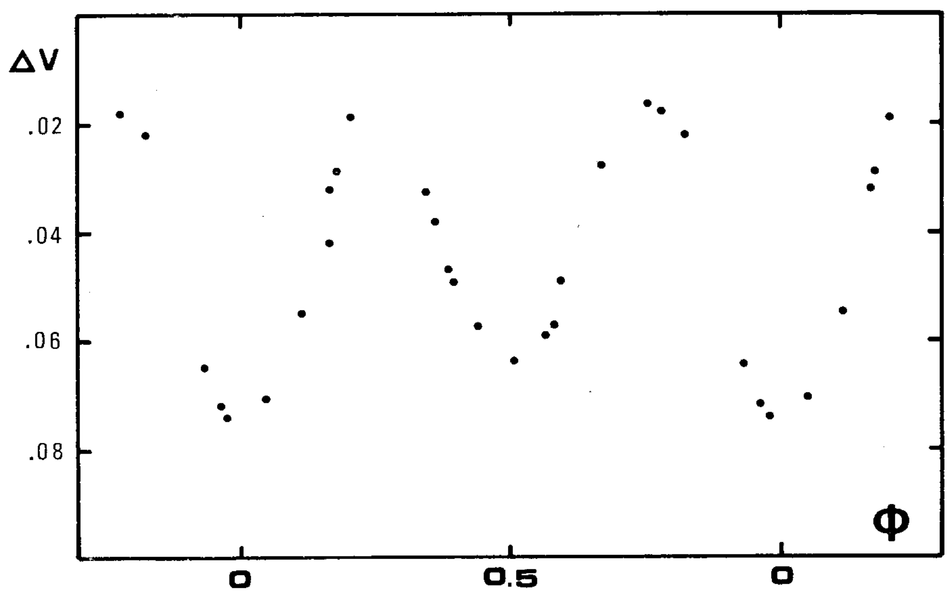

Figure 1: Light curve of HD 61429 relative to HD 60863. The phases are given by $\Phi = (J.D. - 2443100)\ 2.57895^{-1}$.

Photometry in the Maitzen system (Maitzen, private communication) excludes an Ap-Si star. A period of 4.488 days is neither convincing nor would HD 61429 fit into any known variable class.

As so often we have to call on more observations, photoelectric and spectroscopic, for further clarification.

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References:

Smith, M.A.: 1977, Ap.J. 215, 574
Stift, M.J.: Astron.Astrophys.Suppl. 32, 343

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1541

Konkoly Observatory
Budapest
1979 January 31

LIGHT VARIATIONS OF THE Be STAR HD 63462

Classified B0Vpe? in the Bright Star Catalogue and B1IV?nne by Hiltner et al. (1969) this star has been little observed so far. Merrill and Burwell (1943) note Hα in emission in December 1934, the profile being somewhat unsymmetrical. Jaschek et al. (1969) characterize the spectrum in March 1966 as almost continuous with strong central emission in Hβ and all other Balmer lines practically flat. Henize (1976) finds moderately sharp and rather weak emission in Hα. Photometry by Feinstein (1968) suggests marginal photometric variations, Buscombe & Kennedy (1965) report radial velocity variations.

UBV observations of HD 63462 relative to HD 60863 were obtained on 15 nights between January 16 and January 31, 1977 using the Bochum University 61cm telescope at La Silla, Chile. Reduction procedures were the same as those described by Stift (1978). Combining all observations made within an interval of less than 1 hour leads to an internal precision of $\sim 0\overset{m}{.}003$. A plot of the observations versus Julian Date is shown in Fig. 1. Variations on a time scale of a few days attain $0\overset{m}{.}02$ in V, colour variations are marginal. No periodicity can be found; HD 63462 shows irregular or semiregular behaviour similar to that of the other Be stars where light curves are available (e.g. HD 88661, HD 174237, HD 187399).

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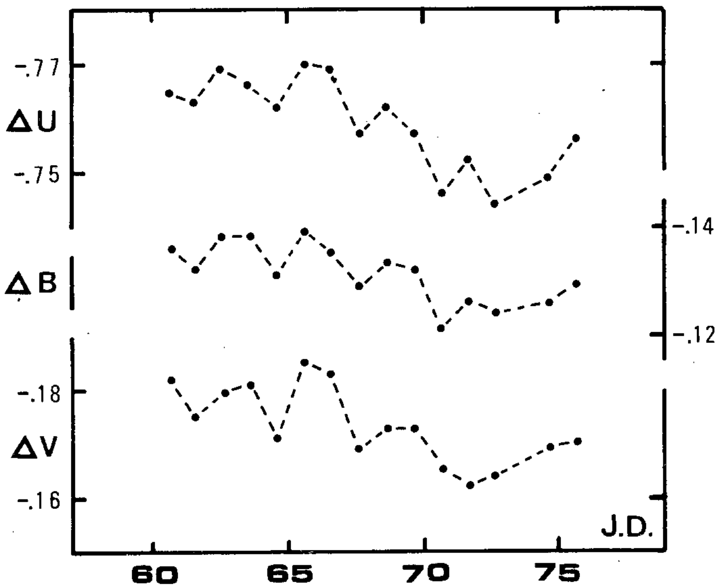

Figure 1: Observations of HD 63462 relative to HD 60863 plotted versus J.D. - 2443100.

References:

Buscombe, W. and Kennedy, P.M.: 1965, Monthly Motices RAS 130,281

Feinstein, A.: 1968, Z. Astrophys. 68, 29

Henize, K.G.: 1976, Ap.J. Suppl. 30, 491

Hiltner, W.A., Garrison, R.F. and Schild, R.E.:1969,Ap.J.157,313

Jaschek, M., Jaschek, C. and Malaroda, S.:1969,Astron.Astrophys.3, 485

Merrill, P.W., Burwell, C.G.: 1943, Ap.J. 98, 153

Stift, M.J.: 1978, Astron.Astrophys. Suppl. 32, 343

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1542

Konkoly Observatory
Budapest
1979 January 31

5-HOUR LIGHT VARIATIONS OF HD 65953 (28 Mon) ?

Photoelectric UBV observations are presented of the K4 giant HD 65953. Used as one of several comparison stars for the study of variability of HD 67594 it turned out to be variable itself.

Between January 18 and January 31, 1977 14 observations were made of HD 65953 relative to HD 67594 using the Bochum University 61cm telescope at La Silla, Chile. HD 67594 remained constant to within the internal precision of the photometry, i.e. $0\overset{m}{.}003$. Reduction procedures were the same as those described by Stift (1978). Plotting the UBV magnitudes versus Julian Date seems to indicate semiregular behaviour on a time scale of about 5 days (Fig. 1). Amplitudes are $0\overset{m}{.}020$ in V, $0\overset{m}{.}025$ in B and $0\overset{m}{.}030$ in U.

A search for periodicity with the help of a 5 component Fourier least squares fit leads to a 5 hour period (Fig. 2). The curve is remarkably smooth and it appears most unlikely that it is due to chance only. The nightly observing interval of about 1/2 hour makes it impossible to confirm or discard the 5 hour period.

The observations lend further support to the conclusion of Maeder and Rufener (1972) who claim that <u>all</u> K-giants from K5 are variable. We may speculate whether such short-period variations are due to oscillations connected with mass loss in K-giants (Deutsch, 1960), but only spectroscopic observations can provide the necessary information.

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References:
Deutsch, A.J.: 1960, The loss of mass from red giant stars, in Stellar Atmospheres,Ed.J.L.Greenstein,Univ.of Chicago Press, Chicago, p.543
Maeder,A. and Rufener, F.: 1972, Astron.Astrophys.20, 437
Stift, M.J.: 1978, Astron.Astrophys.Suppl. 32, 343

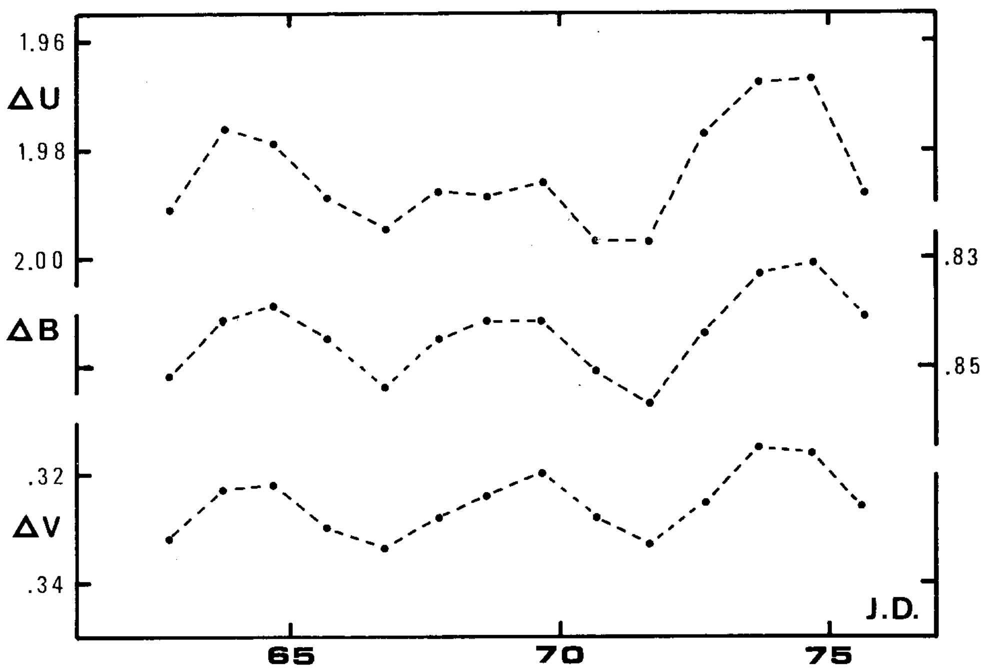

Figure 1: Observations of HD 65953 relative to HD 67594 plotted versus J.D. - 2443100.

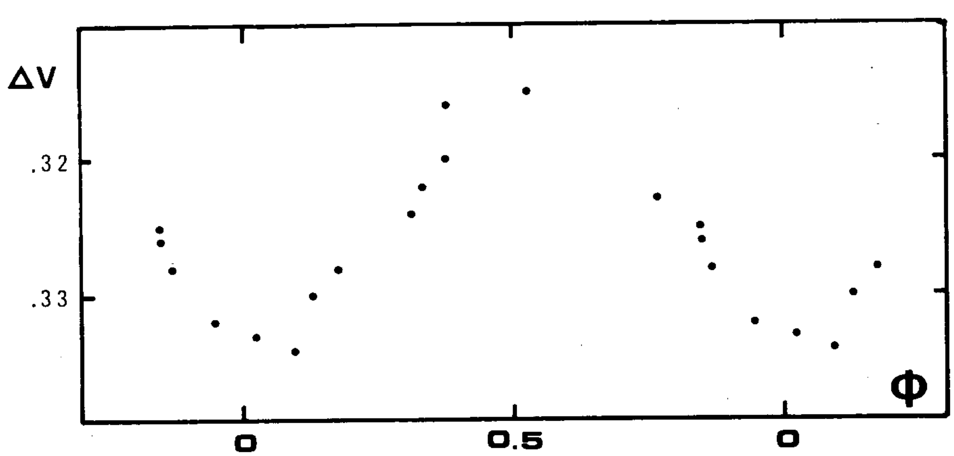

Figure 2: Observations of HD 65953 relative to HD 67594. The phases are given by φ = (J.D. -2443100) 0.207878^{-1}.

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Konkoly Observatory
Budapest
1979 February 2

UBV OBSERVATIONS OF NOVA CYGNI 1978

Nine UBV observations of Nova Cygni 1978 have been made during two nights in September 1978 with the Lund Observatory 61-cm Cassegrain-Nasmyth reflector. The results are given in Table 1. The comparison star was HD 204102. The adopted magnitude and colours of this star were: V=8.02, B-V=0.10 and U-B=0.05.

Table 1

	JD	V	B-V	U-B
Sept 12	2443764.353	6.38	0.67	0.04
	.361	6.38	0.67	0.03
	.364	6.38	0.67	0.02
	.375	6.38	0.66	0.02
	.379	6.38	0.66	0.02
	.410	6.40	0.66	0.01
Sept 19	2443771.335	7.86	0.18	-0.59
	.373	7.87	0.19	-0.59
	.583	7.83	0.18	-0.58

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Correction to IBVS No. 1522

The formulae on page 3 should read :

"$tg\ \beta = [(1-r)/(1+r)]\ cotg\ i$ and

$r = H_e(min)/H_e(max)$"

According to my new calculations I have obtained a more accurate value for β:

$$\beta = 73^{\circ} \pm 3^{\circ}$$

K. PANOV

COMMISSION 27 OF THE I. A. U.
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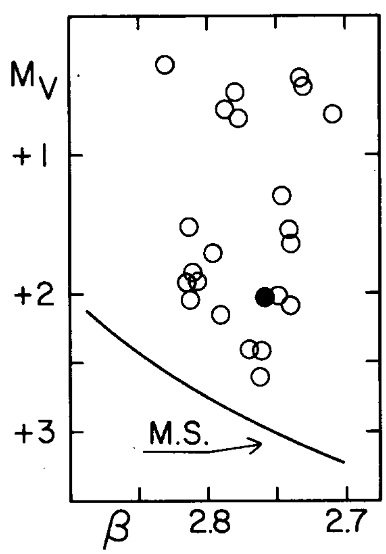
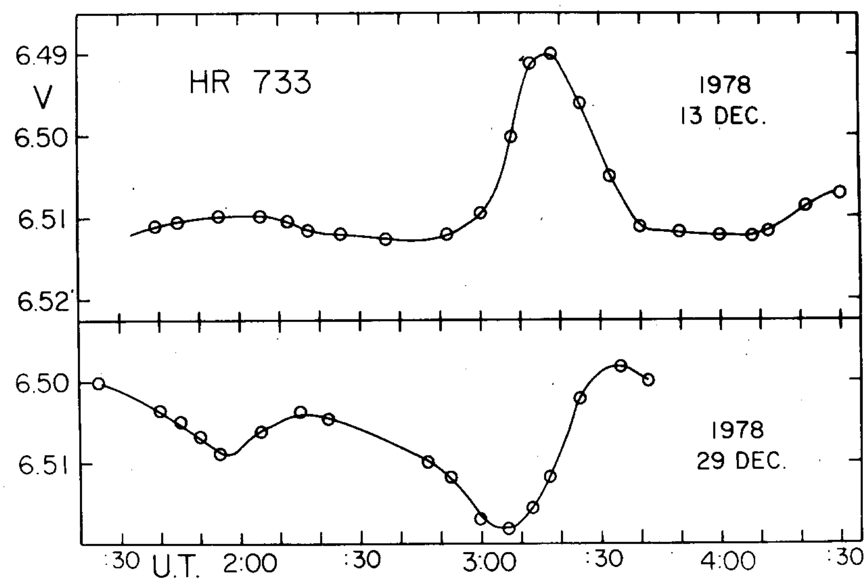
Konkoly Observatory
Budapest
1979 February 2

HR 733: A NEW USPC IN THE HYADES GROUP

The known ultrashortperiod cepheids (USPC) in the Hyades group have been discussed elsewhere (Eggen 1979). The distribution of luminosities shown in Figure 1 by open circles is taken from that discussion. The filled



circle represents HR 733, a Hyades group member with (U, V, W) = (+ 38, -17, -11) km/sec, based on a proper motion from all available meridian positions and on the FK4 system with precessional corrections of (μ_α, μ_δ) = (+ 0.087, + 0.033) arcsec, a radial velocity from two accordant Mount Wilson plates of + 25 km/sec, and a modulus of 4.45 mag. The star was monitored for



light variation on 13 and 29 December 1978 with the 0.6 m reflector on Cerro Tololo using HR 730 as a comparison star. The resulting light curves are shown in Figure 2. The light variation ranges from 0.003 to 0.02 mag. with a period near 0.05 days. The two open circles nearest the new variable in Figure 1 represent δ Sct, with a period of 0.19 days and light amplitude of 0.1 to 0.2 mag. and BQ Cnc, with a period near 0.07 days and light amplitude near 0.01 mag.

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Reference:

Eggen, O.J. 1979 Ap. J. (in press).

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

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Konkoly Observatory
Budapest
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PHOTOELECTRIC OBSERVATIONS OF 53 Cam

The peculiar star 53 Cam (=AX Cam=HR3109=HD 63339), classified as an A2p Sr-Cr-Eu star by Bidelman and Böhm (1955) shows a strong magnetic field varying with a period of about 8 days.The variability of the line intensities (Faraggiana 1973) tends to follow the 8^d period, whereas radial velocities appear to fit at least two different periods: i) a shorter one lying probably in the range 1-8 days; ii) a longer one (on the order of several years) suggesting for 53 Cam a binary nature.

The light variations (Jarzebowski 1960a, 1960b, Rakos 1962, 1968; Preston and Stepien 1968; Wolff and Wolff 1971; Schöneich et al. 1976) evidence a period of about 8 days, in fairly close agreement with what has been derived from magnetic observations. Moreover, Rakos (1968, see also Faraggiana 1973) argued that a period of about 1 day better fitted his own observations than a longer one of about 8 days.

53 Cam was observed by us during 13 nights in 1970, 9 nights in 1971, 11 nights in 1972 and one night in 1974. The observations were mostly carried out with the 30-cm Cassegrain reflector of the Astronomical Observatory of Trieste, equipped with a single beam photoelectric photometer using UBV filters. The 50-cm Newtonian telescope of the Observatory,equipped with a three-channel simultaneous photoelectric photometer, was used only in some nights. Corrections were allowed for differential extinction and the measures were transformed to the standard UBV system.

Table 1

Comparison star	V	B-V	U-B
HD 62522	7.012±.005	0.573±.005	0.021±.011
HD 62976	6.778±.010	0.100±.004	0.137±.011
HD 65429	6.858±.006	0.376±.006	-0.010±.005
HD 66286	6.693±.006	0.091±.008	0.162±.008
HD 68457	6.420±.009	0.199±.010	0.189±.009

Table 2

JD 2440000+	V	σ	N	JD 2440000+	B	σ	N	JD 2440000+	U-B	σ	N
656.3174	6.048	.003	6	656.3178	6.172	.008	6	656.3178	0.096	.011	4
666.3434	6.030	.009	7	666.3431	6.168	.012	7	666.3362	0.065	.005	6
688.3543	6.033	.013	5	688.3555	6.158	.013	5	688.3561	0.089	.009	5
689.3532	6.032	.007	5	689.3550	6.174	.011	5	689.3558	0.059	.011	5
695.3714	6.044	.004	2	695.3725	6.181	.005	2	695.3729	0.065	.011	2
701.4044	6.017	.006	4	701.4058	6.167	.018	4	701.4064	0.096	.007	4
709.3585	6.023	.034	7	709.3542	6.148	.010	6	709.3598	0.084	.013	7
711.4182	6.023	.015	5	711.4235	6.176	.019	6	711.4198	0.063	.031	5
715.3843	6.033	.020	4	715.3853	6.176	.004	4	715.3854	0.065	.024	5
726.3708	6.032	.015	5	726.3648	6.175	.014	4	726.3653	0.080	.011	4
730.3819	6.030	.006	3	730.3833	6.151	.008	3	730.3840	0.072	.035	3
731.3635	6.016	.007	4	731.3652	6.155	.011	4	731.3588	0.084	.001	2
735.3773	6.025	.006	3	735.3773	6.167	.012	3	735.3798	0.066	.008	3
988.4519	6.029	.012	6	988.4527	6.171	.016	6	988.4531	0.066	.008	6
993.3788	6.035	.010	9	993.3841	6.173	.005	8	993.3802	0.071	.005	4
1008.5005	6.029	.010	10	1008.4905	6.165	.009	9	1008.4998	0.060	.008	9
1008.5261	6.033	.005	5	1008.5277	6.177	.006	5				
1035.3710	6.037	.006	12	1035.3710	6.169	.010	12	1035.3710	0.068	.010	12
1048.3600	6.037	.011	7	1048.3609	6.185	.011	7	1048.3614	0.071	.009	7
1048.3457	6.020	.009	8	1048.3457	6.178	.017	8				
1060.3710	6.034	.013	7	1060.3719	6.169	.011	7		0.073	.007	7
1061.3557	6.023	.020	8	1061.3567	6.175	.026	8	1061.3572	0.066	.008	8
1062.3424	6.022	.009	9	1062.3433	6.185	.014	9	1062.3437	0.071	.009	9
1063.3346	6.033	.022	8	1063.3357	6.174	.024	8	1063.3361	0.075	.011	8
1363.2979	6.025	.004	9	1363.2938	6.159	.006	8				
1364.2779	6.026	.013	4	1364.2799	6.153	.032	4				
1392.2574	6.023	.014	8	1392.2539	6.177	.012	9				
1398.3548	6.032	.015	24	1398.3548	6.181	.016	24				
1399.3566	6.026	.012	26	1399.3566	6.181	.014	26				
1401.3993	6.038	.014	17	1401.4023	6.188	.025	16				
1402.3528	6.036	.010	16	1402.3538	6.175	.013	16				
1414.3483	6.032	.013	18	1414.3495	6.176	.008	18				
1415.3568	6.026	.013	12	1415.3579	6.177	.018	12				
1417.3519	6.030	.008	14	1417.3527	6.180	.005	14				
1648.5015	6.022	.004	11	1648.5024	5.171	.005	11				
2120.4281	6.032	.009	16	2120.4281	5.168	.013	16	2120.4281	0.073	.005	16

Data (together with their standard deviation) of the five comparison stars adopted are given in Table 1. No variability of these stars has been detected within the errors. The normal points of the photoelectric data of 53 Cam together with their standard deviation σ and the number N of observations are listed in Table 2.

The character of brightness variations is noticeably less remarkable in U light than in B and V, since U data are affected by considerable observational errors. The observational scatter along with the small amplitude of light variations makes it impossible to determine with precision the shapes of the B and V lightcurves. A rough analysis of our data reveals that brightness variations fit two different periods, a longer one of about 8.0 days and a shorter one of about 1.14 days; this latter period may be an effect due to aliasing.

Acknowledgement : We are indebted to Dr.U. Flora and Dr. M. Pucillo who generously provided a part of the observational data.

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References:

Bidelman, W.P.,Böhm,K.H.,1955,Publ.Astron.Soc.Pacific 67, 179
Faraggiana, R.,1973, Astron. and Astrophys. 22, 265
Jarzebowski, T., 1960a, Acta Astronom. 10, 31
Jarzebowski, T., 1960b, Acta Astronom. 10,273
Preston,G. and Stepien, K.,1968, Astrophys.J. 151, 563
Rakos, K.D., 1962, Lowell Bull. 5, 227
Rakos, K.D., 1968, Publ. Astron. Soc. Pacific 80, 563
Schönech, W. and Hildebrandt, G., 1976,Astron.Nachr.297, 39
Wolff, S.C. and Wolff, R., 1971, Astron.J. 76, 422

COMMISSION 27 OF THE I. A. U.
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Number 1546

Konkoly Observatory
Budapest
1979 February 5

SYNCHRONOUS U, B, V FLARE OBSERVATIONS ON UV Ceti

The flare observations on UV Ceti have been made at Maydanak high-mountain expedition of Tashkent Astronomical Institute. In the period from 1 to 14 of August 13 flares were detected on UV Ceti. Some of them have been observed simultaneously in three colours U,B and V by the 60-cm and 48-cm telescopes. The total effective time of observations was about 26 hours.

The measurements have been made by photon counters. The duration of each measurement was 1.6 second. The precision of synchronization of observations for the instruments was 0.001 second.

The data of observed flares are presented in Table 1. The light curves of two flares, No.6 and No.13 are presented in Figures 1 and 2 for illustration.

Table 1

No	Date of flare up	UT	Total duration of flare (sec)	ΔU	ΔB	ΔV
1	2 8 1978	$22^h12^m30^s$	40	$1^m.5$	$0^m.4$	$0^m.1$
2	4 8 1978	21 39 20	20	2.7	1.0	0.4
3	4 8 1978	21 43 15	110	2.7		0.2
4	4 8 1978	21 46 50	24	1.8		
5	4 8 1978	22 41 08	26	1.9		
6	4 8 1978	22 43 10	50	2.2	0.6	0.1
7	5 8 1978	23 13 40	20	3.5		0.4
8	7 8 1978	21 22 22	60		1.9	0.2
9	7 8 1978	22 55 50	> 180		1.4	
10	9 8 1978	20 54 30	110	3.7	2.4	0.6
11	9 8 1978	20 56 50	>3600	6.5	>4.3	3.2
12	10 8 1978	22 13 36	> 180		3.0	0.7
13	12 8 1978	23 13 50	> 240	3.5	2.0	0.4

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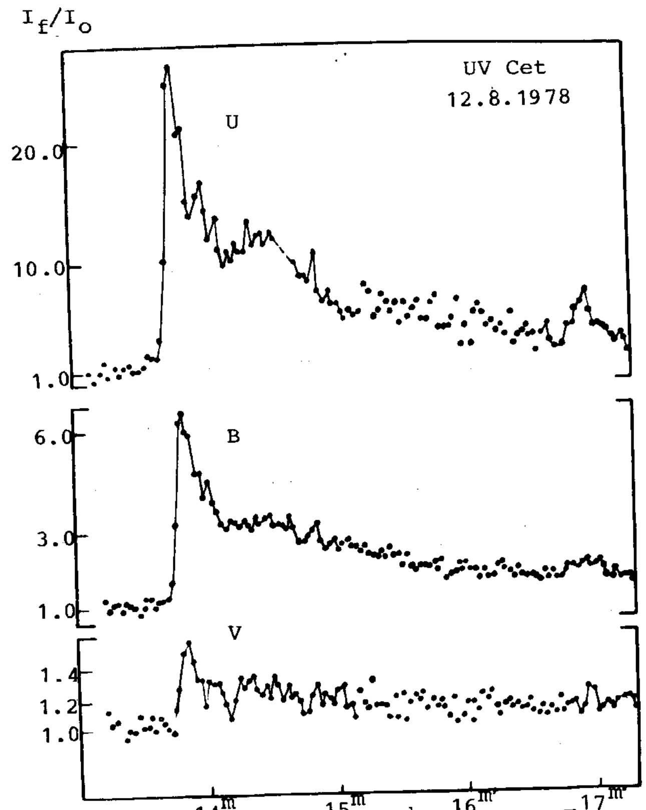

Figure 1

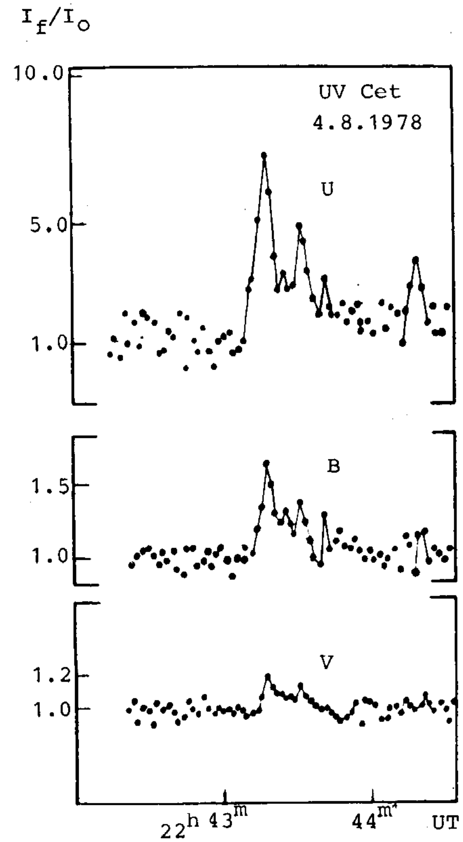

Figure 2

COMMISSION 27 OF THE I. A. U.
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Number 1547

Konkoly Observatory
Budapest
1979 February 12

THE PHOTOELECTRIC MINIMA AND THE LIGHT CURVE OF THE ECLIPSING BINARY HU TAURI (BV 312)

The eclipsing nature of HU Tau was first announced by Strohmeier and Knigge (1960). Strohmeier (1963) has given the light elements as

$$JD=24256.41+2\overset{d}{.}056297 \cdot E \qquad (1)$$

In GCVS's second supplement, a new set of light elements is given as

$$JD=42412.256+2\overset{d}{.}056302 \cdot E \qquad (2)$$

The spectroscopic orbital elements of the system were obtained by Mammano, Mannino and Margoni (1967), The have classified the spectral type of primary component as B9V. The system shows a single line spectrum.

So far, no photoelectric light curve of HU Tau has been obtained. During the period from October, 1978 to November, 1978 the eclipsing binary HU Tau was observed photoelectrically with the 48 cm reflector, attached with an unrefrigerated 1P21 phototube, at Ege University Observatory and the light curve of the system was secured in two colours B and V. BD+19°742 and BD+19°740 were used as comparison and check stars, respectively. No variation in the light of comparison star was detected. The light curve and the colour variation are shown in Figure 1 and 2, respectively.

The times of minima obtained during the observations made are shown in Table I. The O-C values were calculated with the help of Equation (2).

Table I

JD (Hel)	O-C	E	Minimum
24 43833.3662	+0.0055	691	primary
43834.3967	0.0079		secondary
43835.4228	0.0058	692	primary
43837.4797	0.0064	693	primary

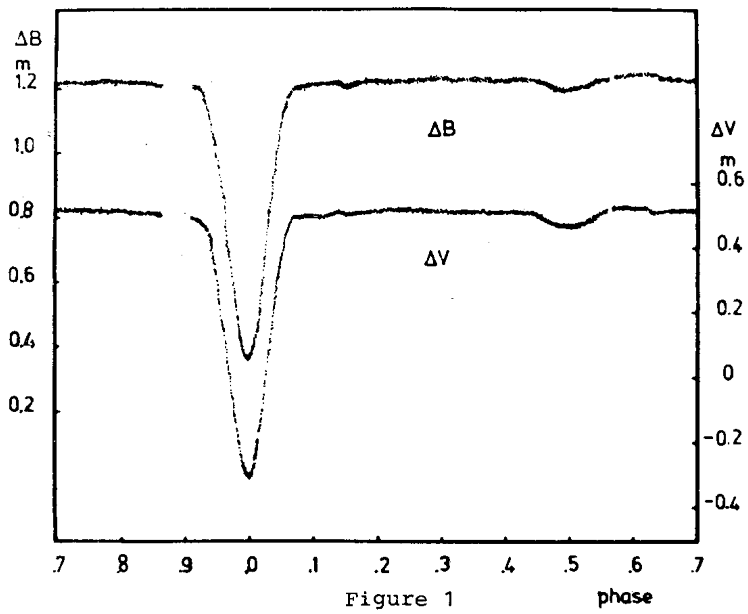

Figure 1

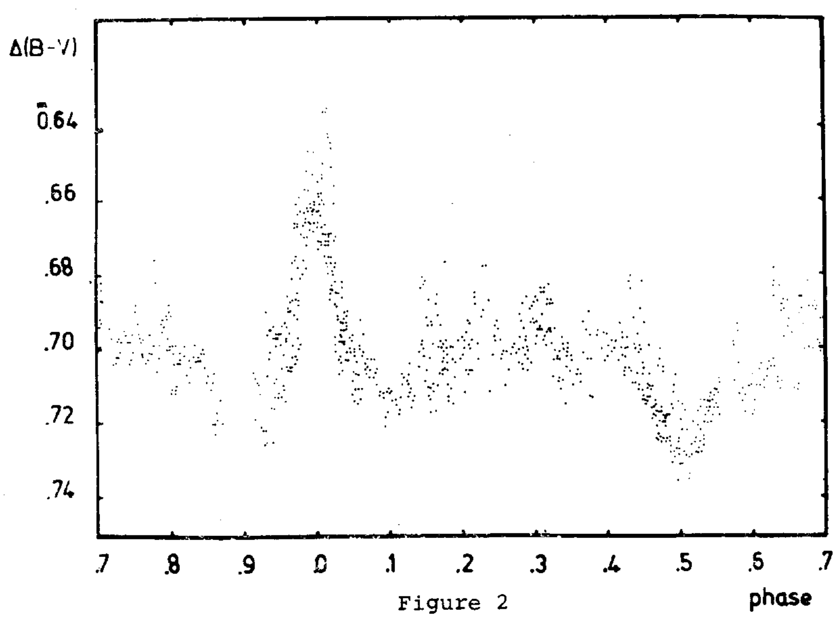

Figure 2

The times of minima which have been obtained so far by other observers are listed in Table 2. The O-C values are computed again from Equation (2). The O-C values were plotted against E and are shown in Figure 3.

Table II

JD(Hel.)	E	O-C	Ref.
24 37925.609	-2182	+0.004	1
958.492	-2166	-0.014	1
958.494	-2166	-0.012	1
958.501	-2166	-0.005	1
958.509	-2166	+0.003	1
38770.754	-1771	+0.009	2
805.696	-1754	-0.006	2
39169.664	-1577	-0.004	3
194.337	-1565	-0.006	4
194.338	-1565	-0.005	5
198.458	-1563	+0.002	6
492.501	-1420	-0.006	5
40985.368	-694	-0.014	7
41244.476	-568	0	8
248.595	-566	+0.006	7
314.398	-534	+0.007	8
688.637	-352	-0.001	7
717.424	-338	-0.002	7
42052.615	-175	+0.012	5
375.454	- 18	+0.011	9
404.244	- 4	+0.013	9
408.343	- 2	-0.004	9
410.391	- 1	-0.009	9
412.452	0	-0.004	9
412.459	0	+0.003	9
412.462	0	+0.006	9
414.514	1	+0.002	9
445.360	16	+0.003	10
445.362	16	+0.005	10
447.409	17	-0.004	10
449.464	18	-0.005	10
449.476	18	+0.007	10
451.508	19	-0.018	10
739.410	159	+0.002	11
774.357	176	-0.008	12
774.361	176	-0.004	13
776.442	177	+0.021	13
786.715	182	+0.012	14
807.274	192	+0.008	15
43080.750	325	-0.004	16
105.427	337	-0.003	17
138.329	353	-0.002	17
138.341	353	+0.011	17
212.352	389	-0.005	18
212.369	389	+0.012	18
504.342	531	-0.010	19
508.450	533	-0.015	19
576.301	566	-0.022	19

Table II (cont.)

JD(Hel.)	E	O-C	Ref.
24 43578.353	567	-0.026	19
578.360	567	-0.019	19
578.363	567	-0.016	20
578.365	567	-0.014	19
578.366	567	-0.013	19
578.373	567	-0.006	19
732.597	642	-0.005	20

1. Dueball, J. and Lehmann, R.B., 1965, A.N.288, 167
2. Robinson, L.J., 1965, I.B.V.S.,No.111
3. Robinson, L.J., 1967, I.B.V.S.,No.180
4. Braune, W.,Hübscher,J. and Mundry,E.,1970,A.N.,292, 185
5. Baldwin,M.E.,1977, J.A.A.V.S.O., 5, 24
6. Robinson, L.J., 1966, I.B.V.S., No.154
7. Baldwin, M.E., 1977, J.A.A.V.S.O., 5, 84
8. B.B.S.A.G. Bulletin, 2, 1973
9. B.B.S.A.G. Bulletin, 20, 1975
10. B.B.S.A.G. Bulletin, 21, 1975
11. B.B.S.A.G. Bulletin, 26, 1976
12. B.B.S.A.G. Bulletin, 25, 1976
13. B.B.S.A.G. Bulletin, 27, 1976
14. Mallama, A.P. Skillman, D.R.,Pinto, P.A. and Krobusek, B.A., 1977, I.B.V.S. No.1249
15. B.B.S.A.G. Bulletin 34
16. Stephan, C.P., 1977, I.B.V.S.,No.1350
17. B.B.S.A.G. Bulletin, 32, 1977
18. B.B.S.A.G. Bulletin, 33, 1977
19. B.B.S.A.G. Bulletin, 37, 1978
20. B.B.S.A.G. Bulletin, 38, 1978

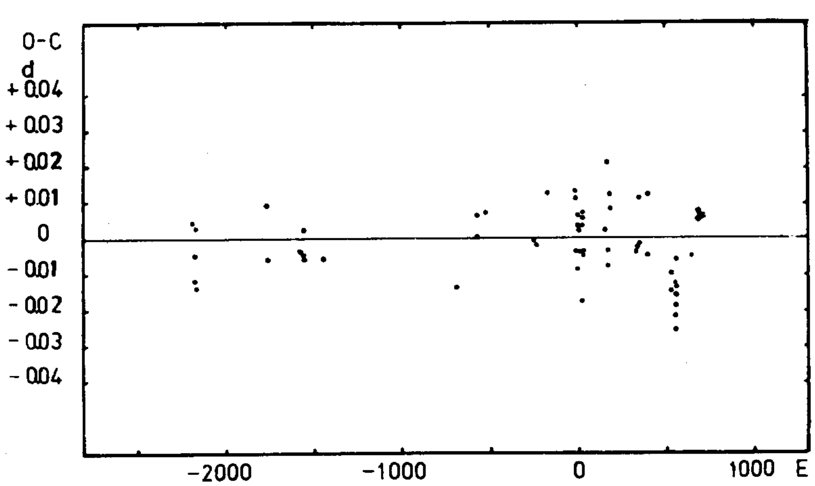

Figure 3

Since, the times of minima listed in Table II were all obtained visually, as is seen from Figure 3, the O-C values show a great scatter along the line corresponding to O-C=O. An attempt has been made to improve the values of epoch, T_O, and period, P, by representation of points with a straight line. However, this failed because the correlation coefficient turned out to be too small due to the great scattering of the points.

The analysis of the light curve is in progress.

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References:

1. Strohmeier, W., Knigge,R.,Veröff. Bamberg Bd. V, 5, 1960
2. Strohmeier, W., Sky and Tel. 26, 264, 1963
3. Mammano, A., Mannino, G. and Margoni, R., Mem.Soc.Ast.Italiana vol.38,fasc.3,1967

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SOME PECULIARITIES OF THE PULSATING STAR DELTA SCUTI

The pulsating star δ Sct differs in many respects from the other Delta Scuti stars. Frolov (1972) proposes that δ Sct is perhaps a dwarf cepheid. For this star Elliott (1974) gives a series of (especially photometric) peculiarities and discrepancies of the observational data.

It is of interest to study other characteristics of δ Sct. Using observational data of 59 Delta Scuti stars (Breger and Bregman, 1975) we have estimated their pulsation modes and have calculated the evolution and pulsation masses (Tsvetkov, 1977 a, b). Our results have indicated new peculiarities of δ Sct, which distinguish this star from the remaining Delta Scuti stars.

1. By comparison of the photometric M_V and "theoretical" M_{bol} absolute magnitudes (the latter are derived from theoretical period - effective temperature - luminosity relations for the four lowest modes) we have estimated the pulsation modes. The difference between the two kinds of luminosities for the estimated in this manner mode of a given star does not exceed 0.2-0.3mag. But for δ Sct this difference is about 1 mag: $M_V=1^m.62$, $M_{bol}=0^m.56$ for fundamental mode (for overtones M_{bol} is still smaller).

2. The pulsation M_Q and evolution M_e masses of all stars studied by us are consistent (in the limits of the accuracy of determination). For δ Sct, however, we have derived a too large difference: $M_Q=0.57\ M_\odot$, $M_e=1.66\ M_\odot$.

Using a scanning spectrometer, moreover, Doroshenko and Glushneva (1971) have observed a variable emission at λ 4501 Å in the δ Sct spectrum. The presence of a strong emission during the larger part of the pulsation period just at λ 4501 Å (if it would be confirmed by new observations) is perhaps another peculiarity of this star. We note that a weak emission in the spectral lines of the hydrogen (Valtier et al., 1975) or calcium (Dravins et al., 1977) has been observed in certain Delta Scuti stars.

The results of the investigations given above confirm Elliott's conclusion that "in nearly every respect δSct is the exception rather than the rule" for Delta Scuti stars. It is possible that δ Sct belongs to another type of variable stars, the mass is not "normal" and the evolution stage is different, or the ordinary photometric calibrations are not applicable to this star. Further detailed observations of δ Sct are needed to clarify these problems. The investigators must pay special attention to this star.

In conclusion we note that only ρ Pup of the remaining stars studied by us has similar but less expressed peculiarities: $M_V = 1^m.82$, $M_{bol} = 1^m.31$ for fundamental mode; $M_Q = 0.98\ M_\odot$, $M_e = 1.59\ M_\odot$. A chromospheric-type emission has been observed in this star (Dravins et al., 1977).

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References:

Breger, M., and Bregman, J.N., 1975, Ap.J., 200, 343

Doroshenko, V.T., Glushneva, I.N., 1971, Astron.Circ., No.652, 3

Dravins, D., Lind, J., Särg, K., 1977, Astron.& Astrophys., 54, 381

Elliott, J.E., 1974, A.J., 79, 1082

Frolov, M.S., 1972, Astron. Circ., No.671, 3

Tsvetkov, Ts., 1977 a, Dissertation, Moscow

Tsvetkov, Ts., 1977 b, Nauchnye Informatsii, 37, 63

Valtier, J.C., Le Contel., J.M., Sareyan, J.P., Baglin, A., 1975, I.A.U. Colloquium, No.29, Budapest, Part II, 243

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THE SPECTRAL TYPE OF BQ SERPENTIS

In the course of our observation of double mode Cepheids, several spectrograms of BQ Ser[1)] have been obtained at the Okayama Astrophysical Observatory. The observations were carried out on July 1978 with the use of image intensifier spectrograph attached the Cassegrain focus of the 188cm reflector. The dispersion is about 108Å/mm for the first order of the grating. All the plates were taken with the Kodak 103a-O emulsion. The covered wave length range is about λλ3900-5400.

For the spectral type determination, the Balmer H_β, H_γ, H_δ lines and the appearance of G band were used from a comparison with the spectra of MK standard stars obtained with same spectrograph. Table 1 lists the adopted standard stars. These are taken from Morgan and Abt[2)], Morgan and Keenan[3)], and Cowley[4)].

Table 1

Adopted MK standard stars

Standard star	Spectral type	References
HR 8025	F1 III	4
HR 7222	F2 III	2,4
HR 6577	F6 III	2,3,4
HR 9057	F8 III	4

Results are presented in Table 2. The last column gives the obtained ones from the $H_{\beta,\gamma,\delta}$ lines and the features of G band, respectively. The errors, based on the uncertainties of continuum level and the fluctuation of intensity curve, roughly correspond to the accuracy of 1-2 subdivision of spectral class. Especially using the H_γ profile, which is blended by the strong HgI emission line of city light, lacks the sufficient accuracy. Because of the above reason, no concerning is paid to the phase variation.

Table 2

Spectral type of BQ Ser

Plate No.	Date 1978	JD 2443000+	Spectral type $H_{\beta,\gamma,\delta}$	G band
IS 549	July 8	698.006	F5~F6	-
IS 550	July 9	698.154	F5~F6	F6
IS 552	July 14	703.149	F6~F7	F6

In conclusion, the mean spectral type of BQ Ser is F6. This result gives somewhat late type in comparison with the early reports of Herbig[5)] (F3 III) and Kukarkin et al.[6)] (F5 III).

The author would like to thank Dr. M. Takeuti for helpful advices. Messrs.S. Egawa and K. Hara are also acknowledged for their cooperation in the observations.

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References:

1. The precise photometric observations for the star has been carried out by L. Szabados (1977, Mitt.Sternw.Ung.Akad.Wiss., Budapest, No.70)
2. Morgan, W.W. and Abt, H.A., 1972, Astron.J., 77, 35
3. Morgan, W.W. and Keenan, P.C., 1973, Ann.Rev.Astron.Astrophys. 11, 29
4. Cowley, A. 1976, Publ.Astron.Soc.Pacific, 88, 95
5. Herbig, G.H. 1960, Astrophys.J. 131, 632
6. Kukarkin, B.V. et al., 1970, Gen.Cat.of Var. Stars,3rd.ed.Vol.2

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OBSERVATIONS OF BRIGHT T Tau STARS IN NGC 2264

Between December 16, 1972 and April 8, 1973 twenty exposures of the young galactic cluster NGC 2264 were taken with the 6" refractor of the Wilhelm Foerster Observatory on Kodak 103 a-f film. The limiting magnitudes of these exposures are between $14^{m}.5$ and $15^{m}.3$ V. Using the identification charts and V-magnitudes of Walker (1956), the magnitudes of seven bright T Tau stars were determined by the Argelander step method. Daily means of these magnitudes are listed in Table 1, they are uncertain by about $\pm 0^{m}.1$.

Rapid variability by about $0^{m}.4$ within half an hour is observed for IO Mon, MM Mon and S5192. LR Mon, MM Mon and MO Mon showed brightness fluctuations of about $0^{m}.5$ within some days. IP Mon showed only slow variability and S5181 seemed to be constant during these observations.

Table 1

Date (J.D.)	IO	IP	LR	MM	MO	S5181	S5192
2441 $668^{d}.3$		13.3	<13.5				13.2+
681.3	13.8	13.7	13.9	13.7:	13.7	13.1	14.1:
682.3	14.1:	13.6	14.0:	13.9:	14.0	13.3	14.3:
685.3	13.9	13.6	14.3	14.4:	13.7+	13.4	14.3
740.3	13.7	13.6	14.0	14.1	13.8	13.4	14.2
758.3	13.8:	13.2	<14.3	14.0:	14.1:	13.5	<14.3
764.3	13.6	13.5	14.0	13.5	<13.7	13.2	<14.0
766.3	13.6	13.4	14.1	14.2:	14.1	13.2	13.9:
772.3	13.8+	13.4	14.1:	13.9+	13.7	13.3	14.2:
773.3	13.7	13.5	14.1	13.6	13.7	13.3	14.2
781.3	13.7	13.4	14.1	13.8	13.6	13.3	14.1

+ rapid variability by $0^{m}.4$ within half an hour observed

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Reference:

Walker, M.F. 1956 - Astrophys.J.Suppl. 2, 365

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BVRI OBSERVATIONS OF TWO SUSPECTED VARIABLES

Observations on the Johnson BVRI system are reported for two suspected variables. The Purdue High Speed Photometer, described by Barnes _et al_. (1978), was used in making the observations. The instrumental system and reduction procedures are discussed by Moffett and Barnes (1979).

Most of the observations were obtained on the 91-cm and 76-cm reflectors at McDonald Observatory and a few were also made on the 61-cm reflector at the Table Mountain Observatory and the No. 2, 91-cm telescope at Kitt Peak National Observatory.

The results for the two suspected variables: BS2018 and BS8726 are given in Table I. The estimated uncertainties for a single observation are: V = ± 0.014, (B-V) = ± 0.009, (V-R) = ± 0.009, and (R-I) = ± 0.012.

The General Catalogue of Variable Stars does not list BS2018 as a suspected variable but the results reported here clearly show variability over the 444 days covered. The GCVS lists BS8726 as suspected variable #102221 but over the 141 days covered by our observations, no strong variability was detected.

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References :

Barnes, T.G., Evans, D.S., and Moffett, T.J., 1978, M.N.R.A.S., 183, 285.

Moffett, T.J., and Barnes, T.G., 1979, P.A.S.P., (submitted).

TABLE I

SUSPECTED VARIABLES

BS2018

HJD (2440000.+)	V	(B-V)	(V-R)	(R-I)
3128.79	6.195	1.675	1.683	1.387
3129.70	6.206	1.768	1.692	1.386
3130.82	6.202	1.714	1.585	1.383
3132.73	6.192	1.729	1.573	1.410
3135.87	6.195	1.727	1.590	1.372
3138.86	6.200	1.725	1.585	1.364
3144.77	6.243	1.744	1.596	1.374
3429.96	6.259	1.732	1.589	1.391
3508.82	6.251	1.724	1.633	1.325
3511.66	6.219	1.729	1.641	1.345
3516.67	6.248	1.728	1.638	1.317
3517.77	6.273	1.718	1.640	1.320
3564.59	6.268	1.768	1.654	1.275
3572.62	6.294	1.703	1.707	1.288

BS8726 = # 102221

HJD (2440000.+)	V	(B-V)	(V-R)	(R-I)
3367.00	4.977	1.779	1.363	1.027
3371.00	4.966	1.771	1.368	1.016
3376.99	4.960	1.778	1.353	1.044
3377.88	4.982	1.779	1.382	1.013
3397.86	4.986	1.771	1.370	1.024
3398.85	4.997	1.766	1.362	1.040
3427.68	5.004	1.809	1.375	1.016
3496.60	5.006	1.797	1.394	1.015
3508.56	5.022	1.804	1.415	1.007

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NOTE ON 16 LACERTAE, AN ECLIPSING SYSTEM WITH A β CEPHEI PRIMARY

The single-line spectroscopic binary 16 Lacertae, the primary component of which is a well-known β Cephei variable, was recently discovered by Jerzykiewicz et al. (1978) to be an eclipsing system . The discovery resulted as a by-product of frequency analysis of two extensive series of photoelectric observations of the star. The first series consisted of over one-thousand blue magnitude observations, obtained by the present writer on 31 nights in the summer and autumn of 1965 at the Lowell Observatory. As it turned out, these data could be represented by a synthetic light-curve, having the form of a sum of three sine-wave components with frequencies of 5.9112, 5.5032, and 5.8551 cycles/day, and the corresponding amplitudes of $0^m.020$, $0^m.011$, and $0^m.010$, respectively. The agreement between the observed and computed variation was satisfactory, except that on one night a number of points fell below the synthetic curve by as much as $0^m.040$.

The second series consisted of about five-hundred blue magnitudes, secured by Jarzebowski, Jerzykiewicz, Le Contel, and Musielok in the autumn of 1977 at the San Pedro Mártir Observatory of the National University of Mexico, the Mt.Chiran station of the Haute Provence Observatory, and the Białków station of the Wrocław University Observatory. Three components, with frequencies identical to those determined previously, were also found in these data, although with amplitudes much smaller than in 1965. Again, the synthetic light-curve fitted the observations well, except that on one night several points deviated in much the same manner as on the above-mentioned one night in 1965.

Jerzykiewicz et al. (1978) noticed that the difference between the moments of the greatest deviations in 1977 and 1965, divided by the spectroscopic orbital period of $12^d.097$, amounted to very nearly a whole number. They also found that the orbital phases of the deviating observations corresponded to the point at which the descending branch of the orbital velocity-curve crosses the γ-axis. Jerzykiewicz et al. (1978) concluded, therefore, that the deviations of the observed brightness of 16 Lac from the synthetic light-curves were due to an eclipse. The duration and depth of the eclipse they estimated as equal to $0\overset{d}{.}4$ and $0\overset{m}{.}040$, respectively.

In this note the light-curve of the eclipse of 16 Lacertae derived from the above mentioned 1965 and 1977 observations is presented. Moreover, results of a solution based on the spherical model are briefly discussed - details will be published elsewhere.

In Figure 1 the deviations from the above-mentioned 1965 and 1977 synthetic light-curves are plotted as a function of orbital phase computed according to the following elements:

$$\text{Minimum light} = JD_{\odot}2439054.575 + 12\overset{d}{.}09684 \cdot E \qquad (1)$$
$$\pm.005 \qquad \pm.00003$$

All observations with orbital phase within the interval 0.95 to 0.05 are shown - points represent the 1965 data obtained on seven nights, while open circles correspond to observations taken on one night in 1977 at the Mt. Chiran and San Pedro Mártir Observatories (left and right of the mid-eclipse phase, respectively). The improved value of the orbital period in eq. (1) was derived by forcing the 1965 and 1977 data to agree in phase along the ascending branch of the light-curve.

According to the spectroscopic orbital elements of Fitch (1969), the orbit of 16 Lacertae is very nearly circular ($e=0.035 \pm 0.03$), with $K_1 = 23.0 \pm 0.6$ km/sec, $a_1 \sin i = 3.82 \times 10^6$km, and the mass-function $f(\mathfrak{M}) = 0.0152\,\mathfrak{M}_{\odot}$. From this value of the mass-function one gets the mass ratio $q = \mathfrak{M}_2/\mathfrak{M}_1 < 0.2$, if only $i > 55^{\circ}$ and $\mathfrak{M}_1 > 6\mathfrak{M}_{\odot}$. Thus, from the fact that an eclipse is observed, for any value of $\mathfrak{M}_1$, even remotely consistent with the primary's MK type of B2 IV, it follows that the mass of the secondary is of the order of $1 \cdot \mathfrak{M}_{\odot}$, and that $a_1 + a_2$ amounts to at least 3×10^7km. Consequently, the system is a detached one, with the secondary contributing a negligible fraction of total light, unless the radii of the components are very much greater than their main-sequence values. This conclusion is borne out by the circumstance that no proximity effects are observed.

In view of these results, a solution based on the simple

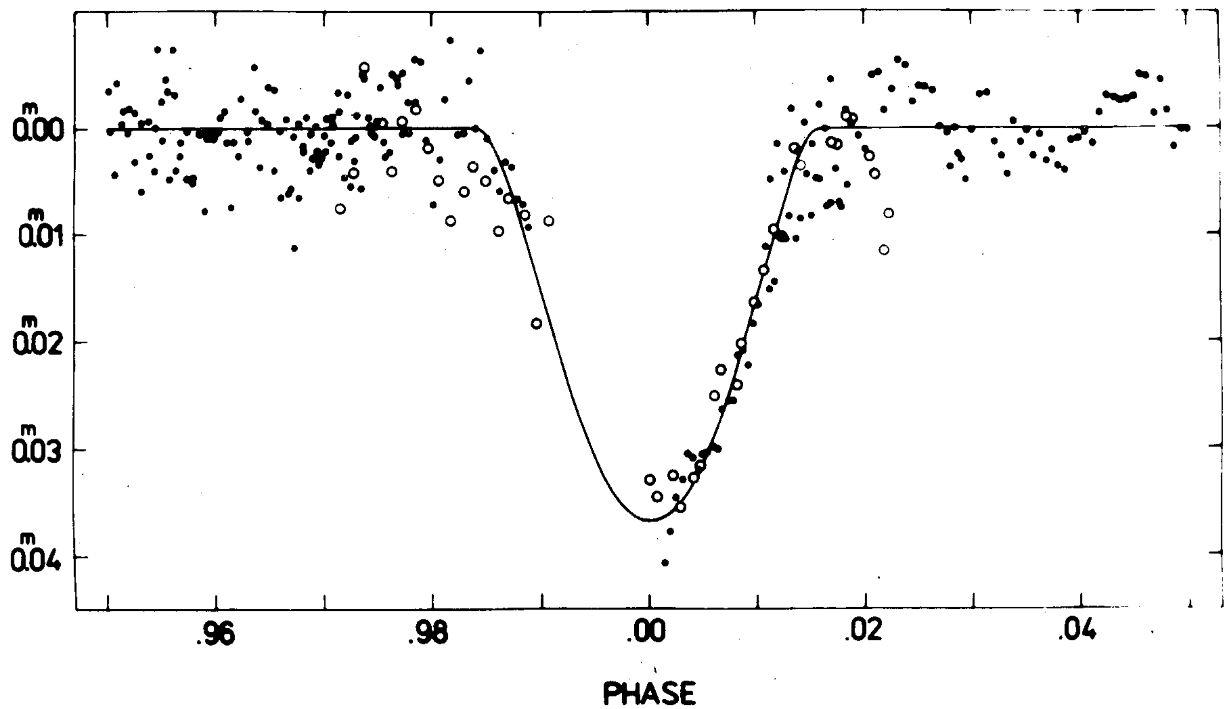

Figure 1. The primary eclipse of 16 Lacertae. The deviations from synthetic light-curves are plotted against the phase of the $12^{d}.09684$ orbital period. All observations were taken in the blue spectral region. The 1965 and 1977 data are shown with points and open circles, respectively. The line corresponds to the solution presented in Table 1.

spherical model was attempted. The contribution of the secondary to the total light of the system was neglected and for the primary the cosine law of limb darkening was assumed with the limb darkening coefficient of 0.4. Use was made of the Fitch's (1969) spectroscopic orbital elements. A number of trial solutions were computed for different values of radius and mass of the primary. It was found that a satisfactory agreement with the observations can be obtained for a radius consistent with the observed position of the star on the H-R diagram, and its mass derived from Population I evolutionary tracks. These values are $R_1=5.76\ R_\odot$ and $\mathfrak{M}_1=10.1\mathfrak{M}_\odot$, with the star still in the hydrogen-burning stage (Sterken and Jerzykiewicz, in preparation). The solution is given in Table 1, and the corresponding computed light-curve is shown in Fig.1 with a solid line.

Table 1

The Eclipsing System 16 Lacertae

Duration of the eclipse = $0^d.37 \pm 0^d.02$
Depth of the eclipse = $0^m.037 \pm 0^m.002$

$i=84^\circ.14$	
$R_1= 5.76\ R_\odot$	$R_2= 1.21\ R_\odot$
$\mathfrak{M}_1=10.1\mathfrak{M}_\odot$	$\mathfrak{M}_2= 1.26\mathfrak{M}_\odot$
$a_1= 3.84\times10^6$km	$a_2= 30.8\times10^6$km

Using these values it can be easily verified that the system is indeed a detached one, with the radius of the primary amounting to less than one-third of the radius of its Roche lobe. The radius and mass of the secondary are consistent with it being a main-sequence object. The mass ratio is q=0.125, by far the smallest known among unevolved eclipsing binaries.

The eclipse is a partial transit. At the mid-eclipse phase about 83 percent of the disc of the secondary is projected onto the primary. This circumstance opens an interesting possibility of investigating the changes of the primary component's geometry, caused by its oscillations, by means of observing the differences in the shape of the eclipse at different epochs.

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References:
Fitch, W.S. 1969, Ap.J. 158, 269
Jerzykiewicz, M., Jarzębowski, T., Le Contel, J.-M. and Musielok, B. 1978, I.B.V.S. No.1508

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B V OBSERVATIONS OF SIX RED VARIABLE STARS

Using an uncooled RCA 1P21 photomultiplier behind Schott filters BG 12 + GG 13 for B and GG 11 for V, photoelectric observations of red variable stars were made with the 75 cm telescope of the Wilhelm-Foerster Observatory. Four of the measured stars belong to the Mira-Ceti type, and the others are of type SRa (W Cyg) and Lb (VY UMa). Table 1 lists the obtained observations and Table 2 contains the used comparison stars. Some magnitudes and colours of comparison stars are taken from the USNO-catalogue, the rest was determined by measuring nearby standard stars.

It is well known from visual observations that Mira variable stars differ in maximum heights and light-curve from cycle to cycle. A comparison of the presented measurements of Chi Cyg and T Cep with older UBV observations of Landolt (1968, 1969) at the same phase of the V-light-curve shows that also the colour (B-V) differs, too, from cycle to cycle.

The presented colour (B-V) of the SRa star W Cyg is constant during the observed rise in V. This is in good agreement with the measurements of Smak (1964) during a decline.

The accuracy of the presented observations is in the order of $\pm 0^{m}.02$ for V and in the order of $\pm 0^{m}.01$ for (B-V).

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References:

Landolt, A.U., 1968, Publ.Astron.Soc.Pacific 80, 680
1969, Publ.Astron.Soc.Pacific 81, 134
Smak, J., 1964, Astrophys. J. Suppl. S. 9, 141

Table 1
Observations

Star	Julian Date	V	B-V
T Cep	2443 790^d	6.01	+1^m.52
	794	6.11	1.47
	808	6.42	1.54
	828	7.00	1.58
	833	7.16	1.59
	847	7.53	1.60
	862	8.05	1.64
R Cyg	328	8.15	1.81
W Cyg	794	6.29	1.51
	808	6.27	1.57
	828	6.00	1.46
	833	5.84	1.51
	848	5.57	1.58
Chi Cyg	790	4.43	1.66
	794	4.49	1.86:
	828	5.75	1.73
	832	5.87	1.87
	848	6.46	1.90
R Tri	808	9.24	1.35
	833	8.45	1.19
	848	7.82	1.12
	862	6.95	1.18
VY UMa	254	6.10	2.43:
	605	6.15	2.52
	606	6.14	2.43:

The observation of R Cyg was made with the 12" refractor and the first observation of VY UMa was made with the 6" refractor of the Wilhelm Foerster Observatory.

Table 2
Comparison Stars

Star	V	B-V	Variable
SAO 019214	6^m.95	+0^m.06	T Cep
019211	8.17	+0.27	
031845	9.00	+1.50	R Cyg
031823	9.91	-0.09	
051109	6.19	+0.19	W Cyg
051161	6.72	-0.06	
068827	4.97	+0.47	Chi Cyg
068895	6.46	+0.20	
068835	6.18	+1.13	
068902	7.51	+1.24	
055741	7.85	+0.54	R Tri
055744	8.29	+1.22	
015269	5.00	+1.39	VY UMa

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PHOTOELECTRIC UBV LIGHT CURVES AND PERIOD DETERMINATION OF BX ANDROMEDAE

The variable nature of BX Andromedae (=ADS1671A=HD 13078 =BD+40° 442=SVS 995 And) was announced by Soloviev (1945). Observed times of minima have been published by Soloviev (1945), Ashbrook (1951, 1952, 1953), Svolopoulos (1957), Chou (1959), Oburka (1965), Robinson (1965), Pohl and Kizilirmak (1970,1974), and Meyer (1972). Light elements have been published by Ashbrook (1951), Svolopoulos (1957), and Chou (1959).

Kukarkin (1969) listed BX And as a W Ursae Majoris type system. W UMa systems are defined as close eclipsing binaries that have periods less than one day. They often show period variations and variation in maximum and minimum magnitude from cycle to cycle. Furthermore, VW Cephei, another W UMa star has recently found to be an X-ray source (Cruddace, Dupree and Carroll, private communication).

BX And is a relatively bright W UMa system well placed for northern observers. Chou (1959) reported that BX And apparently underwent a period increase in 1952. To study this effect, new UBV observations of BX And were obtained on October 26/27 and 27/28, 1978 and all available previous observational material collected. Because BX And shows some of the same characteristics as VW Cephei, observations are published at this time.

UBV photoelectric observations were made with the Yerkes Observatory 61cm reflector using a refrigerated 1P21 photomultiplier and pulse counter. BD+39°476 was used as the comparison star. BD+39°481 and BD+39°484 were used as check stars. One primary minimum and one secondary minimum were observed. The Julian dates were, respectively, 2443809.8873 and 2443809.5705 (±0.0005).

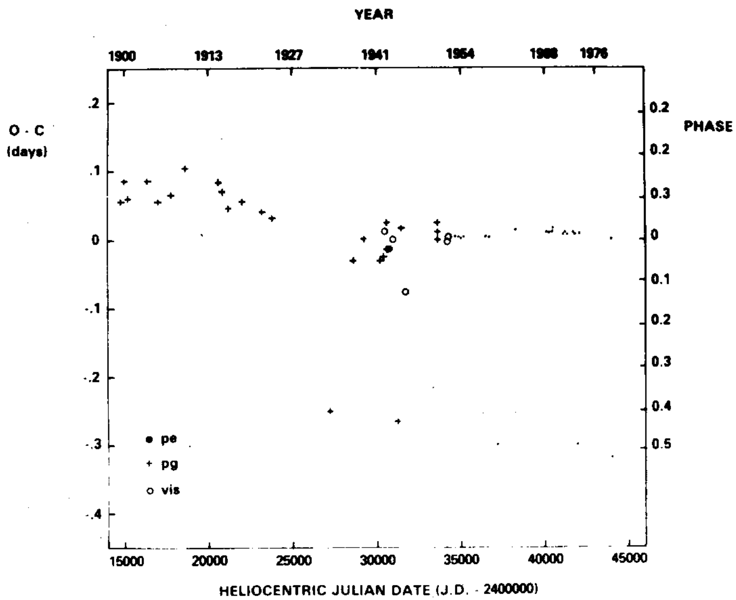

Fig. 1. O – C diagram for the times of minima calculated using the period 0.61011508^{d}

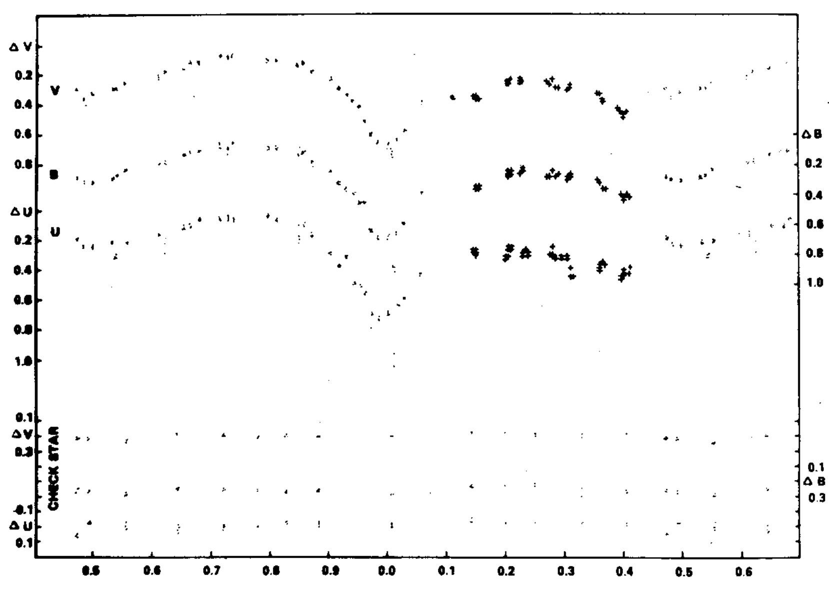

Fig. 2. UBV observations of BX And on 1978 Oct. 26/27 (crosses)
and Oct. 27/28 (dots)

The new times of minima allow the period and ephemeris to be improved. Combining these observations with the previous material gives the following elements:

$$\text{Hel JD MinI} = 2443809.8873 + 0^{d}.61011508 \cdot E$$

Figure 1 shows the residuals of observed minima for BX And computed from the above elements. The few available secondary minima timings are also shown, displaced 0.5 in phase. It is seen that a definite period change occurred between JD 2424000 (1924) and JD 2427360 (1936). There is some indication, especially from the secondary minima, of a period variation around 2433500 (1950).

Figure 2 shows the magnitude difference between BX And and the comparison star BD+39°476 versus phase. The light curves indicate depths of the two minima of about the two minima of about $0^{m}.65$ and $0^{m}.30$ in each color. Comparison of the two nights of observation shows apparent variation in the magnitude at maximum. No similar difference between the two nights was found for the check star. Also, anomalous spikes near primary minimum were observed in all colors. The large decrease in magnitude (about $0^{m}.1$ in the V, $0^{m}.2$ in the B, and $0^{m}.3$ in the U) occurred in less than one minute. No instrumental problem could be found and the effect was apparently real.

The author wishes to extend his gratitude to Dr.L. Hobbs and the staff of Yerkes Observatory for the allotment of observing time and their assistance, and Dr.W.Osborn whose suggestion and comments for the paper are greatly appreciated.

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References:

Ashbrook, J., 1951, Astron.J., 56, 54
Ashbrook, J., 1952, Astron.J., 57, 259
Ashbrook, J., 1953, Astron.J., 58, 171
Chou, K.C., 1959, Astron.J., 64, 468
Kukarkin, B.V.,et al., 1969,"Gen.Cat.of Var.Stars",3rd ed.,Vol.1
Meyer, A., 1972, I.B.V.S. No.668
Oburka, O., 1965, Bull.Inst.Czechoslovakia, 16, 212
Pohl, E. and Kizilirmak, A., 1970, I.B.V.S. No.456
Pohl, E.,and Kizilirmak, A., 1974, I.B.V.S. No.932
Robinson, L.J., 1965, I.B.V.S. No.119
Soloviev, A., 1945, Astr.Circ.Acad.USSR, No.44
Svolopoulos, S.N., 1957, Astron.J., 62, 330

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Konkoly Observatory
Budapest
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PHOTOMETRIC BEHAVIOUR OF Be STARS IN THE LIGHT OF RECENT ACTIVITY OF EW Lac

EW Lac (HD 217050, HR 8731, MWC 394) is a well-known shell and Be star observed now for almost 100 years. The spectrum of the star was variable until the end of the World War I. Emission and shell features appeared and disappeared several times. However, from 1926 to the end of 1977 the star was quite inactive. It exhibited a well-developed shell spectrum and double emission components of hydrogen and strongest metallic lines, with the V/R ratio always close to unity. Hydrogen shell lines are resolvable up to H42 on our 4.2 Å/mm spectrograms taken in 1973.

During the whole stable period, only mild velocity variations of the shell lines were observed - radial velocity being always in the range from -10 to -30 km/s. A detailed study of these variations (based on some 200 Ondřejov and Okayama coudé spectrograms of 1965 - 1978) is now being prepared in collaboration of Drs. Hirata and Kogure from Japan and Harmanec, Koubský, Krpata and Ždárský from Czechoslovakia.

The photometric variability of EW Lac was discovered by Walker (1953) who found cyclic variations of the V magnitude with characteristic duration of about 0.8 days and with variable amplitude. Lester (1975) detected a 0.7-day quasi-periodicity in his 1972 four-colour measurements of the star. As far as we know, any systematic study of the photometric behaviour of EW Lac on longer time scale has not been published so far.

In 1978, the shell of EW Lac has become active again. We have found a strong Balmer progression on a spectrogram taken in July 7.9, 1978, and the V/R ratio of the Hβ emission much larger than 1 on another spectrogram taken on December 5.9, 1978 (see Hadrava et al., 1978).

The purpose of this note is to present UBV photometric measurements of the star obtained during 1972 - 1978 at the Hvar Observatory, and to show that the activity of the shell was accompanied by a large change especially in the U-B index of the object. We measured the star differentially (relative to 4 Lac and 5 Lac) - always in the July - September period in the years 1972, 1974, 1975, 1976, 1977 and 1978. The measurements were carefully transformed to the international UBV system assuming Johnson's et al., (1966) values V = 4.58, B-V =+0.09, U-B =-0.34 for 4 Lac. For 5 And, we used the values V = $5^m.688$, B-V =$+0^m.433$, U-B =$+0^m.013$, which we derived differentially relative to 4 Lac. No measurable variations of either 4 Lac or 5 And were detected.

Our series of measurements during individual nights cover usually less than 0.2 days and do not indicate variations larger than $0^m.05$. Consequently, we used nightly mean UBV values to construct the U-B versus B-V diagram shown in Fig.1. Different ob-

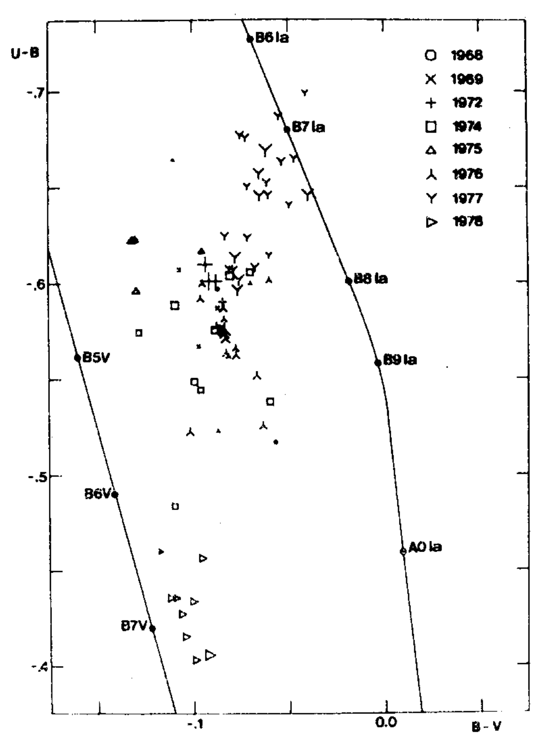

Figure 1

serving seasons are denoted by different symbols. The 1968-1969 measurements are from Haupt and Schroll (1974), corrected to our values for 5 And. Position of unreddened main sequence and Ia supergiants is also shown in Fig.1. Grouping of the points of individual seasons is clearly visible, which lends support to our conclusion that the long-term variations are much larger than the variations occurring on shorter time-scales (unless the variations are strictly periodic with a period very close to one day, which is improbable).
Similar behaviour is known also for 88 Her (Harmanec et al.,1978), BU Tau (Sharov and Lyuty, 1976), π Aqr (Nordh and Olofsson, 1977) and for some other Be stars.

Thus, we cannot agree with a recent conclusion by Percy (1979) that "it is becoming increasingly evident that the major light variations of Be stars occur on a time scale of hours rather than a time scale of days or weeks as previously believed...". In all cases known to us, the long-term light and colour variations of Be stars, occurring on a time scale of years, are the most pronounced ones. It seems that these variations and the long-term spectral variations of Be stars (appearance and disappearance of emission and shell lines) are closely connected and are therefore consequences of the same physical cause. In this sense these variable Be stars could be understood as very mild examples of reccurrent novae.

On the other hand, it is apparent from Fig.1 that also variations occurring on shorter time scales do exist and the questions such as: which is the relation between these and long-term variations or which is the relation between Be stars and β Cep variables are very exciting. What is urgently needed in this connection are longer systematic series of photoelectric observations of Be stars, which are almost lacking so far. We appeal to all photometrists securing the data for Be stars to use always differential photometry and to transform their data to international systems. Otherwise, very important information is lost.

Finally, we want to remark that the large change of EW Lac, which occurred during 1978, can be formally interpreted as if the object had changed its luminosity class from Ia to V without changing the spectral type B7. It will be interesting to see whether this is a pure coincidence or whether this finding has some connection with the observed changes in the spectrum.

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References:

Hadrava, P., Harmanec, P., Koubský, P., Krpata, J., Žďárský, F., (1978) IAU Circular No. 3317

Harmanec, P., Horn,J., Koubský, P., Kříž, S., Žďárský, F., Popoušek, J., Doazan, V., Bourdonneau, B.,Baldinelli,L., Ghedini, S., Pavlovski, K.,(1978) Bull.Astr.Inst.Czech. 29, 278

Johnson, H.L.,Mitchell, R.I., Iriarte, B.,Wiśniewski, W.Z.(1966) Comm. Lunar Planet.Lab. 4, 99

Lester, D.F. (1975) Publ.Soc.Pacific 87, 177

Nordh, H.L. and Olofsson, S.G.(1977) Astron.Astrophys.56, 117

Percy, J.R. (1979), I.B.V.S. No. 1530

Sharov, A.S., Lyuty, V.M. (1976) in "Be and Shell Stars" (ed. by A. Slettebak),Proc.IAU Symp.No.70,D.Reidel,Dordrecht Holland, p. 105

Walker, M.F., (1953), Astrophys.J. 118, 481

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A BRIGHT, SHORT PERIOD ECLIPSING VARIABLE IN TAURUS

The star SAO 077615, not previously reported as variable, was observed on 11 December 1978 and 1 January 1979 with an unfiltered S-20 photomultiplier attached to the 61 cm reflector of the Table Mountain Observatory in Wrightwood, California. The best composite fit of the lightcurves to one another results from assuming that 62 double cycles occured in 505.0 hours. The resulting period is $8^h08^m43^s\pm5^s$. A somewhat poorer, but not unreasonable fit can be obtained by assuming only 61 cycles occured in the same interval, yielding a period of $8^h16^m43^s\pm5^s$. Figure 1 is a composite lightcurve for the former value of the period.

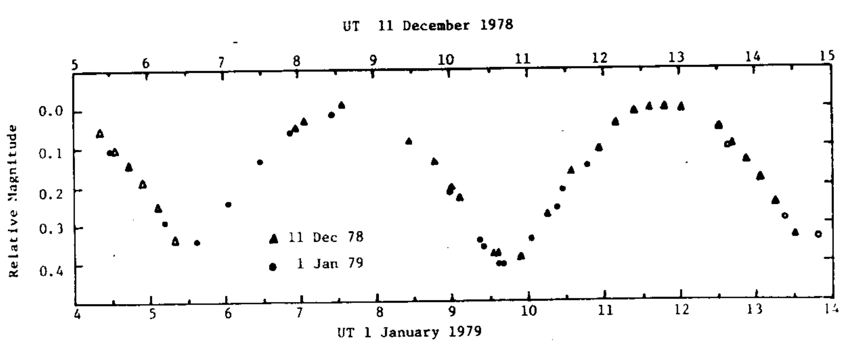

Figure 1

Open symbols are repeated data, plotted ±1 cycle from the actual times of observation. The observations have not been corrected for light time.

The star is listed in the SAO catalog as m_V= 8.6 and spectral class G0. The 1950 coordinates are given as:

$$\alpha = 5^h 47^m 06^s$$
$$\delta = 26^\circ 56' 58''$$

Figure 2 is a finding chart for the star, identified by "V". All stars brighter than $m_V \approx 9.5$ are included within the coordinate lines, and stars to $m_V \approx 12.5$ are shown in the immediate vicinity of the star.

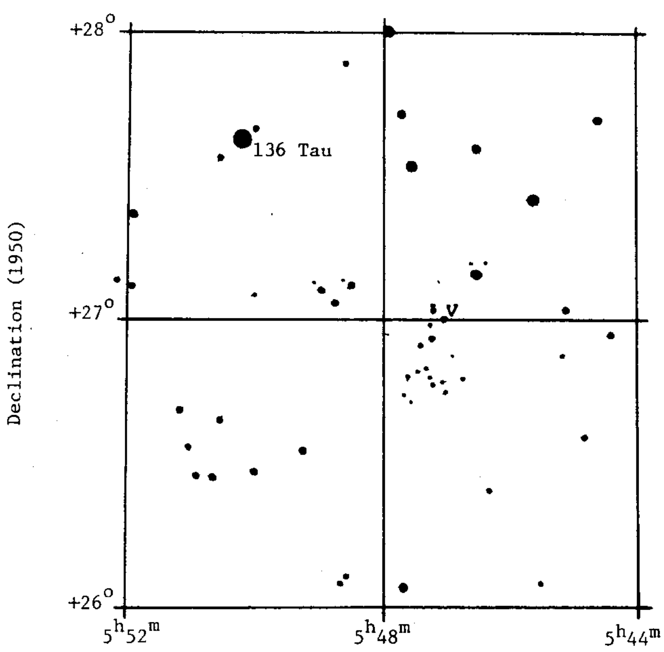

Figure 2

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UBV OBSERVATIONS OF RR Lyr

A series of UBV observations of RR Lyr was made, beginning just before maximum brightness, on August 31, 1978. The twin telescope of the Shemakha station of the Zentralinstitut für Astrophysik (see Hildebrandt, Panov, 1975) was used. The comparison star was HD 182487. The results are shown in Table I.

The observed magnitude differences were transformed to the UBV system with the help of UBV magnitudes for HD 182487 given by Preston et al. (1965) and transformation coefficients obtained from observations of ten standard stars. With each magnitude its quadratic error and the number of observations N is given. The V maximum (7.20 mag) is at JD (hel.)=2443752.205. No indications of short time brightness fluctuations have been found.

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References:

Hildebrandt,G., Panov,K.,(1975) IAU Coll.No.29,Budapest,p.85,Vol.2
Preston, G.W., Smak,J.,Paczynski, B.,(1965) Ap.J.Suppl.XII,99

Table I

UBV Magnitudes for RR Lyr

JD(hel.) 2443752+	V		N	B		N	U		N
.197	7.206	0.003	5	7.391	0.005	5	7.524	0.005	5
.202	7.198	0.002	5	7.375	0.003	5	7.525	0.006	5
.205	7.198	0.003	5	7.376	0.002	5	7.531	0.006	5
.209	7.195	0.007	5	7.376	0.002	5	7.548	0.007	5
.213	7.211	0.004	5	7.387	0.003	5	7.548	0.006	5
.220	7.241	0.003	5	7.424	0.003	5	7.586	0.004	5
.224	7.253	0.005	5	7.446	0.003	5	7.613	0.005	5
.228	7.275	0.003	5	7.469	0.003	5	7.633	0.005	5
.232	7.292	0.005	5	7.491	0.003	5	7.653	0.006	5
.235	7.312	0.004	5	7.517	0.006	5	7.666	0.006	5
.243	7.345	0.002	5	7.567	0.005	5	7.718	0.006	5
.247	7.357	0.004	5	7.588	0.003	5	7.736	0.005	5
.251	7.384	0.002	5	7.607	0.012	4	7.748	0.012	5
.254	7.395	0.004	5	7.637	0.003	4	7.768	0.004	5
.258	7.418	0.004	5	7.657	0.002	3	7.797	0.004	5
.278	7.485	0.004	5	7.753	0.003	5	7.881	0.007	3
.281	7.500	0.002	5	7.774	0.003	5	7.900	0.007	3
.284	7.514	0.003	5	7.795	0.004	5	7.913	0.007	3
.288	7.531	0.002	5	7.811	0.003	5	7.928	0.007	5
.291	7.541	0.004	5	7.829	0.002	5	7.951	0.004	2
.300	7.562	0.005	5	7.860	0.004	5	7.976	0.002	3
.303	7.571	0.003	5	7.872	0.004	5	7.970	0.002	2
.307	7.583	0.003	5	7.890	0.003	5	7.995	0.005	3
.310	7.600	0.002	5	7.909	0.003	5	8.009	0.005	5
.314	7.607	0.003	5	7.923	0.004	5	8.023	0.003	5

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SMALL VARIATIONS IN BRIGHTNESS OF NOVA CYGNI 1975

Photoelectric observations of Nova Cygni 1975 were carried out from September 25 till October 7, 1975. During every observational night, the observations were going on for several hours in order to be able to detect any variation in Nova's brightness, which usually appeared during the transition phase (McLaughlin, 1960). In the case of Nova Cygni 1975 the transition phase coincides with the interval from about September the 9th to early October (Lockwood and Millis, 1976).

The 63cm Newall refractor of Pentelis Astronomical Station was used, together with the two beam, multi-mode, nebular stellar photometer (Goudis and Meaburn, 1973) of the National Observatory of Athens. The filters used - B and V are in close accordance with the standard ones. The observations have been reduced using Hardie's method (1962) and the standard error was found to be $\pm 0\overset{m}{.}01$ in V and $\pm 0\overset{m}{.}02$ in B.

Figures 1-3 show the short duration and small amplitude detected variations in Nova's brightness.

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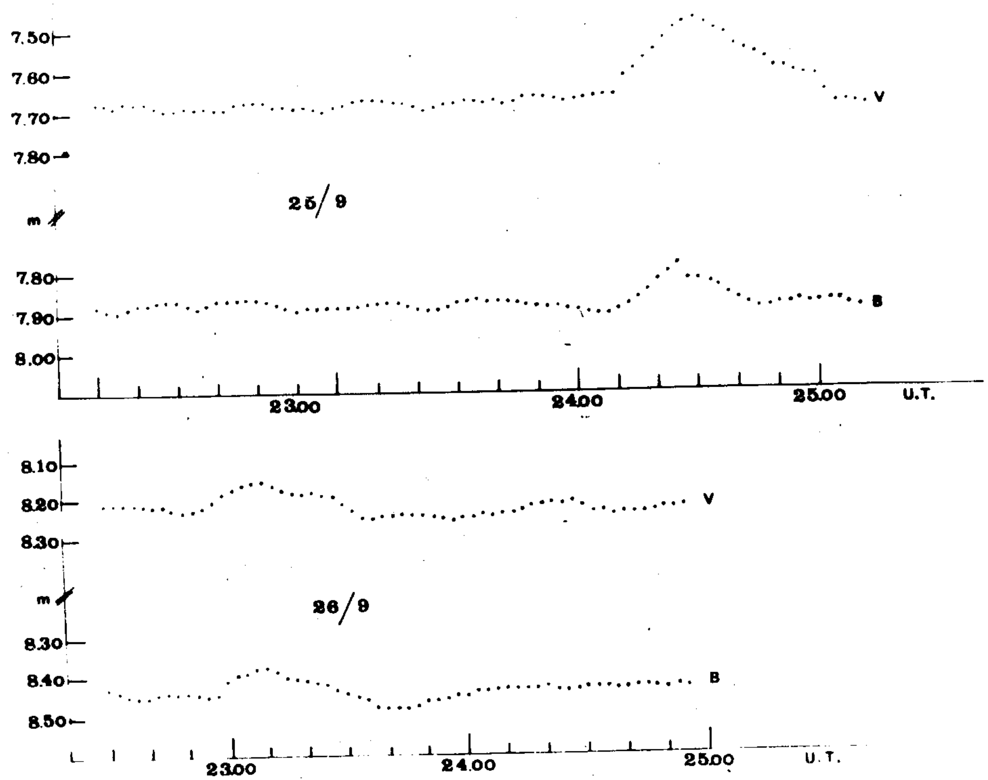
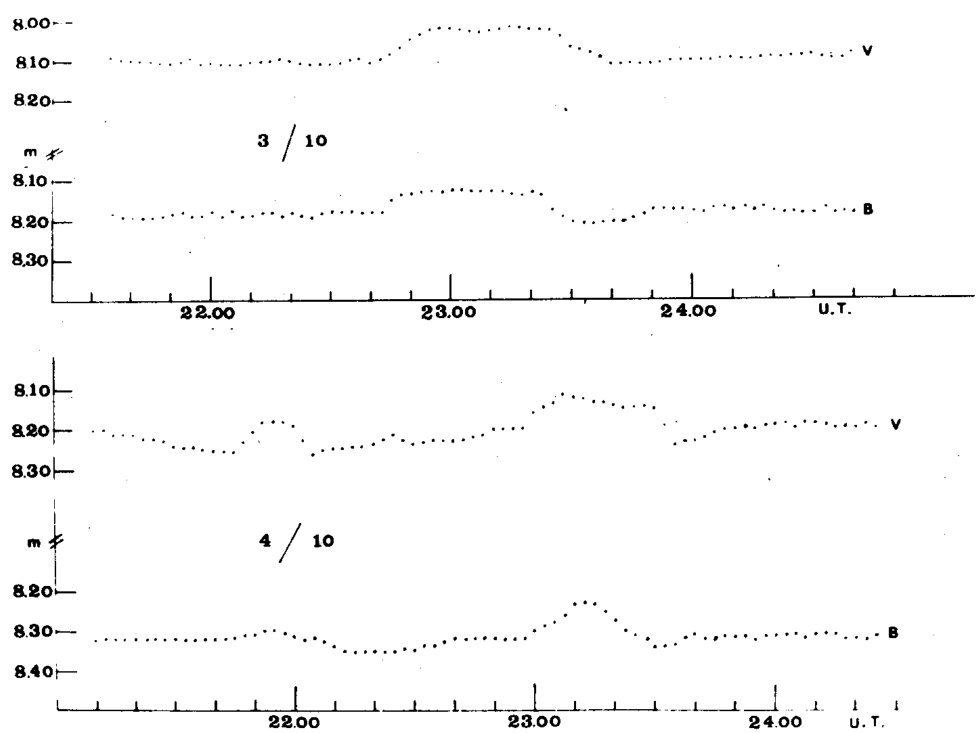
References:

1. Goudis, C. and Meaburn, J.,1973, Astrophys.and Sp.Sci.,20,149
2. Hardie, R.H.,1962,Astronomical Techniques, Stars and Stellar Systems Vol.II,ed.Hiltner,W.A., The University of Chicago Press
3. Lockwood, G.W. and Millis, R.L., 1976,Publ.A.S.P., 88, 235
4. McLaughlin, D.B.,Stellar Atmospheres, Kuiper,G.P. and Middlehurst, B.M. eds., University of Chicago Press



7.50
7.60
7.70
7.80
m
25/9
V
7.80
7.90
8.00
B
23.00
24.00
25.00
U.T.
8.10
8.20
8.30
V
m
26/9
8.30
8.40
8.50
B
23.00
24.00
25.00
U.T.

Figure 1


8.00
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3 / 10
V
m
8.10
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B
22.00
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8.10
8.20
8.30
V
m
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8.20
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B
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Figure 2

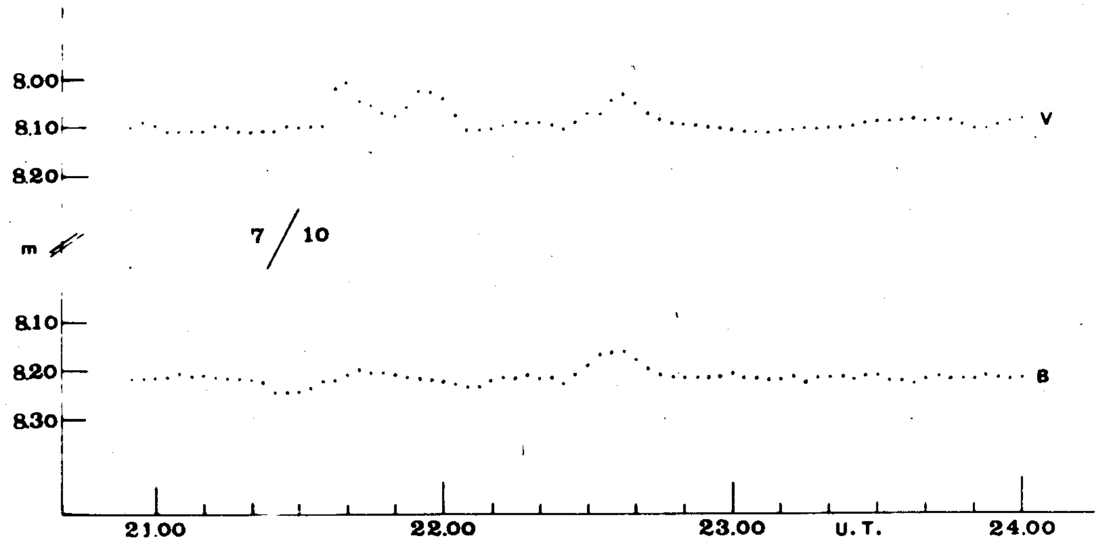

Figure 3

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Budapest
1979 February 26

RECENT PHOTOMETRY OF WZ Sge

During December 1978 we obtained photoelectric observations, mostly V, of WZ Sge using the Seyfert 60-cm telescope at the Dyer Observatory. The differential V and (B-V) observations, with respect to the Krzeminski and Kraft (1964) comparison star BD +17°4225, are listed in Tables I and II, respectively. They are in the sense, comparison minus variable. We estimate that the accuracy of our ΔV and Δ(B-V) data is of the order of $\pm 0\overset{m}{.}007$ and $\pm 0\overset{m}{.}012$, respectively. Most of our ΔV data is shown in the figure, where the phases have been obtained from the epoch and period of Robinson, et al., (1978) and each night's results have been plotted separately. On those nights over which more than one cycle of the orbital period was observed the second cycle observations are shown as crosses. The light variations on individual nights do show some evidence for the small time scale flickering (2 to 10 minutes) noted by Patterson and McGraw (1978). We also call attention to the virtual doubling of the ΔV amplitude over a two day period, from about $0\overset{m}{.}13$ on HJD 2443855 to about $0\overset{m}{.}27$ on HJD 2443857. A straight averaging of each night's (B-V) data indicate that the color index of WZ Sge becomes progressively redder as the recurrent nova decreases in brightness.

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References:

Krzeminski, W. and Kraft, R.P. 1964, Ap.J. 140, 921
Patterson, J. and McGraw, J.T., 1978, I.A.U. Circular No. 3311
Robinson, E.L., Nather, R.E., and Patterson, J. 1978,Ap.J.219,168

Table I

Differential V Data for WZ Sge

Hel. J.D.	ΔV	Hel. J.D.	ΔV	Hel. J.D.	ΔV
48.4837	-0.142	55.4848	-0.931	55.5384	-0.978
48.4875	-0.147	55.4858	-0.934	55.5394	-0.981
48.4902	-0.122	55.4877	-0.922	55.5405	-0.976
48.4994	-0.007	55.4885	-0.916	55.5414	-0.983
48.5022	+0.048	55.4895	-0.892	55.5423	-0.975
48.5047	+0.014	55.4905	-0.896	57.4848	-0.871
48.5178	-0.167	55.4913	-0.907	57.4861	-0.871
48.5204	-0.197	55.4970	-0.847	57.4873	-0.891
48.5286	-0.204	55.4980	-0.852	57.4885	-0.903
48.5312	-0.159	55.4990	-0.856	57.4897	-0.937
48.5337	-0.170	55.4999	-0.858	57.4921	-0.962
48.5423	-0.183	55.5009	-0.879	57.4931	-0.982
48.5444	-0.170	55.5030	-0.880	57.4942	-1.003
48.5468	-0.148	55.5039	-0.877	57.4954	-1.000
52.5025	-0.655	55.5049	-0.895	57.5007	-1.058
52.5040	-0.672	55.5059	-0.913	57.5019	-1.088
52.5065	-0.703	55.5070	-0.917	57.5029	-1.084
52.5077	-0.691	55.5131	-0.922	57.5039	-1.079
52.5103	-0.681	55.5141	-0.939	57.5050	-1.087
52.5115	-0.682	55.5152	-0.958	57.5059	-1.099
52.5165	-0.640	55.5161	-0.962	57.5081	-1.085
52.5178	-0.623	55.5171	-0.969	57.5090	-1.080
52.5203	-0.559	55.5193	-0.948	57.5102	-1.085
52.5215	-0.596	55.5205	-0.954	57.5113	-1.071
52.5240	-0.582	55.5215	-0.923	57.5124	-1.069
52.5251	-0.566	55.5226	-0.918	57.5134	-1.054
52.5301	-0.553	55.5237	-0.910	57.5191	-1.057
52.5313	-0.584	55.5246	-0.911	57.5201	-1.074
52.5335	-0.604	55.5302	-0.890	57.5211	-1.085
52.5348	-0.595	55.5313	-0.916	57.5222	-1.085
52.5373	-0.638	55.5323	-0.925	57.5233	-1.038
52.5385	-0.625	55.5333	-0.940	57.5247	-1.040
55.4819	-0.963	55.5342	-0.946	57.5268	-1.046
55.4827	-0.943	55.5363	-0.914	57.5278	-0.978
55.4837	-0.931	55.5375	-0.941	57.5289	-0.929

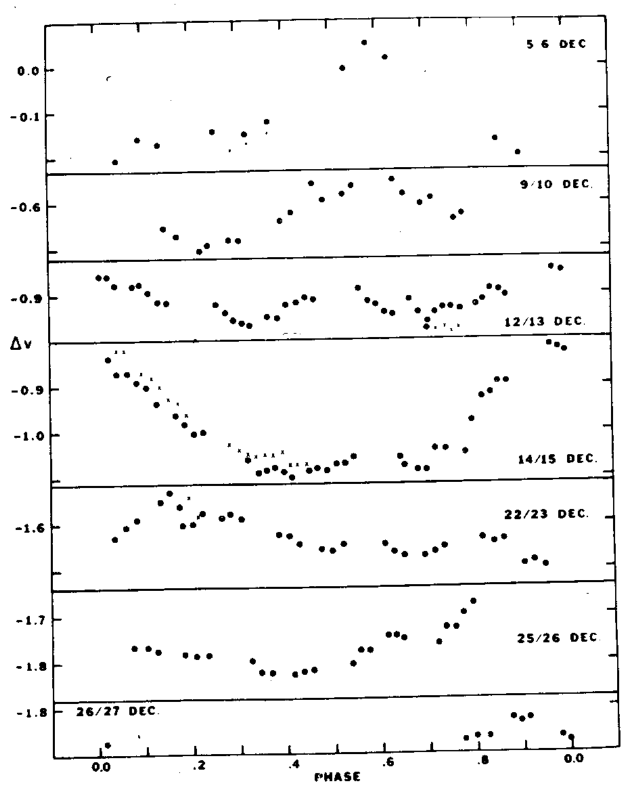
Table I (cont.)

Hel. J.D.	ΔV	Hel. J.D.	ΔV	Hel. J.D.	ΔV
57.5299	-0.918	65.4904	-1.589	68.4871	-1.776
57.5309	-0.895	65.4915	-1.577	68.4902	-1.781
57.5319	-0.896	65.4927	-1.590	68.4917	-1.786
57.5373	-0.811	65.4974	-1.626	68.4931	-1.783
57.5382	-0.821	65.4986	-1.628	68.4983	-1.798
57.5392	-0.828	65.4998	-1.644	68.4994	-1.823
57.5405	-0.836	65.5025	-1.655	68.5008	-1.824
57.5416	-0.821	65.5038	-1.659	68.5034	-1.829
57.5425	-0.823	65.5050	-1.644	68.5045	-1.822
58.5447	-0.870	65.5100	-1.647	68.5057	-1.819
57.5458	-0.880	65.5112	-1.661	68.5103	-1.806
57.5467	-0.899	65.5124	-1.671	68.5114	-1.776
57.5478	-0.927	65.5148	-1.670	68.5125	-1.777
57.5489	-0.936	65.5160	-1.661	68.5147	-1.744
57.5500	-0.961	65.5172	-1.649	68.5157	-1.746
57.5551	-1.027	65.5219	-1.634	68.5157	-1.750
57.5563	-1.039	65.5232	-1.643	68.5208	-1.762
57.5574	-1.049	65.5244	-1.637	68.5218	-1.727
57.5584	-1.053	65.5269	-1.692	68.5229	-1.725
57.5594	-1.051	65.5282	-1.682	68.5239	-1.699
57.5605	-1.049	65.5294	-1.694	68.5249	-1.677
57.5615	-1.043	65.5343	-1.629	69.4874	-1.881
57.5625	-1.074	65.5356	-1.607	69.4889	-1.874
57.5634	-1.071	65.5369	-1.591	69.4904	-1.873
57.5644	-1.080	65.5398	-1.550	69.4932	-1.826
64.4821	-1.622	65.5409	-1.530	69.4942	-1.831
64.4830	-1.623	65.5420	-1.561	69.4953	-1.825
64.4853	-1.656	65.5431	-1.543	69.4992	-1.872
65.4856	-1.603	65.5443	-1.585	69.5002	-1.885
65.4869	-1.600	68.4842	-1.766	69.5001	-1.871
65.4880	-1.578	68.4857	-1.766		

Table II

Differential (B-V) Data for WZ Sge

Hel.J.D.	Δ(B-V)	Hel.J.D.	Δ(B-V)
48.4855	+0.286	55.5020	+0.143
48.4887	+0.241	55.5182	+0.156
48.5007	+0.200	55.5352	+0.151
48.5047	+0.243	57.4909	+0.191
48.5193	+0.210	57.5069	+0.145
48.5299	+0.166	57.5258	+0.127
48.5324	+0.221	57.5436	+0.057
48.5433	+0.200	64.4840	+0.117
48.5457	+0.257	65.4893	+0.120
52.5053	+0.230	65.5011	+0.114
52.5089	+0.227	65.5136	+0.120
52.5190	+0.208	65.5256	+0.142
52.5229	+0.182	68.4887	+0.102
52.5324	+0.172	68.5022	+0.087
52.5361	+0.193	68.5136	+0.070
55.4867	+0.114	69.4920	+0.086



COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1560

Konkoly Observatory
Budapest
1979 February 28

PHOTOELECTRIC OBSERVATIONS OF SZ PISCIUM

The UBV photoelectric observations of SZ Piscium, which is known to be a member of close binaries of the RS CVn type, were secured with the 91-cm reflectors at the Dodaira Station of Tokyo Astronomical Observatory and at the Okayama Astrophysical Observatory on five nights in November and December 1977. HD 219018 was chosen for the comparison star, which is the same as used by Jakate et al.,(1976).

The observations are presented in Table I and also plotted in Figure 1. Phases in the second column of the table were calculated according to the linear ephemeris:

$$t_E = \text{Hel.J.D. } 2442903.635 + 3^{d}.9655702 \cdot E$$

which are based on the times of observed primary minima due to Jakate et al., (1976) and Catalano et al., (1978). In the next three columns, we list the differential magnitudes and colour indices (the variable minus the comparison star) which have been corrected for differential atmospheric extinctions and transformed to the standard UBV system.

It is known that SZ Psc shows a wave-like variation in its light curve, as has been pointed out by Eaton (1977). Although our observations have scantily covered phases outside the eclipses, they seem to confirm such a light variation of this system with an amplitude of at least 0.05 mag in V during our observational period.

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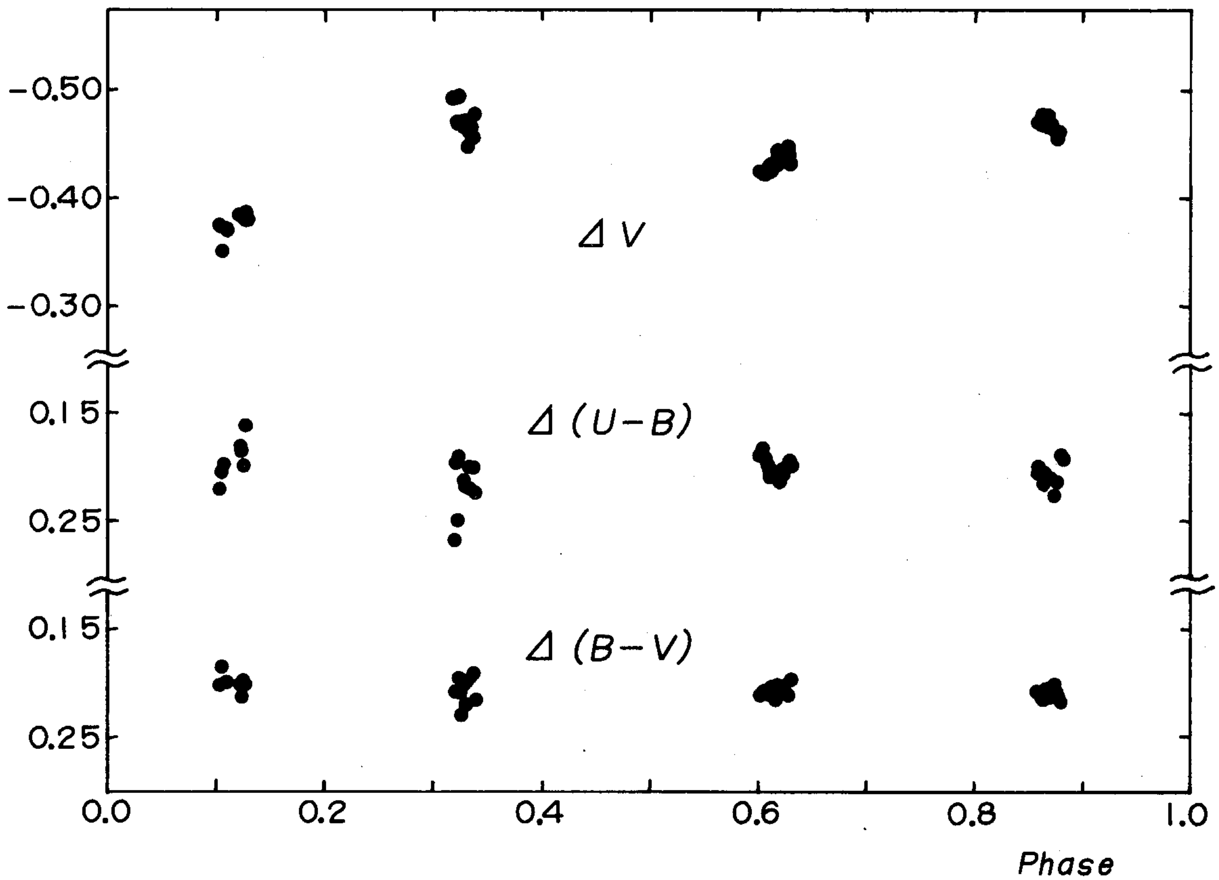
References:
Catalano,S.,Frisina,A.,Rodono,M.,and Scaltriti,F. 1978, I.B.V.S. No. 1427
Eaton, J.A., 1977, I.B.V.S. No. 1297
Jakate,B.,Bakos,G.A.,Fernie,J.D.,Heard,J.F. 1976, Astron.J., 81, 250

Table I

Hel.J.D. 2443400+	Phase	ΔV	Δ(U-B)	Δ(B-V)
71.975	0.3187	-0.491	0.260	0.208
71.985	0.3211	-0.470	0.198	0.208
71.994	0.3235	-0.491	0.251	0.194
72.004	0.3258	-0.466	0.192	0.229
72.014	0.3286	-0.464	0.213	0.203
72.024	0.3312	-0.469	0.219	0.220
72.033	0.3333	-0.448	0.200	0.197
72.042	0.3354	-0.464	0.221	0.196
72.050	0.3375	-0.454	0.201	0.190
72.058	0.3395	-0.478	0.226	0.214
83.019	0.1035	-0.372	0.221	0.203
83.028	0.1059	-0.349	0.204	0.186
83.035	0.1078	-0.371	0.198	0.198
96.898	0.6035	-0.424	0.190	0.210
96.905	0.6053	-0.422	0.184	0.207
96.912	0.6070	-0.424	0.201	0.207
96.920	0.6089	-0.432	0.192	0.211
96.926	0.6106	-0.432	0.210	0.203
96.933	0.6122	-0.426	0.205	0.203
96.939	0.6138	-0.430	0.205	0.200
96.945	0.6154	-0.434	0.203	0.207
96.953	0.6173	-0.444	0.204	0.214
96.959	0.6188	-0.436	0.214	0.206
96.965	0.6205	-0.435	0.203	0.203
96.972	0.6222	-0.440	0.205	0.204
96.978	0.6236	-0.439	0.201	0.208
96.984	0.6252	-0.441	0.207	0.205
96.991	0.6268	-0.448	0.195	0.213
96.997	0.6286	-0.439	0.193	0.211
97.006	0.6305	-0.432	0.194	0.196
97.904	0.8573	-0.470	0.206	0.208
97.911	0.8590	-0.468	0.200	0.208
97.918	0.8608	-0.472	0.202	0.214
97.924	0.8623	-0.478	0.205	0.211
97.931	0.8639	-0.477	0.214	0.216
97.937	0.8655	-0.471	0.217	0.207
97.944	0.8671	-0.466	0.208	0.210
97.950	0.8689	-0.466	0.211	0.209
97.959	0.8709	-0.477	0.209	0.210
97.972	0.8744	-0.469	0.212	0.201
97.980	0.8764	-0.463	0.227	0.203
97.986	0.8779	-0.455	0.212	0.214
97.992	0.8794	-0.457	0.187	0.211
97.999	0.8810	-0.464	0.189	0.218
98.954	0.1220	-0.382	0.180	0.203
98.961	0.1236	-0.381	0.183	0.212
98.969	0.1257	-0.386	0.197	0.196
98.977	0.1278	-0.379	0.163	0.200



−0.50
−0.40
−0.30
0.15
0.25
0.15
0.25
Δ V
Δ (U−B)
Δ (B−V)
0.0
0.2
0.4
0.6
0.8
1.0
Phase

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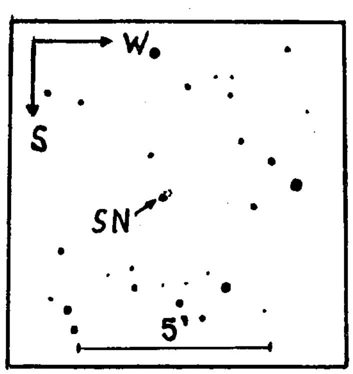
Number 1561

Konkoly Observatory
Budapest
1979 February 28

SUPERNOVA IN ANONYMOUS GALAXY

By comparing older plates with new ones of the supernova survey program at the Konkoly Observatory I discovered a supernova in the anonymous galaxy $\alpha=7^h27{,}2^m$; $\delta=+65^o19'$ (1950). The plate was taken with our 60/90/180 cm Schmidt-telescope on October 24, 1976. The identification chart is shown in Fig.1. The supernova appeared at about 7"0 to the east and 6"0 to the south of the centre of the galaxy and its brightness was about 15 mag.



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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1562

Konkoly Observatory
Budapest
1979 March 2

SHORT PERIODIC VARIATION OF ONE NORTHERN AND FIVE SOUTHERN BRIGHT EARLY B-TYPE STARS

During an observation run of 20 nights at E.S.O., with the Bochum 61-cm photometric telescope, one northern and five southern early B-stars have been observed.

It became immediately clear that, after photometric reduction all the investigated stars had to be considered as variable. Indications for beat-wave phenomena were found in two of these objects.

By comparison of the observations from different nights, approximate periods and variability ranges could be estimated.

Figure 1 shows, as an example, the short periodic variation of α Mus.

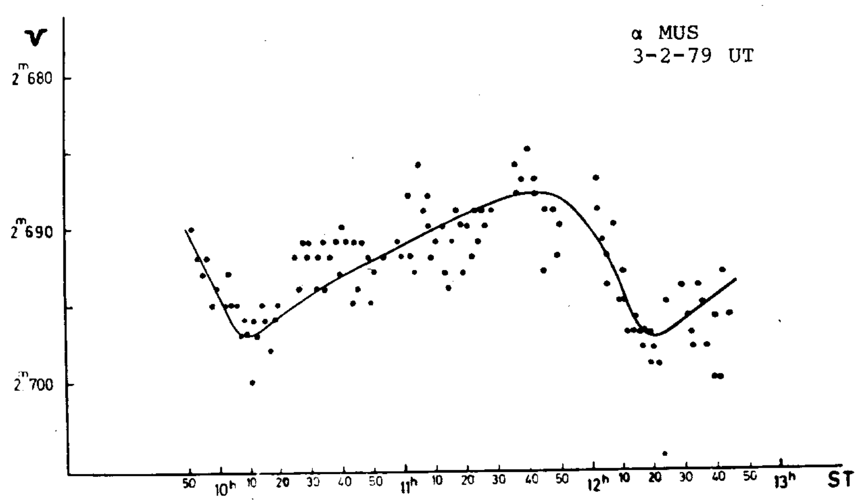

Table 1

Star name	P	ΔV
20 ℓ CMa	$\approx 2^h$	$0\overset{m}{.}020$
χ Car	2^h25^m	$0\overset{m}{.}015$
η Hya	$\approx 4^h$	$0\overset{m}{.}015$
θ^2 Cru	2^h08^m	$0\overset{m}{.}015$
δ Cru	3^h40^m	$0\overset{m}{.}007$
α Mus	2^h10^m	$0\overset{m}{.}010$

Table 1 gives information on the observed stars, their periods and their V-variabilities.

The mean accuracy during the observation period was $0\overset{m}{.}003$ (V-magnitude).

As far as we could deduce from the literature, no short periodic variation has been reported before, from these stars.

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COMMISSION 27 OF THE I. A. U.
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Number 1563

Konkoly Observatory
Budapest
1979 March 6

ON THE RELATION $\frac{\lg E_\pi}{\lg P}$ FOR STARS OF DIFFERENT TYPES OF VARIABILITY

As has already been shown (A.Circ.No.924, 1976) we have made an attempt of finding dependence in RR Lyrae-type stars between long-periodic fluctuations of O-C-(Π) residuals and the period of light variation (P). Later on the work has been extended to a greater number of stars of RR Lyrae-type (80) as well as to the stars of other types of variability.

In the figure a very interesting relation between lg E_π and lg P (where E_π is the period Π of a longperiodic fluctuation of O-C residuals expressed in E) is illustrated. For eclipsing stars P is the period and E is the number of minimum, respectively.

Notations used in the figure are as follows:

o - stars of RR Lyrae-type

• - cepheids

\+ - eclipsing stars

Δ - Mira-type stars

In our work we have referred to the following data on investigation of variability in periods of variable stars:

1.) eclipsing stars - J.M. Kreiner, A.A., Vol.21,No.3,1971

2.) cepheids P.P.Parenago, Per.Zvezdy 11, 4, 1956
O.P.Vasilyanovskaya, G.E.Yerlexova, Bull.In-ta astrofiziki, AN Tadzh.SSR No.54, 1970

3.) Mira-type stars - A.G.Nudzhenko,Per.Zvezdy 19, No.4,1974

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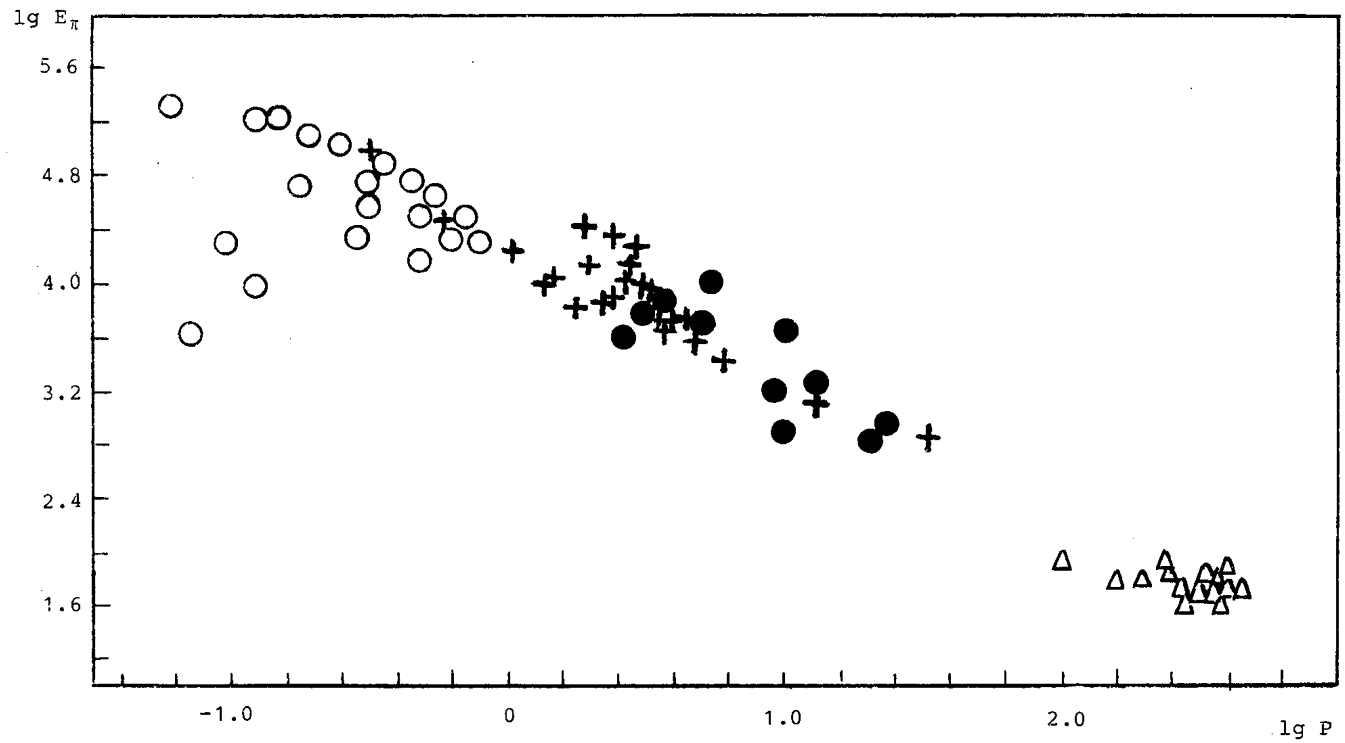

lg E_π
5.6
4.8
4.0
3.2
2.4
1.6
-1.0
0
1.0
2.0
lg P

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Number 1564

Konkoly Observatory
Budapest
1979 March 6

PHOTOELECTRIC OBSERVATIONS OF DR Vul

Photoelectric observations of DR Vul in U,B,V were carried out at Kryonerion Station during July (18-24) 1976. The observations have been made using the two-beam, multi-mode, nebular-stellar photometer (Goudis and Meaburn, 1973) attached to the new 48-inch Cassegrain reflector of the National Observatory of Athens (Contopoulos and Banos, 1976).

The star BD +25°4105 or ADS 13397A ($\alpha_{1950}=20^h05^m8^s.69$; $\delta_{1950}=+26°02'8''.0$) of m_V= 8.5 was used as comparison. Reduction of the observations has been based on Hardie's method (1962). The standard error was found to be of the order of $\pm0^m.01$ in U,B,V.

The following preliminary data for the primary minimum were found:

Hel.J.D.	(O-C)	m_V	B-V	U-B
2442982.4806	$-0^d.0337$	9.27	0.20	0.52

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References:

1. Contopoulos, G. and Banos, C.: Sky and Telescope, 51,154, 1976
2. Goudis, C. and Meaburn, J.: Astroph. Space Sc., 20, 149, 1973
3. Hardie, R.H.: Stars and Stellar Systems Vol. II, Astronomical Techniques, ed. Hiltner, W.A., The University of Chicago Press, Chicago, 1962
4. Kukarkin, B.V. et al.: General Cat. of Variable Stars, Moscow, 1969

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1565

Konkoly Observatory
Budapest
1979 March 9

UBV OBSERVATIONS OF 88 HER

As reported by Harmanec et al. (1978), the Be and shell star 88 Her (B6e) disclosed the brightness decrease in 1977 by an amount of 0.2 mag. in the V band. The shell absorption feature reappeared in the dark phase. Hirata (1978) pointed out that its photometric and spectroscopic behaviors closely resemble to those of Pleione. We here report the results of our photoelectric monitoring between August 19 and December 6, 1978. The differential observations to the comparison star HD 162132 (A0) were made by one of the authors (M.N.) with the 30-cm reflector at the Tokyo Astronomical Observatory and with the 91-cm reflector at the Dodaira Station of the Observatory. Our photometry of the comparison star HD 162132 gave the following UBV values and their probable errors:

$V = 6.503 \pm 0.004$, $B-V = +0.097 \pm 0.003$, and $U-B = +0.112 \pm 0.004$.

These values for HD 162132 were assumed in this study. All observations of 88 Her are presented in the Table in the form of nightly normals, together with their probable errors, and are also shown in the Figure. Since the observations were made at low altitude, the errors were somewhat larger in November and December. The mean values of our twenty-three night observations for 88 Her are

$V = 6.847 \pm 0.005$, $B-V = -0.089 \pm 0.005$, and $U-B = -0.368 \pm 0.006$.

When compared with Harmanec et al. (1978), it is seen that the brightness in the V band stopped to decrease and even turned to increase. This tendecy becomes more clear when we adopt the same magnitude for HD 162132 as Harmanec et al. (1978). As illustrated in the Figure, the brightness in the V band seems to increase with a rate of about 0.05 mag./100 days.

We also obtained one coudé spectrogram (10 Å/mm) in the blue region with the 188-cm reflector at the Okayama Astrophysical Observatory on 1978 November 14. Unfortunately this plate was underexposed. One low-dispersion spectrogram (70 Å/mm at Hγ) was kindly provided by Y. Norimoto of the Tokyo Astronomical Observatory. This spectrogram was obtained on the same night with the prismatic spectrograph attached to the 91-cm reflector at the Okayama Astrophysical Observatory. Both spectrograms disclosed the existence of the shell lines of hydrogen and metals, and the general appearance of the spectra closely resembles to that in 1978 August (Hirata 1978).

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References:

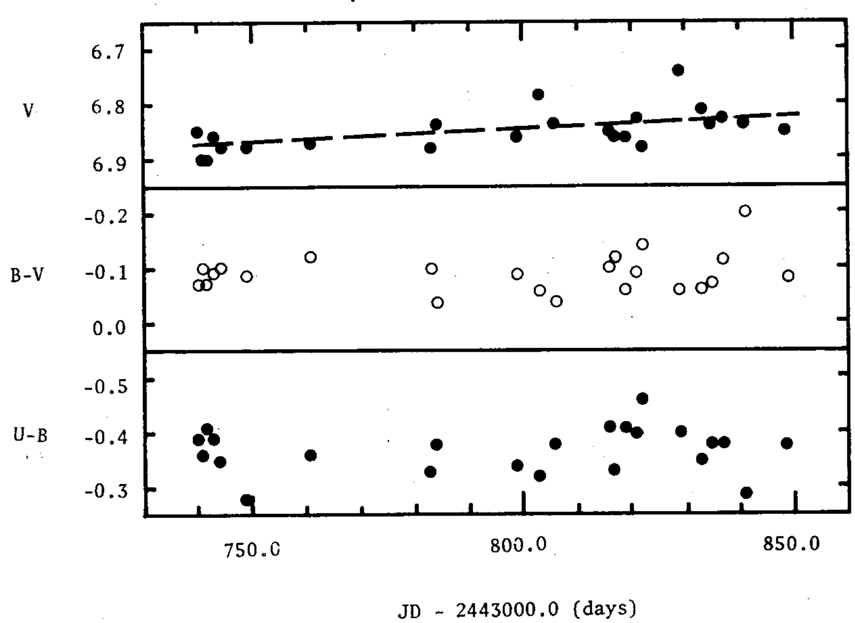
Harmanec, P., Horn, J., Koubský, P., Kříž, S., Zdárský, F., Papoušek, J., Doazan, V., Bourdonneau, B., Baldinelli, L., Ghedini, S., and Pavlovski, K. 1978, Bull. Astron. Inst. Czech. 29, 278.

Hirata, R. 1978, IBVS No. 1496.

Date	(UT)	JD - 2443000	V	B-V	U-B	n*
1978 August	19.53	740.03	6.85±0.00	-0.07±0.00	-0.39±0.01	6
	20.54	741.04	6.90±0.00	-0.10±0.00	-0.36±0.01	4
	21.54	742.04	6.90±0.01	-0.07±0.00	-0.41±0.01	3
	22.58	743.08	6.86±0.00	-0.09±0.01	-0.39±0.00	3
	23.63	744.13	6.88±0.01	-0.10±0.02	-0.35±0.02	3
	28.63	749.13	6.88±0.01	-0.09±0.01	-0.28±0.03	3
September	9.48	760.98	6.87±0.01	-0.12±0.01	-0.36±0.00	3
October	1.47	782.97	6.88±0.01	-0.10±0.01	-0.33±0.01	3
	2.50	784.00	6.84±0.00	-0.04±0.05	-0.38±0.01	3
	17.48	798.98	6.86±0.00	-0.09±0.01	-0.34±0.00	3
	21.52	803.02	6.78±0.02	-0.06±0.03	-0.32±0.03	3
	24.46†	805.94	6.84±0.01	-0.04±0.01	-0.38±0.02	3
November	3.43	815.93	6.85±0.00	-0.10±0.00	-0.41±0.00	3
	4.42	816.92	6.86±0.00	-0.12±0.00	-0.33±0.01	3
	6.44	818.94	6.86±0.01	-0.06±0.01	-0.41±0.01	3
	8.39	820.89	6.83±0.02	-0.09±0.01	-0.40±0.02	4
	9.41	821.91	6.88±0.01	-0.14±0.00	-0.46±0.04	3
	16.42†	828.92	6.74±0.05	-0.06±0.01	-0.40±0.01	2
	20.39	832.89	6.81±0.01	-0.06±0.00	-0.35±0.01	3
	22.39	834.89	6.84±0.02	-0.07±0.02	-0.38±0.03	3
	24.41	836.91	6.83±0.02	-0.11±0.01	-0.38±0.03	3
	28.40	840.90	6.84±0.02	-0.20±0.01	-0.29±0.01	3
December	6.37	848.87	6.85±0.01	-0.08±0.01	-0.38±0.02	3

* n denotes the number of measurements.

† Observed at the Dodaira Station, the others were observed at the Tokyo Astronomical Observatory.



V
6.7
6.8
6.9
B-V
-0.2
-0.1
0.0
U-B
-0.5
-0.4
-0.3
750.0
800.0
850.0
JD - 2443000.0 (days)

COMMISSION 27 OF THE I. A. U.
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Number 1566

Konkoly Observatory
Budapest
1979 March 9

IS THE NEW, VERY RED VARIABLE, THE COMPANION IN THE SOUTH-SOUTH-WEST DIRECTION TO THE SUSPECTED VARIABLE BD+51°762 A MOST REMARKABLE STAR ?

Some months ago I got acquainted with the star BD+51°762 suppossed to be a red variable. I observed the star on more than 350 photographic plates of the Harvard College Observatory Collection and a few photovisual plates. Almost at once the star was a disappointment. But then, persisting and curious still I was rewarded second to none: I found another star - the companion to BD +51°762 which fulfilled two most important prerogatives for the variable stars - a distinct variability of brightness and its periodicity or at least an obvious cyclicity. Moreover, the star showed not one variation but three. A unique phenomenon among the red variables of any kind. I write them:

Duration	Amplitude of variation	Period or Cycle (not irregular!)
Longest	$10^m98 - 12^m04$	5300days ± 250 days
Medium	10.95 - 12.00	475 " ± 35 "
Short	10.85 - 11.35	0.26 day

There is only one out of some 500 N Sp. Variables which has two definite variations of brightness, with two corresponding periods: 2450 and 212 days. It is important though the Creator may smile at it that their mutual ratios are almost identical 11.2 and 11.5. This with the triplet variation suggesting three body problem only accentuets the possibility that this new N or Carbon Variable belongs to the 42 Most Remarkable Stars established during the Golden Age of Stars i.e. between 1920 and 1953.

The magnitudes are approximately on the International system with the Zero point obviously more uncertain than the Scale. The Palomar-Mine Color Index is ≈ 5 mg!

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1567
Konkoly Observatory
Budapest
1979 March 12

PHOTOELECTRIC OBSERVATIONS OF NOVA CYGNI 1978

Between Oct. 15 and Oct. 22, 1978, Nova Cygni 1978 was observed with the 1 m-telescope of the Florence and George Wise Observatory of Tel Aviv University, Israel. Photometric measurements were obtained with a two-channel photoelectric photometer equipped with UBV-filters, monitoring simultaneously in one channel the nova, and in the other a comparison star. They were reduced to the UBV-system by means of some UBV standard stars given by Landold (Astr. J. 78, 959) which were observed several times each night. Thus it was secured that possible errors in the adopted brightness of the comparison star had no effect on the measured brightness of the nova.

In Table 1 the results of the observations are compiled. For each night the mean brightness and colours from all individual measurements as well as their mean errors and the number of observations per colour are given. A single measurement lasted 30 seconds in each colour except for Oct. 15 when the integration time was 5 seconds.

The brightness measured on Oct. 20 (given in brackets) is probably influenced by clouds. The colours, however, seem to be reliable.

The position of the nova in a two-colour-diagram has been plotted and it is found to move from the vicinity of the blackbody sequence towards the supergiant sequence. The mean temperature during the observed period is near 11 000 K. But as long as nothing certain is known about the interstellar reddening of the nova, this can be regarded as a preliminary value only. There is a trend for the temperature to increase with time, which is consistent with observations of other novae after maximum.

Date (U.T.)	V		B – V		U – B		N
1978 Oct. 15.752	9.70	± 0.01	0.09	± 0.01	-0.83	± 0.01	17
16.703	9.81	0.02	0.09	0.01	-0.55	0.02	5
17.698	9.70	0.02	0.04	0.01	-0.75	0.01	4
18.694	9.81	0.02	0.04	0.01	-0.70	0.01	4
19.639	9.71	0.01	0.05	0.01	-0.73	0.01	4
20.699	(10.49	0.02)	0.06	0.01	-0.72	0.02	4
21.720	9.91	0.02	0.06	0.08	-0.74	0.03	4
22.936	9.80	0.03	-0.02	0.02	-0.71	0.01	4

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PERIODS AND LIGHT CURVES OF THE ECLIPSING BINARIES BV ERIDANI AND BW ERIDANI

Since their discovery by Hoffmeister (1933, 1936), the eclipsing binaries BV and BW Eri have experienced little attention. Solov'yov (1954 a, b) published a few minima from plates of the Stalinabad sky patrol.

Photoelectric observations by Baade in 1976 and by Duerbeck in 1977 furnished complete light curves. The derived periods were improved by the use of photographic minima from Bamberg sky patrol plates, and by Solov'yov's early minima:

BV Eri: J.D.hel. (primary min.) = 2 443 449.7193 + 0.5076643 · E

BW Eri: J.D.hel. (primary min.) = 2 443 448.6840 + 0.6384773 · E

BV Eri is an EB system with a remarkably short period. The colour of the system corresponds to spectral type F2 V. The light curve shows an annular primary minimum and a total secondary minimum.

BW Eri is also an EB system. The colour corresponds to spectral type A3 V. The primary minimum is annular, the secondary is total.

Both light curves (in UBV) are shown in Figs. 1 and 2. A thorough investigation and an analysis of the light curves will be published later.

Acknowledgements. D.B. was a visiting astronomer at the Cerro Tololo Inter-American Observatory, which is operated by the Association of Universities for Research in Astronomy, Inc., under contract with the National Science Foundation. D.B. and H.W.D. were also visiting astronomers at the European Southern Observatory, La Silla. H.W.D. and M.T.K. thank Professor J. Rahe for the opportunity to use the Bamberg plate collection and for the hospitality during their stay at the Bamberg Observatory.

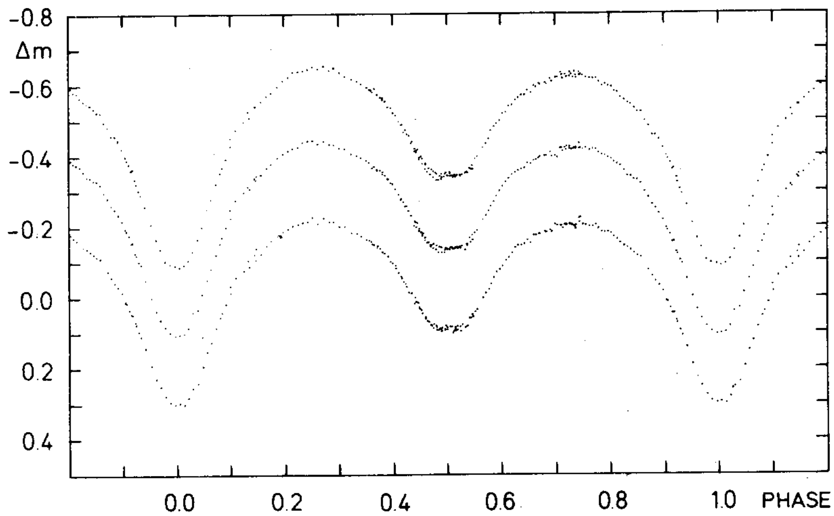

Fig. 1. (From above): U B V light curves of BV Eri, relative to SAO 149230.
The scale is given for the B magnitudes; the U magnitudes are shifted by $-0\overset{m}{.}2$, the V magnitudes by $+0\overset{m}{.}1$.

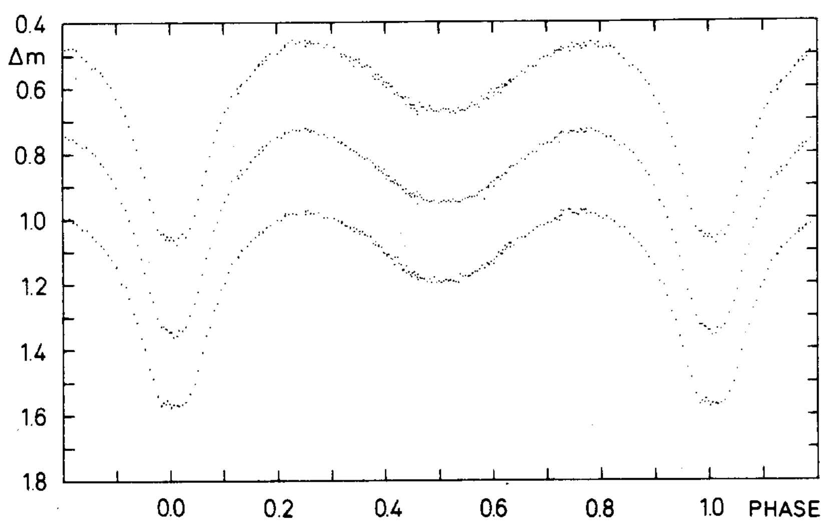

Fig. 2. (From above): U B V light curves of BW Eri, relative to SAO 169137.
The scale is given for the B magnitudes; the U magnitudes are shifted by $+ 0\overset{m}{.}3$, the V magnitudes by $-0\overset{m}{.}3$.

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References:

Hoffmeister, C. 1933, Astr. Nachr. 247, 281.

Hoffmeister, C. 1936, Astr. Nachr. 258, 39.

Solov'yov, A. 1954a, Astr. Tsirk. 149.

Solov'yov, A. 1954b, Astr. Tsirk. 151.

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IMPROVED EPHEMERIS, V502 OPHIUCHI

V502 Ophiuchi (BD+0°3562) is a contact binary system which undergoes partial eclipses. From his period study of the system, Kwee (B.A.N. 14, 131, 1958) noted a variability in the period and calculated the following light elements: JD Hel. Min. I = 2435257.4459 + $0^d.45339630$ E. A more recent study by Binnendijk (A.J. 74, 218, 1969), indicated a decrease had occured in the period after 1958. Binnendijk gave the ephemeris JD Hel. Min. I = 2439639.9431 + $0^d.45339304$ E.

The present observations were made during the interval 4-12 June 1978 with the 0.5 meter Cassegrain telescope at Palomar Observatory. The photometer housed standard B,V filters and a 1P21 photomultiplier refrigerated with dry ice. A digital counter was used for the intensity measurements, and the time of each observation was obtained from a strip chart tracing. A WWV receiver was used to calibrate the chart. BD+0°3566 was used as the comparison star, and BD+0°3569 and BD+0°3574 were used as check stars.

The measurements yielded 587 observations with the B filter and 625 with the V filter, with each observation being the average of two consecutive ten-second integrations. Differential extinction corrections were not made to the observations. Epochs of minimum light were determined from the observations defining one primary and three secondary eclipse curves. The method of bisecting the chords connecting points of equal magnitude on the opposing branches of an eclipse curve was used to find the temporal mean. The epochs of minimum light are listed in Table I. The O-C's were determined from the ephemeris given by Binnendijk, shown above.

Table I

Hel. JD 2443600+	Min.	O-C
65.8463	II	$-0^{d}.0003$
66.7545	II	+0.0011
68.7951	I	+0.0015
71.7469	II	+0.0062

A least squares straight line fit to the observations between JD 2437000 and JD 2443671 yielded the ephemeris:

$$\text{JD Hel. Min. I} = 2439639.9474 + 0^{d}.45339293\ E.$$

This period differs only slightly from that determined by Binnendijk.

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PHOTOMETRIC OBSERVATIONS OF THE OLD NOVA T AURIGAE

Photometric observations of the old nova T Aur have been carried out at Asiago Astrophysical Observatory using a dual-channel photometer with B filters and a time resolution of 10 seconds for both the nova and the comparison. Two eclipses have been observed on november 22 and 24,1978.

In the following table we give the heliocentric times of mid-eclipse, the O-C values given with respect to the elements obtained by Mumford (Ap.J.210, 416, 1976) by linear interpolation, the eclipse duration and the variations of magnitude, Δm_1 and Δm_2, which occurred between the eclipse-center and, respectively, the phases immediately preceding and following it.

JD hel. 2443000+	O-C	T (min.)	Δm_1	Δm_2
835.4896	-0.0054	60	0.31	0.19
837.5331	-0.0060	41	0.24	0.24

On November 22 we observed a bright shoulder preceding the eclipse while on November 24 a "hump" following the eclipse was also present.
A more detailed discussion of these observations will be given in a forthcoming paper.

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THE SYSTEM CC CASSIOPEIAE

The star CC Cas was discovered to be a spectroscopic binary by Pearce (1927) who has given its period and the spectroscopic elements. A photographic light curve and the elements of the system have been given by Gaposchkin (1940). Gibson and Hjellming (1974) have detected occasional variable radio emissions at frequencies 2695 and 8085 MHz. Szafraniec (1975) has pointed out that no light minimum of the system has been observed since 1930.

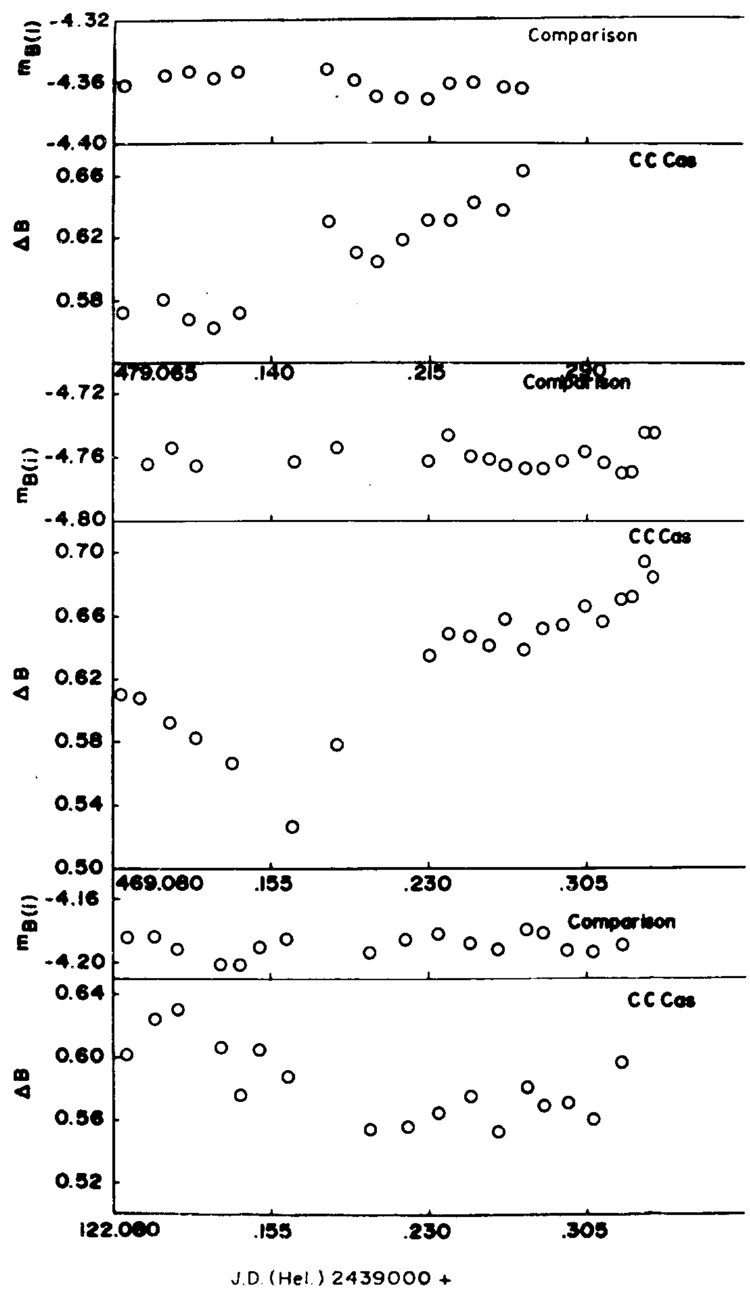
A total of twenty seven nights of observations were secured during the period 1965 to 1969 and on one night in 1974, on the 38-cm reflector of the Uttar Pradesh State Observatory through standard U,B and V filters, using an unrefrigerated 1P21 photomultiplier and employing d.c. techniques. Initially the stars BD+59°601 and BD+58°567 were used as comparison stars but the star BD+58°567 has been used for final computations as it was found to be far more suitable one in respect of magnitude, constancy of light and its colour.

We were able to observe three primary minima during the course of our observations. On other nights the star showed no variation. The variations are about $0^{m}.16$ in B and V filters and $0^{m}.14$ in U filter. The observed primary minima in B and V filters are given in Figures 1 and 2.

The times of primary minima have been determined mainly on observations around the minimum light phase, since the ascending and descending branches in any one minimum could not be fully covered. The observed times of primary minima and the corresponding values of (O-C), based on the ephemeris (Guthnick and Prager, 1930).

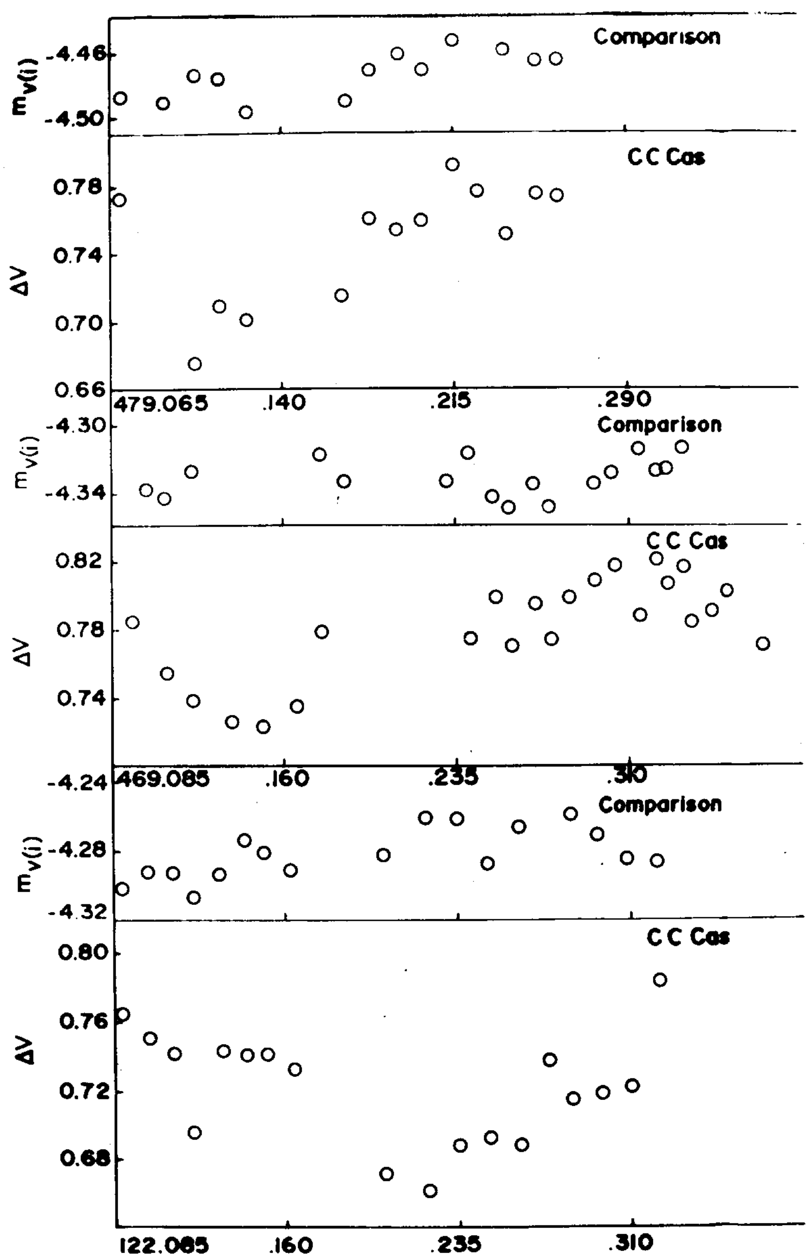
$$\text{Primary Minimum} = \text{JD(Hel)}\ 2426000.3 + 3^{d}.36897 \cdot E$$

are given in Table 1. One finds that the (O-C) are all negative



Comparison
CC Cas
Comparison
CC Cas
Comparison
CC Cas
$m_{B(i)}$
ΔB
479.065
.140
.215
.290
469.080
.155
.230
.305
122.080
.155
.230
.305
J.D. (Hel.) 2439000 +

Figure 1



J D (Hel.) 2439000 +

Figure 2

Table 1

Observed times of primary minima of CC Cas

Observed Primary Minimum	(O-C)
JD(Hel) 2439122.219	$-0^{d}.219$
469.157	-0.285
479.129	-0.420

and are large. Further, on the basis of our first observed minimum as epoch no variation of light was detected within -4.3, +1.9 hours of predicted time of minimum on the night of December 9, 1968.

The observed colours and magnitudes of CC Cas along with those of comparison stars have been listed in Table 2. These are in good agreement with those of Roman (1956), viz. $B-V=0^{m}.50$, $U-B=-0^{m}.48$ and $V=7^{m}.1$.

Table 2

Colour and visual magnitude for comparison and variable stars

Star	B-V	U-B	V	Remarks
CC Cas	$0^{m}.48$	$-0^{m}.48$	$7^{m}.18$	Outside the eclipse
BD+59°601	0.34	-0.24	9.24	-
BD+58°567	0.32	-0.39	8.06	-

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References:

Gaposchkin, S. 1940, Harvard Reprint No.212, 9
Gibson, D.M. and Hjellming, R.M. 1974, Pub.Astr.Soc.Pacific, 86, 652
Pearce, J.A. 1927, Pub.Dom.Astrophys.Obs., 4, 67
Guthnick, P. and Prager, R. 1930, Astr.Nachr., 239, 13
Roman, N.G. 1956, Astrophys. J., 123, 247
Szafraniec, R. 1975, Roczn. astr. Obs. Krakow, No. 46, 94

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PHOTOELECTRIC OBSERVATIONS OF AD Leo

The results of photoelectric monitoring of the flare star AD Leo, made through a standard B filter are reported herein. Four flares were detected during a total of 17^h28^m monitoring, spread over 7 nights. All flare events were observed using the 104-cm reflector equipped with a refrigerated EMI 6094S photomultiplier. Flare events of 12 February 1977 are within the programme of Cooperative flare star observations for 1977 (Mavridis, 1977).

Table 1

Monitoring Intervals

(Times rounded off to nearest minute of U.T.)

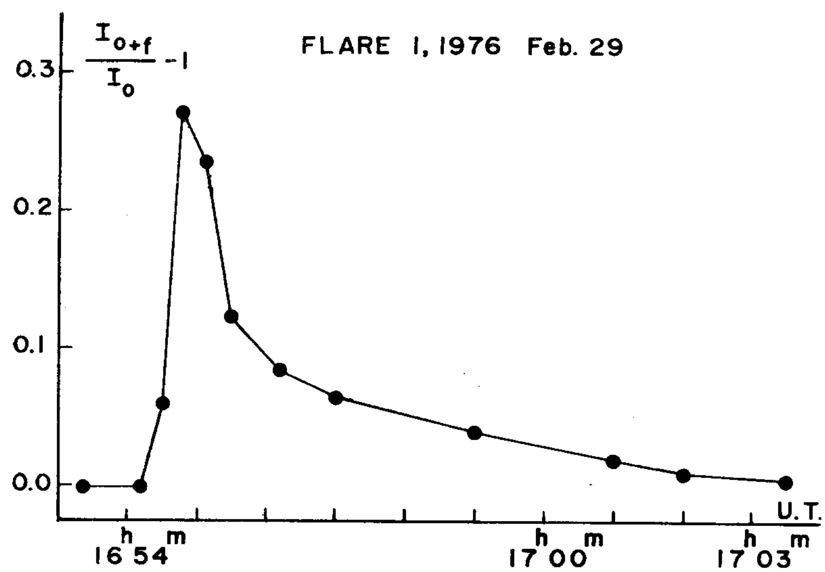
Date	Telescope		
1976 Feb.29	104-cm	16^h12^m- 17^h04^m	17^h05^m- 17^h33^m
		17 58 - 18 55	18 56 - 19 14
		19 20 - 19 34	20 03 - 20 21
		20 45 - 21 03	
1977 Feb. 2	104-cm	17 32 - 17 48	17 56 - 18 54
10	56-cm	15 06 - 15 24	15 26 - 15 48
		15 50 - 16 12	16 13 - 16 40
		16 42 - 17 03	18 01 - 18 13
		19 34 - 20 02	20 26 - 21 04
11	56-cm	15 14 - 15 51	16 16 - 17 20
12	104-cm	16 48 - 17 16	17 18 - 21 31
1978 May 17	56-cm	17 47 - 18 30	
1978 Dec.23	56-cm	18 25 - 18 31	18 32 - 18 47
		18 49 - 19 07	19 08 - 19 16
		19 18 - 19 30	

The flare light curves (Figs. 1-4), monitoring intervals (Table 1) and flare characteristics (Table 2) are presented.

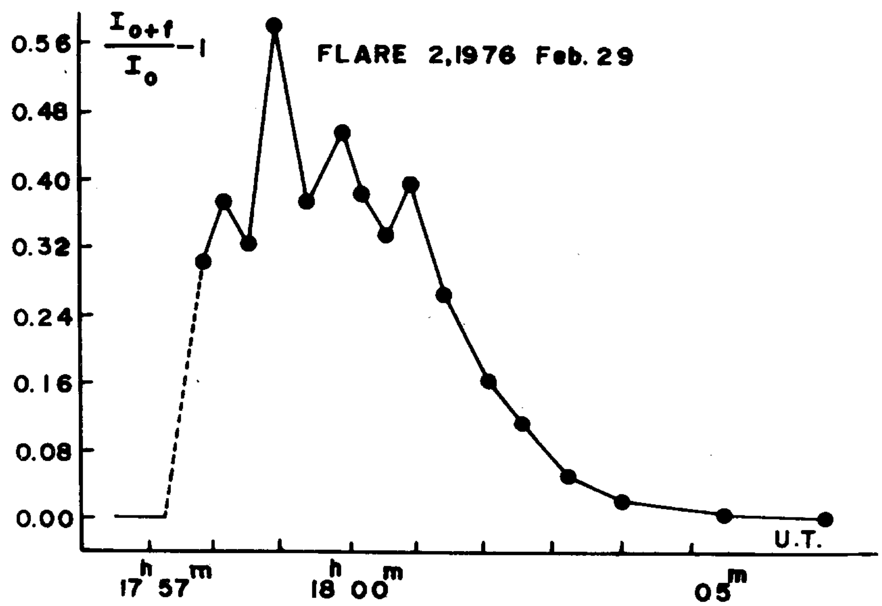
Energy released during a flare event is computed using the following equation (Cristaldi and Rodono, 1973):

$$E_B = 4 \pi d^2 \times 10^{-0.4 m_B} \times \pi_B \times 60 \times P_B \text{ ergs}$$

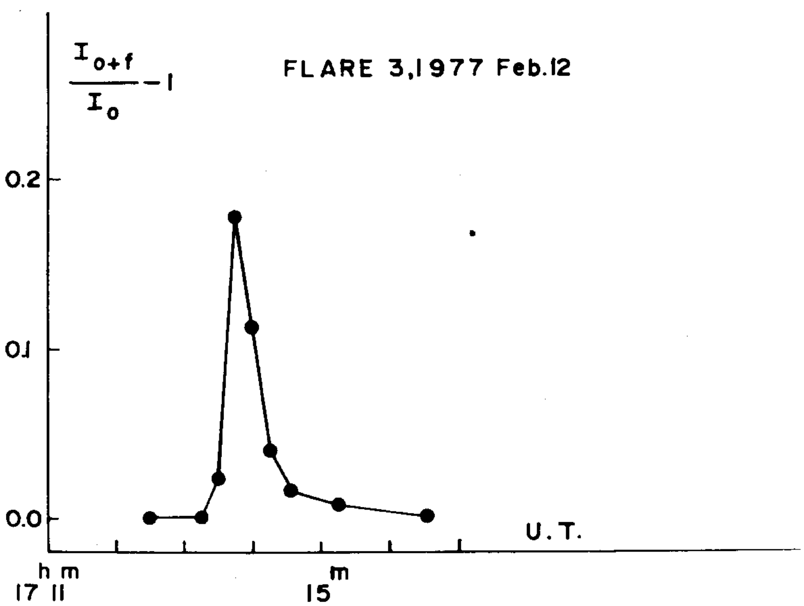
Where d is the distance of the star, m_B its apparent magnitude in B colour, π_B the energy flux produced by a zero magnitude star outside the terrestrial atmosphere which is taken



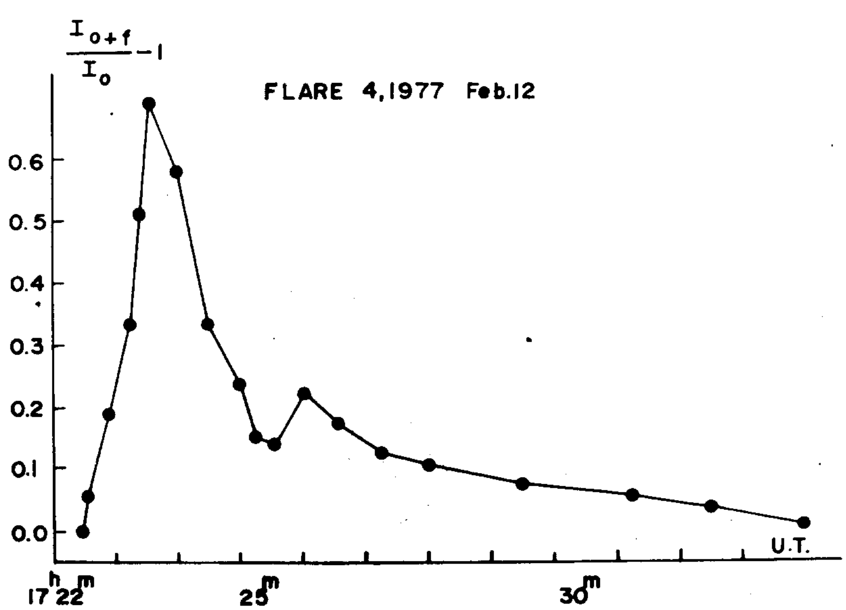
FLARE 1, 1976 Feb. 29
$\frac{I_{o+f}}{I_o} - 1$
0.3
0.2
0.1
0.0
U.T.
$16^h 54^m$
$17^h 00^m$
$17^h 03^m$



FLARE 2, 1976 Feb. 29
$\frac{I_{o+f}}{I_o} - 1$
0.56
0.48
0.40
0.32
0.24
0.16
0.08
0.00
U.T.
$17^h 57^m$
$18^h 00^m$
05^m



$\frac{I_{o+f}}{I_o}-1$
FLARE 3,1977 Feb.12
0.2
0.1
0.0
U.T.
17h 11m
15m



$\frac{I_{o+f}}{I_o}-1$
FLARE 4,1977 Feb.12
0.6
0.5
0.4
0.3
0.2
0.1
0.0
U.T.
17h 22m
25m
30m

Table 2

CHARACTERISTICS OF FLARE EVENTS OF AD Leo

(V = 9.43, B-V = 1.54, Parallax = .204, Spectral type = dM 4.5e)

Date	U.T. max	Flare duration (in minutes) Before max t_b	After max t_a	$\frac{I_{o+f}}{I_o} - 1$	Δm_B	$\frac{\sigma}{I_o}$	P_B (min)	F(z)	Energy released at flare max, 10^{30} ergs/S	Total emission during the event 10^{31} ergs.
1976 Feb.29	$16^h54^m.8$	0.6	1.13	0.296	.28	.011	0.51	1.08	0.97	2.28
	17 59.8	1.6	8.10	.585	.41	.011	1.77	1.02	1.08	7.89
1977 Feb.12	17 13.7	0.5	2.75	.177	.18	.010	0.10	1.05	0.87	0.45
	17 23.7	1.1	11.00	.687	.57	.010	1.82	1.04	1.25	8.13

6.3×10^{-6} ergs $cm^{-2} sec^{-1}$ (Cristaldi and Rodono, 1973) and

$$P_B = \int \left(\frac{I_{o+f}}{I_o} - 1\right) dt,$$

where I_{o+f} is the intensity deflection due to the quiet star (I_o) plus that of the flare (I_f) at maximum.

In the case of multipeaked light curves, the peaks may belong to independent flare events even when separated by small interval of time during which the relative intensity should drop to zero. Thus the energy lost during an event should be the total energy lost by numerous weaker events.

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References:

Cristaldi, S. and Rodono, M., 1973, Astron.Astrophys.Suppl.10,47
Mavridis, L.N., 1977, I.B.V.S. No. 1234

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Budapest
1979 March 23

PHOTOGRAPHIC OBSERVATIONS OF OLD NOVAE

Using the 30 cm f/5 four lens astrograph of the Hoher List Observatory, blue plates (ZU-2) of some novae, which had their outbursts some years or decades ago, were taken. The magnitudes listed in the table were obtained by the Argelander method, using the indicated comparison sequences of nearby galactic cluster photometries.

Nova	Outburst	Observing date	m_{pg}	Reference
V 356 Aql	1936	2 443 374.447	[16.5	
V1229 Aql	1970	374.447	[16.5	
IV Cep	1971	374.564	[16.3	
		717.410	[16.7	
V1500 Cyg	1975	374.348	13.8	Soviet Astr.21,364
		713.469	14.9:	
		715.396	14.5	
		717.439	14.6	
		718.431	14.5	
		719.406	14.8	
		723.499	14.5	
		725.474	15.4:	
HR Del	1967	2 441 543.444	11.3	J.Obs. 51, 353
		2 443 374.368	11.8	
		714.463	11.8	
V 533 Her	1963	374.471	16.2	Acta Astr.19, 82
CP Lac	1936	374.564	16.6:	
V 368 Sct	1970	374.392	[15.7	
		714.446	[16.7	
V 373 Sct	1975	714.446	[16.7	
FH Ser	1970	374.420	16.4:	
LU Vul	1968	374.496	[16.8	Astr.Astrophys.2,100
		715.450	[16.8	
LV Vul	1968	374.496	16.4	Astr.Astrophys.2,101
		715.450	[16.8	
NQ Vul	1976	715.428	15.8:	

The times given are geocentric, the accuracy of the magnitudes is about $\pm 0^{m}.1$. With this uncertainty, the observations of V 1500 Cyg show that the short time fluctuation still goes on 1065^{d} after the outburst.

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A NEW ECLIPSING VARIABLE IN CANIS MINOR

A relatively bright eclipsing variable was found and measured on about 250 photographs taken between February, 1974 and February, 1979. The photographs were of panchromatic emulsion with yellow-green filter, thus giving very close to visual brightness. The used cameras were of 20,30 and 50 cm focal-lengths. The position of the star is

$\alpha=7^h25^m02^s$, $\delta=+4^\circ43'.8$ (1900.0)

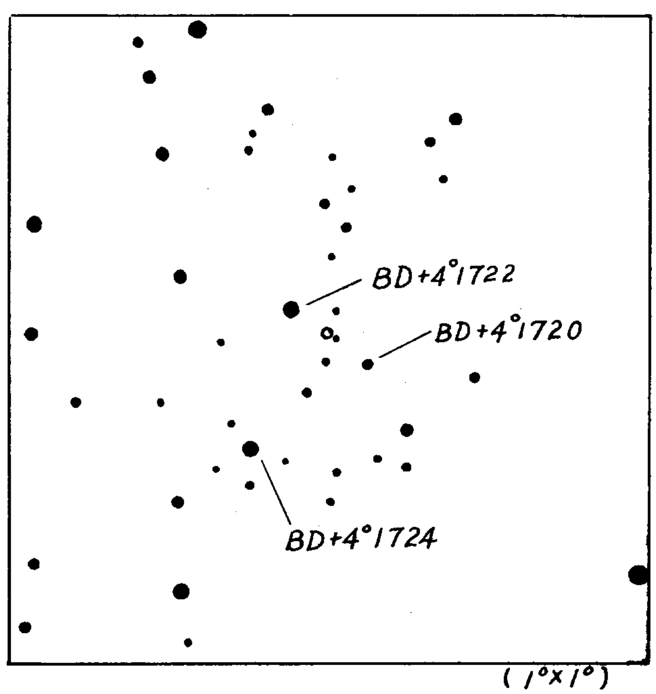

Fig.1. Identification chart.

As the measurements are made by visual estimations, scattering of brightness is fairly big. In Fig.2. are plotted the

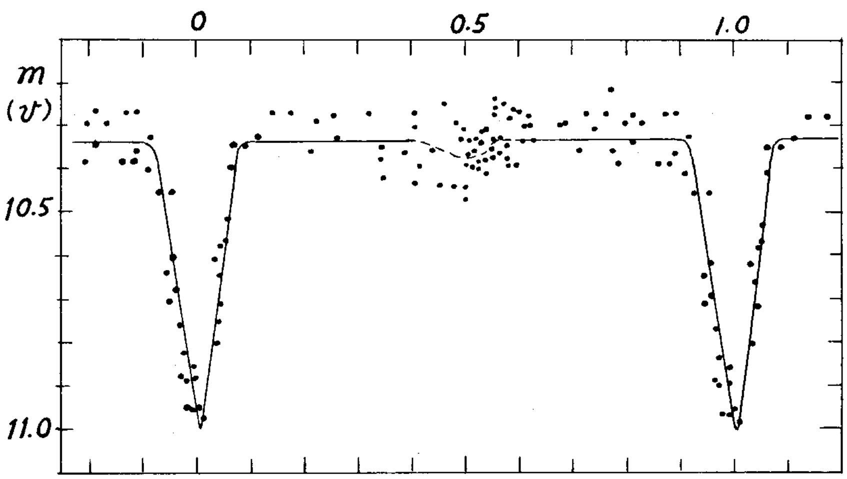

Fig.2. Light curve in v-region.

measurements on the photographs taken in 1978-79, and it suggests the type to be EA. The range of variation is $10^{m}.3$-$11^{m}.1$ (v), and the derived element is as follows.

$$m = J.D.\ 244\ 2100.48 + 1^{d}.18069 \cdot E.$$

In 1978-79, about 90 photographs were taken with blue sensitive emulsion, Kodak 103a-O, and the photographic range was obtained as $10^{m}.7$-$11^{m}.3$(p).

The duration of the eclipse is $0^{P}.18$ or $0^{d}.21$, having no constant brightness at minimum. The light curve shows the possibility of having secondary minimum. Fairly many photographs were taken around the phase recently with both emulsion, but this could not be ascertained.

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ASYMMETRIC PROFILES OF EW LAC

As reported by Hadrava et al. (1978) and Harmanec et al. (1979), the Be and shell star EW Lac (HD 217050, B2IIIpe) has exhibited a strong change in its spectrum and colors in 1978, after a long stable shell phase. We here present our results of spectroscopic observations which were made on November 14, 15, and 19, 1978 with the coudé spectrograph attached to the 188-cm reflector at the Okayama Astrophysical Observatory. The list of our observations is as follows:

Plate number	Julian day	Dispersion (Å/mm)	Exposure time (minute)	Spectral region (Å)
C4-5464	2443827.00	10.2	49	3500-4300
C4-5465	2443827.03	10.1	29	3800-4600
C4-5466	2443827.06	10.2	36	3500-4300
C4-5467	2443827.13	10.1	166	3800-4600
C4-5471	2443827.99	9.9	54	4300-5050
C4-5488	2443831.97	20.1	128	5200-6800

The strong asymmetry and the strengthening of the shell lines were noticed on the whole. Figure 1 shows the Hβ-, Hγ-, and Hδ-line profiles normalized to the adjacent continuum, together with the CaII K and FeII λ4233 lines. The abscissa is the heliocentric radial velocity in km/sec. It is evident that the shell-absorption profiles are very steep in their shortward sides, while distinctly winged in the longward sides. The deepest points are located at the shortward edge of the absorption cores. The violet emission components are stronger than the red ones (V/R > 1).

The shell absorption profiles for some Balmer lines on the spectrogram C4-5466 are shown in figure 2, where the point-to-point normalization with

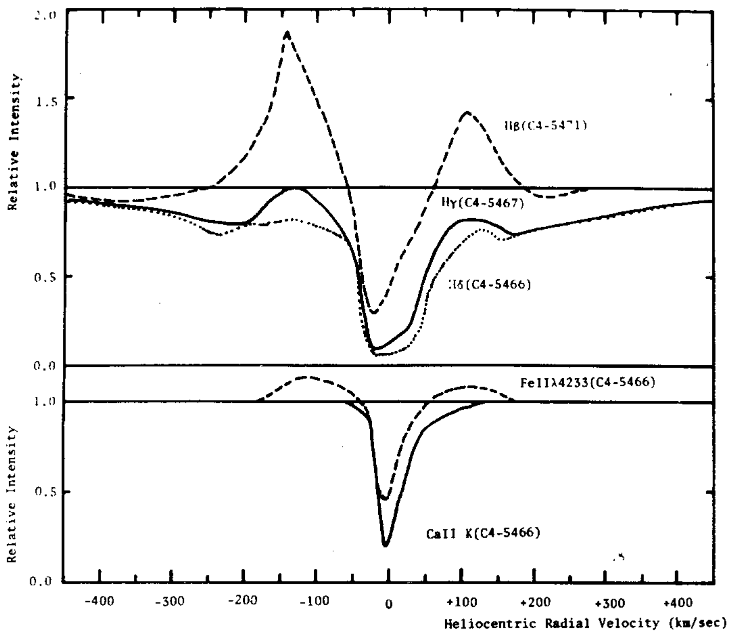

Figure 1

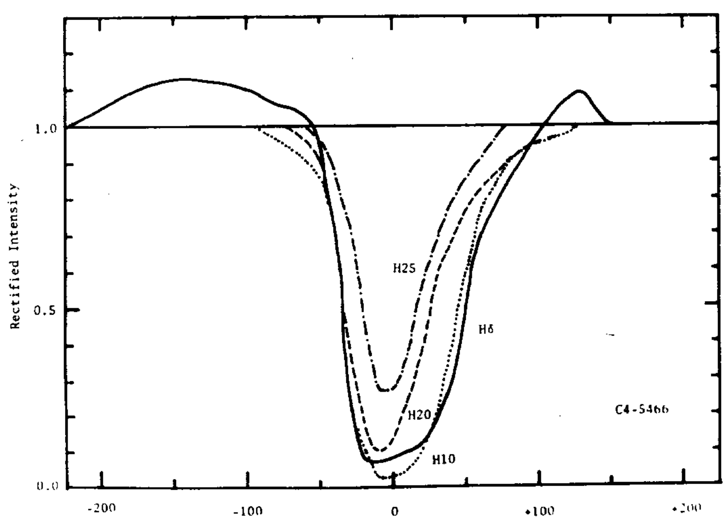

Figure 2.

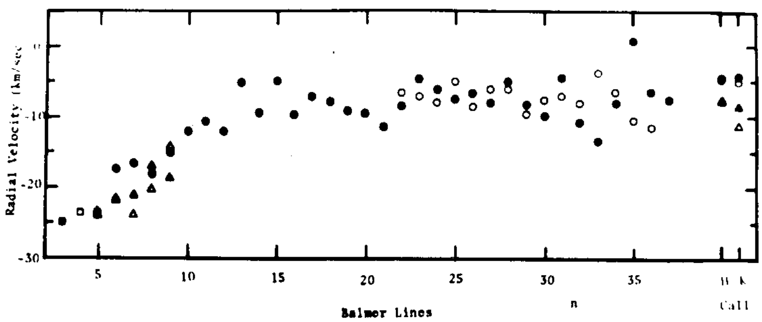

Figure 3

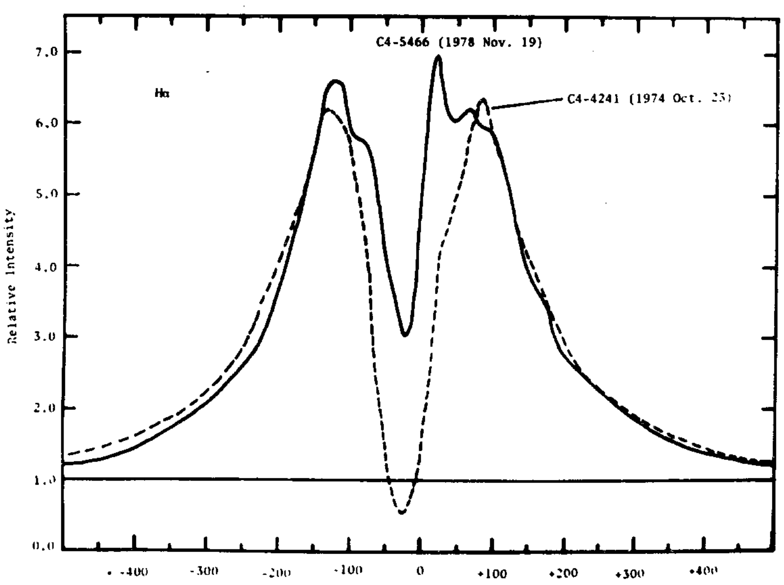

Figure 4

respect to the photospheric line profile has been made up to H17. The steep shortward wing coincides with each other in the lower members, while the longward wing weakens rapidly as the principal quantum number increases. These behaviors could be attributed to the difference in the optical depth $\tau_\alpha(v)$ of the envelope in the Hα line and the fractional area $\beta(v)$ of the photospheric disk which is screened by the envelope, where v is the line-of-sight velocity (Kogure et al. 1978). That is, the profiles of shortward wings in the lower members correspond to large $\tau_\alpha(v)$, and thus represent $\beta(v)$, while those of longward wings correspond to smaller values of $\tau_\alpha(v)$ with large $\beta(v)$, in each zone of the corresponding line-of-sight velocity. In the higher members like the H25 line, the optical thickness of the envelope becomes smaller even in the shortward wing.

The heliocentric radial velocities of the deepest points in the profiles of the Balmer shell lines and the CaII H and K lines are plotted in figure 3. The symbols in figure 3 are as follows: C4-5464 (o), C4-5465 (▲), C4-5466 (●), C4-5467 (Δ), C4-5471 (□), and C4-5488 (■). The progression phenomenon is clearly seen in between the Hα and H15 lines in the sense that the higher members have larger velocities. The higher members than H15 show rather constant velocity of about -7 km/sec. The mean radial velocity of the metallic lines was about -5 km/sec, slightly larger than those of the higher Balmer lines. These results are in good agreement with Hadrava et al. (1978) in December 5.869, 1978.

The profile of the Hα line in November 19, 1978 is puzzling (figure 4). For comparison, the Hα-line profile in October 23, 1974 (JD 2442344.14, Vr = -19.7 km/sec) is also shown in figure 4 (broken line). While the emission wing was similar in these two epochs, the central part was considerably filled by the emission, and the central dip was the reverse type of the other shell lines in November 19, 1978. We note that the NaI D lines on the same plate (C4-5488) with the Hα line had the similar type profile to the CaII K line in figure 1. Because of the strong emission intensity, the profile of the Hα line reflects essentially the emission profile and may also be influenced by the re-absorption process in the outer part.

It is hard to judge at present whether this active phenomenon is a transient one as observed in Pleione or indicates the beginning of the long-term cyclic variation as in 48 Lib and ζ Tau. Further spectroscopic observations and the photoelectric monitoring are highly desirable.

Finally we wish to acknowledge M. Nakagiri for his kind help in the use of the Grant-type comparator at the Tokyo Astronomical Observatory.

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References:

Hadrava, P., Harmanec, P., Koubský, P., Krpata, J., Žďárský, F. 1978, IAU Circular No. 3317.

Harmanec, P., Horn, J., Koubský, P., Žďárský, F., Kříž, and Pavlovski, K. 1979, IBVS No. 1555.

Kogure, T., Hirata, R., and Asada, Y. 1978, Publ. Astron. Soc. Japan, 30, 385.

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INFORMATION BULLETIN ON VARIABLE STARS
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1979 March 26

PHOTOELECTRIC MINIMA OF ECLIPSING VARIABLES

The following Table I contains minima of the eclipsing variables V566 Oph and VW Cep obtained during the year 1978 at the Kryonerion Observatory, Greece. The observations were made with a 48-inch Cassegrain reflector (Contopoulos and Banos 1976) and a two beam multi-mode photometer (Goudis and Meaburn, 1973). The two intermediate pass-band filters used were selected to be in close accordance with the standard UBV colour system.

All the times of minima and the mean errors σ were calculated by the method of Kwee and Van Woerden.

The successive columns contain the name of the star, the heliocentric time of minimum, the mean error σ, the difference O-C, the filter used and remarks. The O-C for V566 Oph was computed from the elements of Dawson and Narayanaswamy (1977) while the O-C for VW Cep was computed using the elements of Cristescu (1978).

Table I

Star	HJD 2440000 +	σ	O-C	Filter	Rem.
V566 Oph	3676.4026	±0.0003	+0.0084	B,V	
V566 Oph	3677.4272	±0.0004	+0.0089	B,V	Min II
VW Cep	3678.5786	±0.0006	+0.0045	B,V	Min II
VW Cep	3679.5510	±0.0002	+0.0028	B,V	
VW Cep	3680.6646	±0.0003	+0.0032	B,V	

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References:

Contopoulos, G. and Banos, C.: 1976, Sky and Telescope,51,154
Cristescu, C.:1978, I.B.V.S. No.1383
Dawson, D., Narayanaswamy, J.: 1977, P.A.S.P. 89, 47
Goudis, C. and Meaburn,J.: 1973, Astrophys.Space Sci.,20, 149

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A NEW LIGHT CURVE OF THE ECLIPSING VARIABLE W UMa

Photoelectric observations of W UMa (BD +56°1400, HD 83950) in two colours B and V were made with the 48 cm Cassegrain telescope equipped with a 1P21 photomultiplier tube at the Ege University Observatory between February 23 and February 25, 1979. BD +56°1399 was used as comparison star during the observations.

The light curve is shown in the Figure where the individual magnitude differences between the comparison and the variable star have been plotted against the phases which were calculated with the elements given by Cester and Pucillo (1972) as:

$$\text{Hel Min J.D.} = 24\ 35918.4154 + 0^{d}.33363808 \cdot E.$$

The analysis of the light curve is in progress.

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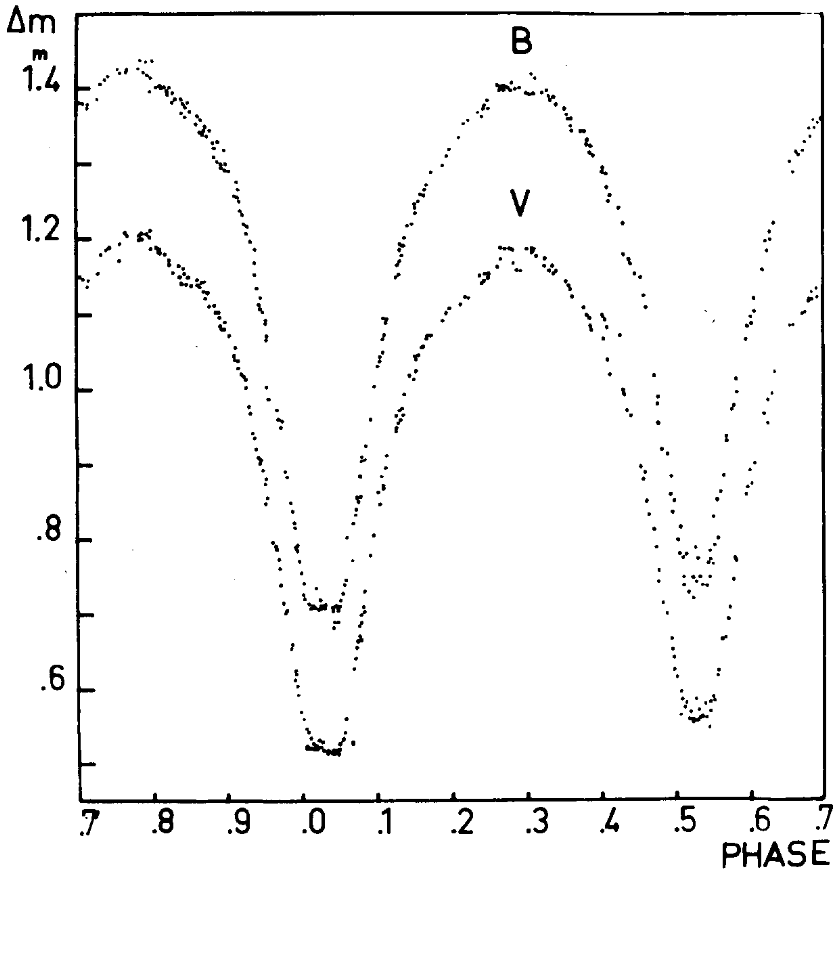
Reference:

Cester, B. and Pucillo, M. 1972, I.B.V.S. 659



Δm
m
1.4
1.2
1.0
.8
.6
B
V
.7
.8
.9
.0
.1
.2
.3
.4
.5
.6
.7
PHASE

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NEW VARIABLE HD 219018, THE COMPARISON STAR OF SZ Psc

Introduction

The eclipsing binary system SZ Piscium is a member of RS CVn stars. Extensive photometric and radial velocity observations of SZ Psc are published by Jakate et al. (1976).

SZ Psc was observed simultaneously photometrically (by the author) and spectroscopically (by Dorothy Fraquelli) during October and November 1978 season from the David Dunlap Observatory. The purpose of the present paper is to report the photometric variability of the usual comparison star for SZ Psc, HD 219018 (G5).

Observations

The photometric observations through V filter were obtained using 48 and 61 cm telescopes of the David Dunlap Observatory. HD 219150 (F2) was on the observing program as a check star to HD 219018. Observations of the first night JD 2443805 itself gave some indications of the variability of HD 219018. Therefore, during the subsequent nights SZ Psc was also observed independently against HD 219150.

Table 1

HD 219018 - HD 219150

$JD_{\odot}$ 2443800.+	ΔV	$JD_{\odot}$ 2443800.+	ΔV
05.638	.478	10.554	.407
.656	.474	.589	.410
.685	.474	.606	.407
.711	.470	.632	.408
06.649	.465	.664	.404
.658	.464	13.516	.476
.666	.466	.579	.470
.686	.458	.637	.471
.713	.458	15.590	.456
10.543	.401		

Table 1 gives observations of HD 219018 against HD 219150, obtained on a total of five nights. HD 219018, the usual comparison star for SZ Psc, seems to be a variable with an overall amplitude of at least .08 mag.

Table 2

SZ Psc - HD 219018			SZ Psc - HD 219150		
$JD_{\odot}$ 2443800.+	PHASE	ΔV	$JD_{\odot}$	PHASE	ΔV
06.578	.706	−.436	06.650	.723	.035
645	.722	−.435	.656	.725	.033
682	.732	−.435	.664	.727	.025
.715	.740	−.438	.689	.733	.029
10.535	.703	−.357	10.540	.705	.039
.559	.709	−.364	.551	.707	.043
.595	.718	−.365	.554	.708	.040
.611	.722	−.368	.586	.716	.033
.658	.734	−.366	.601	.720	.039
.671	.737	−.367	.629	.727	.035

Since there was no second check star used, the observations of SZ Psc itself are presented as evidence towards the variability of HD 219018 and constancy of HD 219150. Table 2 gives two nights of observations of SZ Psc, as observed independently against HD 219018 and HD 219150. On both of these nights SZ Psc was going through a similar phase of outside eclipse. SZ Psc against HD 219018 gives difference of about .08 mag on these two nights whereas the observations against HD 219150 show variations less than .01 mag as expected.

Consequences of the variability of the comparison star of SZ Psc in connection with the properties of this system reported in Jakate et al. (1976) and results of the spectroscopic (Dorothy Fraquelli) and of the other photometric observations of SZ Psc will be discussed in the future paper.

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Jakate, S.M., Bakos, G.A., Fernie, J.D. and Heard, J.F. 1976, Astron. J. 81, 250.

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THE IUE ULTRAVIOLET SPECTRUM OF V1073 CYGNI

V1073 Cyg (HD204038, BD+33°4252) is a contact binary with an Am-type star as the bright member although Hill, et al. (1975) give an early F-classification, perhaps as a result of the dispersion of their spectra. FitzGerald (1964) has solved the double line velocity variation using several measurements of the weak, diffuse lines of the secondary star. Popper (1970), however, noted that the visible-band lines for each component are of a quality too poor to yield reliable masses. Kondo (1966) and Bendenelli, et al. (1967) analyzed the partially-eclipsing light curve and Kruseman (1968) noted that his light curves agree with Kondo's solution. A newer synthesis of Kondo's light curve has been presented by Leung and Schneider (1977), who then also represented FitzGerald's velocities on the basis of a circular orbit. It is possible to compare the Strömgren indices by Hilditch and Hill (1975) to the calibration by Crawford and Mandwewala (1976). The metallicity of V1073 Cyg is evident from this comparison but it is also clear that the reddening cannot be derived from the heavily blanketed (u-b) and c_1 parameters. An upper limit to E(b-y) is of the order of 0.06 leading to an upper limit, E(B-V) = 0.08.

Because the period is short, numerous timings of minimum light have been observed and largely collated by Strohmeier, et al. (1962), Kondo, and Strohmeier and Bauernfeind (1968). A few additional timings have become available in the last decade. These eighty years of history make it clear that the eclipses occur at half-period intervals and that the period has varied, but the scatter and character of the residuals from a constant-period ephemeris can be explained either by a secular change at a variable rate or by one discontinuous period increase about JD2427600. For purposes of this note, phases have been calculated from: Hel. Pr. Min. = 2438672.5826 + 0.7858592E.

Program PG2SS, originally defined by S. Sobieski, permitted observation of V1073 Cyg with the IUE satellite. The description of the instrumentation package is given at length in the October 5, 1978 issue of Nature. The journal of our three observations taken in the low-dispersion mode appears in Table I which lists in successive columns

Table I
Low Dispersion Spectra of V1073 Cyg

Image	Hel.J.D.	Phase	Exposure	Aperture	Remarks
LWR2047	2443732.031	0.098	23 min.	Large	Saturated from λ2495 to λ3035
LWR2047	2443732.051	0.136	19	Small	Underexposed shortward of λ2400
LWR2058	2443733.059	0.419	14	Large	

the image number, the mean heliocentric Julian Day Number and phase of the observation, the exposure length and the choice of the large (10" x 20" ellipse) or small (3" circle) aperture for the spectrograph.

Neither interstellar absorption nor stellar emission lines were detected. Each spectrum shows absorption features which are very broad, in part because of the low resolution (≃ 6Å) of the spectra and in part because of the very large number of unresolved, low excitation lines. Because of the unresolved richness of the spectrum, we content ourselves with describing the evidence for 8 common atoms and ions.

Fe I: The strongest evidence is a possible contribution from multiplet 1 to an absorption feature at λ2970. Possibly present.

Fe II: Almost every strong transition falls within a conspicuous absorption feature. The only discrepancy occurs near λ2240 where several intense lines should fall, but only a weak absorption is seen. Definitely present.

Cr II: Blends of lines from multiplets 5, 6, and 11 fall within absorptions of moderate strength near $\lambda\lambda$2860, 2750, and 2870, respectively. Definitely present.

Mg I: The strongest line is expected to occur at λ2852 and a weak absorption is seen at about that wavelength. Possibly present.

Mg II: The resonance doublet at $\lambda\lambda$2795, 2802 is conspicuously in absorption. Members of multiplet 2 fall within a moderate absorption feature near λ2930. Definitely present.

Mn II: Three strong lines of multiplet 1 fall within a conspicuous absorption near λ2600. Possibly present.

Ti I: The strongest transitions of multiplet 1 fall near an absorption feature at λ2950. It is possible that multiplet 3 contributes to an absorption feature at λ2645. Possibly present.

Si I: Multiplet 1 may contribute to a strong absorption feature near λ2525. Possibly present.

A smooth free-hand continuum was drawn from LWR2058, corrected for the cathode sensitivity by the calibration in IUE Newsletter No. 2, and dereddened for E(B-V) = 0.08 by the interstellar extinction curve due to Jamar, et al. (1976). This was compared to sample model atmospheres in the range from 8750K through 6000K - thus bracketing the spectral classifications - drawn from the compilation by Carbon and Gingerich (1969). It proved impossible to reproduce the spectral gradient of the observations by any of these atmospheres, a circumstance due, no doubt, to the severe blanketing.

Obviously, better spectra would be desirable. With the IUE, a suitable high resolution exposure with the small aperture would, however, be longer than the binary period.

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References:

Bendenelli, O., Delli Ponti, C., Catalano, S., and Cristaldi, S. 1967, Mem. Soc. Astr. Ital. 38, 763.

Carbon, D.F., and Gingerich, O. 1969 in Proc. Third Harvard-Smithsonian Conference on Stellar Atmospheres, O. Gingerich, ed (Cambridge: M.I.T. Press), p. 377.

Crawford, D.L., and Mandwewala, R. 1976, Pub. A. S. P. 88, 917.

FitzGerald, P. 1964, Pub. D. D. O. 2, 417.

Hilditch, R.W., and Hill, G. 1975, Mem. R. A. S. 79, 101.

Hill, G., Hilditch, R.W., Younger, F., and Fisher, W.A. 1975, Mem. R. A. S. 79, 131.

Jamar, C., Macau-Hercot, D., Monfils, A., Thompson, G.I. Houziaux, L., and Wilson, R. 1976, Ultraviolet Bright Star Spectrophotometric Catalogue.

Kondo, Y. 1966, A. J. 71, 54.

Kruseman, P. 1968, B. A. N. Supp. 2, 377.

Leung, K.C., and Schneider, J.J. 1978, Ap. J. 222, 917.

Popper, D.M. 1970, Bull. A. A. S. 2, 12.

Strohmeier, W. and Bauernfeind, H. 1968, Veröff. Remeis Sternw. Bamberg 7 (72).

Strohmeier, W., Knigge, R. and Ott, H. 1962, Veröff. Remeis Sternw. Bamberg 5 (13).

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TWO IUE SPECTRA OF RY SCUTI

RY Sct (HD 169515,BD-12°5045) has been studied several times, but the spectroscopic evidence for this large mass system has been most recently summarized by Cowley and Hutchings (1976).

O'Connell (1949) has described a complex light curve derived from photographic estimates. Woodsworth and Hughes (1977) observed an apparently thermal radio spectrum for the binary; Geisel (1970) a (K-N) index greater than 0.5 mag; and Allen and Swings (1976) an (H-K)-excess of 0.40 mag.

Under program PG2SS, originated by S. Sobieski, RY Sct was observed in the low dispersion, large aperture mode with the spectrograph aboard IUE. The instrument is adequately described in the 5 October, 1978 issue of Nature. For a variety of reasons only two spectra were obtained but, because of the intrinsic interest of the binary, they are briefly described here. The circumstances of the spectra appear in Table I; the ephemeris by Cowley and Hutchings was used to calculate

Table I
Low Dispersion Spectra of RY Sct

Image	Hel.J.D.	Phase	Exposure	Remarks
LWR1493	2443643.229	0.004	45 min.	Weakly exposed for λ<2400Å and saturated for 2750Å<λ<2950Å.
SWP1543	2443643.258	0.006	19 min.	Very weak exposure

phase. The counts from the Fine Error Sensor on board the spacecraft give V = +9.59 and +9.68 for the LWR and SWP images, respectively. Comparison with the V magnitudes by Hilditch and Hill (1975) shows that

RY Sct was deeply in its primary minimum for both exposures. For both LWR1493 and SWP1543, the weak exposures are partly due to the large reddening while the interval of saturation on LWR1493 is due to the change in slope of the reddening law and to the dependence of the cathode sensitivity upon wavelength. In fact, for RY Sct it is impossible to obtain a properly exposed spectrum with a unique exposure over $1900Å < \lambda < 3200Å$.

Strömgren indices for RY Sct have been observed by Hilditch and Hill. Their c_1-index shows considerable intrinsic scatter and the ($b-y$) reddening was derived from the ($b-y$, $u-b$) plane calibrated by Crawford (1975) and Crawford and Mandwewala (1976). The ($b-y$) reddening was transformed to $E(B-V) = 1.29$ through the relation given by Crawford and Mandwewala, the interstellar extinction law due to Jamar, et al. (1976) was assumed, and the cathode spectral responses were taken from IUE Newsletter No. 2. The dereddened spectra were faced against model atmospheres by Carbon and Gingerich (1969) and Auer and Mihalas (1972). In general, an atmosphere with $T_e = 40{,}000K$, $3.5 < \log g < 5$ describes the spectrum over the interval $1350Å < \lambda < 3300Å$ within the precision of the observations. A temperature less than 35000K will not represent the observations adequately, and RY Sct would, therefore, appear to be an O6 to O7 object by the temperature scale of Conti (1973). Such a classification is consistent with the dereddened Strömgren indices.

The temperature and inferred spectral type could be in error if a substantial part of the reddening is circumstellar, rather than interstellar. The small ($H-K$)-index noted by Allen and Swings, however, favors an interpretation based on free-free emission and not on thermal emission due to dust. Therefore, a difficulty remains: the IUE spectra were taken during the eclipse of the less massive, and presumably hotter, component, and it is remarkable that a temperature as hot as 40,000K would be found for an object usually classified as B0.

Although SWP1543 is a very weak exposure, it appears that the C IV λ1550 feature shows a P Cyg-type profile. It is also possible that shell features are present for Si IV λλ1394, 1402, OV λ1371, and N IV λ1719. However, N IV λλ1239, 1243 and O IV λλ1338, 1343 could not be detected. Except for λλ2307, 2733 which are obliterated by cathode reseaux, the 3-5 through 3-13 lines of He II may be weakly present in absorption. Other weak absorptions and emissions are also suspected, but the spectra are not really suitable for detailed study.

Obviously more spectra for RY Sct would be useful but no more observing time remains for PG2SS. For other interested observers, exposure times with the large aperture in the low dispersion mode at the same orbital phase would be of the order of 100 minutes for an SWP image, 25 minutes for 2750Å < λ < 2950Å, and 50 minutes for an LWR image to either side of the wavelength interval just noted.

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References:

Allen, D.A., and Swings, J.P. 1976, A. Ap. 47, 293.

Auer, L.H., and Mihalas, D. 1972, Ap. J. Supp. 24, 193.

Carbon, D.F., and Gingerich, O. 1969, in *Proc. Third Harvard-Smithsonian Conference on Stellar Atmospheres*, O. Gingerich, ed. (Cambridge: M.I.T. Press), p. 377.

Conti, P.S. 1973, Ap. J. 179, 181.

Cowley, A.P., and Hutchings, J.B. 1976, Pub. A. S. P. 88, 456.

Crawford, D.L. 1975, Pub. A. S. P. 87, 481.

Crawford, D.L., and Mandwewala, R. 1976, Pub. A. S. P. 88, 917.

Geisel, S.L. 1970, Ap. J. Lett. 161, L105.

Hilditch, R.W., and Hill, G. 1975, Mem. R. A. S. 79, 101.

Jamar, C., Macau-Hercot, D., Monfils, A., Thompson, G.I., Houziaux, L. and Wilson, R. 1976, Ultraviolet Bright Star Spectrophotometric Catalogue.

O'Connell, D.J.K. 1949, A. J. 54, 134.

Woodsworth, A.W., and Hughes, V.A. 1977, A. Ap. 58, 105.

COMMISSION 27 OF THE I. A. U.
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64th NAME - LIST OF VARIABLE STARS

The present 64th Name - list of variable stars has been compiled in accordance with the rules established in the 56th list. It contains all necessary identifications for 280 new variables designated in 1978.

The whole number of the designated variable stars is now 27476.

In the square brackets the reference number is given for the work where (not always firstly) the information on discovery of the variable had been published. This reference number accompanies designation or number of the star given for it in the cited work. Name of the discoverer is mentioned only in the cases when it does not coincide with the name of the author of the cited work.

Reference numbers 0001–5216 correspond to the numbers from literature list published in the first volume of the 3rd edition of General Catalogue of Variable Stars (pages A42–A121). The numbers 5217–5824 correspond to the supplementary list published in the First supplement to the Catalogue (pages 279–289). The numbers 5825–6828 correspond to the supplementary list published in the Second supplement to the Catalogue (pages 361–380). The numbers 6829–7733 correspond to the supplementary list published in the Third supplement to the Catalogue (pages 342–357).

The numbers 7734–7894 had been published in the 62nd Name–list (IBVS No. 1248, 1976), the numbers 7895–7979 - in the 63rd Name - list (IBVS No. 1414, 1978). At last the numbers 8029, 8054, 8070, 8116, 8144, and 8197–8284 are given in the present edition.

We are grateful to *T.D. Nishtcheva* for preparation of the Name - list for the print.

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Moscow, December, 1978

KV And = СПЗ 2205 [8197].
KW And = СПЗ 2206 [8197].
KX And = BD+49°4045 (7.3) = HD 218393 (A5p) [8198] = SAO 052701.
KY And = BD+48°3950 (7.4) = HD 218674 (B3) [5522] = SAO 052742.
KZ And = BD+47°4058 (8.5) = HD 218738 (G5) [5716] = ADS 16557 B = = SAO 052753.
AF Ant = HV 7539 [1353] = P 3307 = = КЗП 1465.
MX Aps = S 5666 [4001] = КЗП 7670.
FF Aqr = BD − 3°5357 (9.1) [8201] = SAO = 145804.
FG Aqr = Gliese 852 A [6873] = Wolf 1561 A.
FH Aqr = СПЗ 2040 [8202].
V1333 Aql = Aql X−1 [8203].
V1334 Aql = СПЗ 2267 [8204].
V1335 Aql = СПЗ 2268 [8205].
V1336 Aql = СПЗ 2270 [8205].
V1337 Aql = S 9424 [3910].
V1338 Aql = S 4407 [0085] = КЗП 4686.
V1339 Aql = HR 7554 [5150] = BD +7°4252 (7.0) = HD 187567 (B3) = SAO 125116.
V799 Ara = HV 8915 [4725] = 788.1935 [4001] = P 4086 = КЗП 2749.
V800 Ara = HV 8993 [4488] = 502.1933 [4001] = P 1145 = КЗП 2883.
V336 Aur = DO 10900 (K5) = СПЗ 2055 [8144].
V337 Aur = СПЗ 2056 [8144].
V338 Aur = СПЗ 2057 [8144].
V339 Aur = СПЗ 2058 [8144].
V340 Aur = СПЗ 2059 [8144].
V341 Aur = СПЗ 2060 [8144].
V342 Aur = СПЗ 2061 [8144].
V343 Aur = СПЗ 2062 [8144].
V344 Aur = СПЗ 2063 [8144].
V345 Aur = DO 11871 (M6) = S 5416 [7793] = = КЗП 6417.
θ Aur [2890, 8236] = 37 Aur = HR 2095 [8207] = BD +37°1380 (3.0) = = HD 40312 (A0p) = SAO 058636 = = IRC + 40150 = ADS 4566 A = = Zi 496 = КЗП 100704.
CX Cnc = 28 Cnc [8250] = HR 3329 [8209] = = BD + 24°1931 (5.8) = HD 71496 (A5) = SAO 080204.
CY Cnc = BD + 20°2138 (8.4) = HD 73345 (A5) [5842] = SAO 080309 = KW 114 [6456].
AX CVn = HR 4816 = BD +36°2295 (6.0) [8217] = HD 110066 (A0p) = = SAO 063118 = КЗП 6945 = = Babcock 40 [4170].
HH CMa = HR 2603 [8219, 8215] = BD −22°1616 (7.1) = CoD−22°3758 (7.3) = CPD−22°1594 (6.9) = = HD 51630 (B8) = SAO 172631.
HI CMa = BD−15°1695 (8.2) = HD 55538 (B2) = SAO 152558 = BV 1092 [5857] = КЗП 102550 = SA 123, № 150 [5208].
κ CMa = 13 CMa = HR 2538 [4456, 4589, 6311] = CoD−32°3404 (4.0) = = CPD −32°1311 (3.9) = HD 50013 (B2p) = SAO 197258.
V366 Car = PK 280−2°.1 [8220].
V367 Car = CoD −57°2916 (7.7) = CPD −57°2451 (7.9) = HD 86441 (B9) [8222] = SAO 237521 = = BV 699 [4665].
V368 Car = HR 4007 [4456, 8223, 6352, 5840] = CoD−58°3085 (6.7) = = CPD −58°1979 (8.2) = HD 88647 (Mb) = SAO 237773.
V369 Car = HR 4147 = CoD −57°3310 (7.3) = CPD −57°3431 (7.4) = = HD 91619 (B8) [8070] = = SAO 238182.
V370 Car = HR 4169 = CoD −58°3410 (6.5) = = CPD −58°2411 (6.0) = HD 92207 (A2p) [8070; 6870] = = SAO 238271.
V371 Car = HR 4338 = CoD −61°2941 (5.5) = CPD−61°2075 (6.0) = = HD 96919 (A0p) [8070] = = SAO 251286.
V588 Cas = S 3880 [0085] = КЗП 138.
V589 Cas = BD + 60°335 (9.4) [7315, 8226] = SAO 011969 = IRC + 60063 = DO 24747 (M6).
V590 Cas = 462.1934 [0542] = P 2561 = = КЗП 286.
V808 Cen = CoD −62°524 (7.2) = CPD −62°2039 (7.1) = HD 99953 (B0) [8070] = SAO 251422.

V809 Cen = HR 4438 = CoD−60°3587 (7.5) = = CPD−60°3011 (7.5) = HD 100198 (A2p) [8227, 8256] = = SAO 251437.

V810 Cen = HR 4511 = CoD −61°3163 (6.0) = = CPD−61°2559 (6.8) = HD 101947 [6870, 8228] = SAO 251555.

V811 Cen = 22 [7452].

V812 Cen = N Cen 1973 [8231].

V813 Cen = V65 in ω Cen globular cluster [8238]. Not member of the cluster.

V814 Cen = V78 in ω Cen globular cluster [8238]. Not member of the cluster.

β Cen = HR 5267 [8215] = CoD−59°5054 (0.8) = CPD−59°5365 (2.5) = = HD 122451 (B1) = SAO 252582.

o^2 Cen = HR 4442 = CoD−58°4101 (5.5) = = CPD−58°3693 (6.4) = HD 100262 (A2p) [6870, 8070] = SAO 239146 (5.3).

V335 Cep = СПЗ 2294 = 1 [8241]. In the NGC 7023 region.

V336 Cep = СПЗ 2295 = 2 [8241]. In the NGC 7023 region.

V337 Cep = 9 Cep = HR 8279 = BD+61°2169 (5.0) = HD 206165 (B2p) [5522] = = SAO 019541.

V338 Cep = BD+60°2289 (9.3) [8245].

AZ Cet = СПЗ 2265 [8246].

α Cet = 92 Cet = HR 911 [1371, 5150] = = BD+3°419 (2.5) = HD 18884 (Ma) [6876] = SAO 110920 = IRC 00038.

θ Cir = HR 5551 = CoD−62°891 (6.0) = = CPD−62°4337 (5.9) = HD 131492 (B3) [6311] = BV 874 [5579].

HH Com = BD+27°2234 (8.1) = HD 115708 (A2) = SAO 082769 = КЗП 7016 = = Babcock 45 [4170].

BO Cru = HV 8454 [4454] = 101.1932 = = P 839 = КЗП 1894.

V1621 Cyg = $19^h31^m.3 + 45°05'.4$ [8251, *Guida*].

V1622 Cyg = M 266 [8252].

V1623 Cyg = M 267 [8252].

V1624 Cyg = 28 Cyg [8253; 8254, *Winzer*] = = HR 7708 = BD+36°3907 (5.5) = HD 191610 (B2p) = = SAO 069518.

V1625 Cyg = M 265 [8252].

V1626 Cyg = M 268 [8252].

V1627 Cyg = M 240 [8252].

V1628 Cyg = M 239 [8252].

V1629 Cyg = M 263 [8252].

V1630 Cyg = M 264 [8252].

V1631 Cyg = M 243 [8252].

V1632 Cyg = M 238 [8252].

V1633 Cyg = M 270 [8252].

V1634 Cyg = M 246 [8252].

V1635 Cyg = M 273 [8252].

V1636 Cyg = M 245 [8252].

V1637 Cyg = M 237 [8252].

V1638 Cyg = M 236 [8252].

V1639 Cyg = M 275 [8252].

V1640 Cyg = M 271 [8252].

V1641 Cyg = M 274 [8252].

V1642 Cyg = M 261 [8252].

V1643 Cyg = M 258 [8252].

V1644 Cyg = 29 Cyg [8254, *E.Walker*] = = HR 7736 = BD+36°3955 (5.4) = HD 192640 (A0) = = SAO 069678.

V1645 Cyg = M 272 [8252].

V1646 Cyg = M 259 [8252].

V1647 Cyg = M 248 [8252].

V1648 Cyg = M 253 [8252].

V1649 Cyg = M 235 [8252].

V1650 Cyg = M 252 [8252].

V1651 Cyg = M 222 [8252].

V1652 Cyg = M 256 [8252].

V1653 Cyg = M 233 [8252].

V1654 Cyg = M 234 [8252].

V1655 Cyg = M 228 [8252].

V1656 Cyg = M 217 [8252].

V1657 Cyg = M 229 [8252].

V1658 Cyg = M 216 [8252].

V1659 Cyg = M 210 [8252].

V1660 Cyg = M 211 [8252].

V1661 Cyg = 55 Cyg = HR 7977 = BD +45°3291 (5.6) = HD 198478 (B2) [8213] = SAO 050099 = = ADS 14337A = Zi 1957a [8268, *Gore*] = КЗП 102035.

V1662 Cyg = S 10076 [3903].

V1663 Cyg = S 8377 [4341].
V1664 Cyg = S 4537 [0085] = КЗП 5370.
V1665 Cyg = СПЗ 2194 [8269].
V1666 Cyg = СПЗ 2296 = BC 61 [8270].
V1667 Cyg = СПЗ 2260 [8274, *Шугаров*].
V1668 Cyg = N Cyg 1978 [8275].
V1669 Cyg = СПЗ 2264 [8211, *Шугаров*].
α Cyg [4766, 8279] = 50 Cyg = HR 7924 = BD + 44°3541 (1.7) = = HD 197345 (A2p) = ADS 14172 A = SAO 049941 = = IRC + 50337 = Zi 1938 = = КЗП 102017.
ν Cyg [2890, 8224] = 66 Cyg = HR 8146 = BD + 34°4371 (4.2) = = HD 202904 (B3p) = ADS 14831 A = Zi 2001a = КЗП 102081.
LP Del = 3 [8281] = DO 6820 (M2) = КЗП 8536.
LQ Del = BD + 18°4590 (8.6) [8282] = = HD 197378 (Map) = SAO 106417 = DO 19285 (M6).
ZZ Dor = 45 [8283]. In the LMC region. Not member of the LMC.
AA Dor = CPD−69°389 (9.4) [6899] = = HDE 269696 (B).
DG Dra = BD + 56°2190 (9.0) [8284] = = SAO 031377.
DY Eri = o^2 Eri C = 40 Eri C [8280] = = BD−7°781 (B) = ADS 3093 C.
DZ Eri = HR 1441 [5150, 6346] = = BD−3°809 (5.6) = HD 28843 (B9) = SAO 131279.
OO Gem = S 9762 [3903] = СПЗ 2006 [8199].
OP Gem = S 9768 [3903].
OQ Gem = S 9771 [3903].
OR Gem = S 9774 [3903].
σ Gem [2890, 8200] = 75 Gem = HR 2973 = BD + 29°1590 (5.0) = = HD 62044 (K0) = SAO 079638 = = IRC + 30191 = Zi 651 = КЗП 100890.
BE Gru = S 6506 [4001] = КЗП 8796.
BF Gru = S 6512 [4001] = КЗП 8805.
BG Gru = S 6524 [4001] = КЗП 8824.
BH Gru = S 6525 [4001] = КЗП 8825.
V677 Her = S 10290 [5515].
V678 Her = S 10291 [5515].
V679 Her = S 10379 [5558].
V680 Her = S 9240 [3910].
V681 Her = S 10380 [5558].
V682 Her = S 10381 [5558].
V683 Her = S 9241 [3910].
V684 Her = S 9242 [3910].
V685 Her = S 10382 [5558].
V686 Her = S 10293 [5515].
V687 Her = S 10294 [5515].
V688 Her = S 9245 [3910].
V689 Her = S 10383 [5558].
V690 Her = S 10384 [5558].
V691 Her = S 10295 [5515].
V692 Her = S 10297 [5515].
V693 Her = S 10298 [5515].
V694 Her = S 10299 [5515].
V695 Her = S 9250 [3910].
V696 Her = S 10391 [5558].
V697 Her = IRC + 30292 [6005, 7759, 7783].
V698 Her = S 9252 [3910].
V699 Her = S 10393 [5558].
V700 Her = S 10394 [5558].
V701 Her = S 9254 [3910].
V702 Her = S 10398 [5558].
V703 Her = S 10399 [5558].
V704 Her = S 10303 [5515].
V705 Her = S 10400 [5558].
V706 Her = S 10305 [5515].
V707 Her = S 10404 [5558].
V708 Her = S 10405 [5558].
V709 Her = S 10406 [5558].
V710 Her = S 10412 [5558].
V711 Her = S 9257 [3910].
V712 Her = СПЗ 2064 [8206].
V713 Her = СПЗ 2065 [8206].
V714 Her = СПЗ 2069 [8206].
V715 Her = СПЗ 2070 [8206].
V716 Her = СПЗ 2071 [8206].
V717 Her = СПЗ 2072 [8206].
V718 Her = СПЗ 2074 [8206].
V719 Her = СПЗ 2075 [8206].
V720 Her = СПЗ 2076 [8206].
V721 Her = СПЗ 2077 [8206].
V722 Her = СПЗ 2078 [8206].
V723 Her = СПЗ 2079 [8206].
V724 Her = СПЗ 2080 [8206].
V725 Her = СПЗ 2081 [8206].
V726 Her = СПЗ 2084 [8206].
V727 Her = СПЗ 2085 [8206].

V728 Her = СПЗ 2086 [8206].
V729 Her = СПЗ 2087 [8206].
V730 Her = СПЗ 2088 [8206].
V731 Her = СПЗ 2089 [8206].
V732 Her = СПЗ 2090 [8206].
V733 Her = СПЗ 2092 [8206].
V734 Her = СПЗ 2093 [8206].
V735 Her = СПЗ 2101 [8206].
V736 Her = СПЗ 2094 [8206].
V737 Her = СПЗ 2098 [8206].
V738 Her = СПЗ 2100 [8206].
V739 Her = СПЗ 2102 [8206].
V740 Her = СПЗ 2103 [8206].
V741 Her = СПЗ 2104 [8206].
V742 Her = СПЗ 2105 [8206].
V743 Her = СПЗ 2106 [8206].
V744 Her = 88 Her [8208] = HR 6664 = BD + 48°2581 (6.5) = HD 162732 (B8) = = SAO 046997.
V745 Her = 85.1934 [0491] = P 4920 = = КЗП 4428.
ν Her [4044] = 94 Her = HR 6707 [7964] = = BD + 30°3093 (4.5) = HD 164136 (F0) = SAO 066524.
KM Hya = 21 Hya [8210] = HR 3655 = BD −6°2845 (6.3) = HD 79193 (A2) = = SAO 136662.
V359 Lac = СПЗ 2290 [8211].
V360 Lac = 14 Lac [2900, 5522, 8212, 8213] = HR 8690 = BD + 41°4623 (6.1) = HD 216200 (B5) = SAO 052412 = КЗП 103103.
SZ Lep = CoD −25°2539 (7.5) = CPD −25°1005 (8.8) = SAO 170582 = = HD 37212 (Na) = IRC −30046 = = BV 642 [4665].
TT Lep = BV 856 [5254].
V466 Lyr = S 9886 [3903].
V467 Lyr = СПЗ 2259 [8214].
V468 Lyr = S 9317 [3910].
V469 Lyr = S 9636 [3905].
V636 Mon = IRC −10122 [6005, 8029].
V637 Mon = 19 Mon [6620, 6876, 8215] = = HR 2648 [7898] = BD −4°1788 (5.0) = HD 52918 (B3) = SAO 134106 = Zi 597 = КЗП 100797 = = 108 G Mon [8216].
EZ Mus = HR 5066 [4456, 4457] = CoD −68°1229 (6.6) = CPD −68°1929 (6.4) = HD 116890 (B9) [8218] = = SAO 252321 = КЗП 7035.
θ Mus = HR 4952 = CoD −64°699 (6.0) = = CPD −64°2183 (6.1) = HD 113904 (Oap) [6870] = SAO 252162.
QU Nor = HR 6131 = CoD −45°10697 (5.9) = = CPD −45°7969 (6.8) = HD 148379 (B1p) [6311, 6313] = SAO 226813.
μ Nor = HR 6155 = CoD −43°10900 (5.5) = = CPD −43°7622 (6.0) = HD 149038 (B0p) [8221] = SAO 226900 = BV 578 [4181].
V2105 Oph = HR 6128 [5841] = BD −7°4292 (6.1) = HD 148349 (Ma) [4621] = SAO 141186 = = IRC − 10340.
V2106 Oph = BD −21°4422 (7.0) = CPD −21°6215 (8.2) = HD 151658 (Ma) [8225] = SAO 184681 = = IRC −20334.
V2107 Oph = N Oph 1977 [8229].
V2108 Oph = IRC + 10322 [6005, 7759, 7783].
V2109 Oph = N Oph 1969 [8232].
V2110 Oph = AS 239 [8234].
ζ Oph [6876, 8230] = 13 Oph = HR 6175 = BD −10°4350 (3) = = HD 149757 (B0) = SAO 160006.
V1029 Ori = СПЗ 1242 [4076] = КЗП 6359.
V1030 Ori = σ Ori E [8235] = HR 1932 = = BD −2°1327 (7.5) = HD 37479 E [6870] = SAO 132408 = = ADS 4241 E.
V1031 Ori = HR 2001 = BD −10°1281 (6.5) = = HD 38735 (A3) = SAO 150814 = = BV 359 [4024] = КЗП 6401.
HY Peg = СПЗ 2283 [8237].
HZ Peg = СПЗ 2257 [8239].
II Peg = BD + 27°4642 (9.0) = HD 224085 (K0) [6412, 6870, 8240] = SAO 091578.
V424 Per = BD + 56°565 (9.0) = HD 14422 (Bp) [5522] = SAO 023238 = = Oo 2138 [5001, 8242] = = КЗП 102381.
V425 Per = BD + 57°582 (6.8) = HD 15497 (B3) [6870, 8243, 8244] = = SAO 023403.
V426 Per = S 9162 [3910].
V427 Per = СПЗ 920 [0940] = КЗП 260.

V428 Per = S9165 [3910].
V429 Per = S9167 [3910].
V430 Per = 3.1939 [8247] = КЗП 271.
V431 Per = S9170 [3910].
V432 Per = S10154 [5515].
V433 Per = S9176 [3910].
V434 Per = S9179 [3910].
V435 Per = СПЗ 666 [0294] = P 2640 = = КЗП 428.
AX Phe = BPM 30551 [8260].
AY Phe = CoD−46°14721 (8.0) = CPD −46°10566 (8.5) = HD 222096 (Mb) [5973] = SAO 231706.
AE Psc = BD+21°203 (8.3) [7964] = = HD 9277 (G5) = SAO 074770.
AF Psc = $23^h29^m09^s$ −03°01.′7 [8248].
PP Pup = BV 1225 [5829].
PQ Pup = HR 3195 = CoD −37°4288 (6.7) = = CPD−37°1916 (7.1) = HD 67888 (B5) [6311] = SAO 198848.
HT Sge = BD+18°4085 (7.1) = HD 183143 (B8) [8213, 8249] = КЗП 102933.
HU Sge = BD+21°4036 (6.6) = HD 190337 (Ma) = IRC +20450 = Wr 168 [3915].
V4027 Sgr = N Sgr 1968 [8232].
V4028 Sgr = HR 6861 [6023, 6304] = CoD −24°14219 (7.5) = CPD −24°6362 (8.0) = HD 168574 (Mb) = SAO 186699 = IRC −20468 = Zi 1382 = КЗП 101720.
V4029 Sgr = BD−16°4829 (8.7) = HD 168607 (B) [8070] = SAO 161374.
V4030 Sgr = BD−16°4830 (8.9) = HD 168625 (B) [8070] = SAO 161375.
V4031 Sgr = HR 6929 [5890] = CoD −25°13170 (7.6) = CPD −25°6532 (6.8) = HD 170235 (B2p) = SAO 186873.
V4032 Sgr = 1154 [5869].
V4033 Sgr = Var 206 [6278] = 21 [5121].
V4034 Sgr = BV 1634 [7594].
V913 Sco = HR 5942 [8054] = CoD −24°12427 (6.1) = CPD −24°5613 (5.8) = HD 142990 (B8) [8255] = SAO 183982.
V914 Sco = CoD −38°11343 (10) = HV 10814 [0263] = КЗП 2851.
V915 Sco = HR 6392 [8258] = CoD −39°11212 (7.0) = CPD −39°7296 (7.9) = HD 155603 (K5p) [4621].
V916 Sco = $17^h40^m32.^s6$ −36°02′07″ [8259] = N Sco 1968.
V917 Sco = He 3 − 1481 [8116].
AL Scl = HR 9049 = CoD−32°17723 (6.0) = = CPD−32°6688 (5.8) = HD 224113 (B3) [8215] = SAO 214860 = Zi 2164 = 34 G Scl [8261] = КЗП 102291.
LV Ser = BD+9°3006 (8.2) = HD 134793 (A3p) [8233, 8262] = КЗП 7174 = = Babcock 53 [4170].
LW Ser = N Ser 1978 [8263].
V727 Tau = Plf 292 [6394] = СПЗ 2297.
V728 Tau = Plf 349 [6893] = 4 [8264] = СПЗ 2298.
V729 Tau = IRC + 30087 [6005] = XIV [5129] = = СПЗ 1568.
V730 Tau = СПЗ 2258 [8265, *Медведева*].
V731 Tau = HR 1961 = BD+23°1015 (6.3) = = HD 37967 (B3) [6870] = SAO 077450.
PR Tel = CoD−52°9130 (10) = CPD −52°11456 (10.0) = PKS 1925 −524 [8266].
ν Tuc = HR 8582 [4621, 8267] = CoD −62°1402 (6.0) = CPD−62°6348 (6.9) = HD 213442 (Mb) [6870] = = SAO 255247.
DD UMa = 18 UMa = HR 3662 [8209] = = BD+54°1285 (5.7) = HD 79439 (A5) = SAO 027191.
DE UMa = СПЗ 2263 [8271, *Горанский*].
DF UMa = BD+48°1958 A [8272] = = ADS 8242 A.
DG UMa = СПЗ 2261 [8273].
HU Vel = PSR 0833−45 = Vela Pulsar [8276].
HV Vel = HR 3413 = CoD−50°3417 (6.4) = = CPD−50°1666 (6.1) = HD 73340 (B9) [7977] = SAO 236110.
GH Vir = GR 76 [8277] = КЗП 6938.
GI Vir = HV 10106 [0756] = КЗП 1943.
GK Vir = PG 1413+01 [8278].

Supplementary Literature List

8029. *K.M.Merrill, W.A.Stein,* PASP 88, 294, 1976.
8054. *H.Pedersen, B.Thomsen,* AsAp Suppl 30, 11, 1977.
8070. *C.Sterken,* AsAp 57, 361, 1977.
8116. *K.G.Henize,* ApJ Suppl 30, 491, 1976.
8144. *И.Даубе, Л.Дунцанс,* Труды Радиоастрофизической обсерватории АН Латв. ССР 16, 100, 1977.
8197. *Н.Е.Курочкин,* АЦ № 974, 4, 1977.
8198. *P.Harmanec, J.Horn, P.Koubsky, S.Kriz, Z.Ivanovic, K.Pavlovski,* IBVS No 1324, 1977.
8199. *И.Даубе,* АЦ № 838, 1974.
8200. *C.R.Chambliss,* IBVS No 1432, 1978.
8201. *M.M.Dworetsky, H.H.Lanning, P.E. Etzel, D.J.Patenaude,* IBVS No. 1284, 1977.
8202. *Н.Е. Курочкин,* ПЗ Приложение 3, 216, 1977.
8203. *J.Thorstensen, Ph.Charles, St.Bowyer,* ApJ 220, L 131, 1978.
8204. *Н.Е.Курочкин,* АЦ № 1007, 1978.
8205. *Н.Е. Курочкин,* Рукопись, 1978.
8206. *Н.Е. Курочкин,* ПЗ Приложение 3, 201, 1977.
8207. *K.T.Johansen,* AsAp 12, No. 2, 165, 1971.
8208. *H.Haupt,* IBVS No. 928, 1974.
8209. *J.R.Percy,* JRAS Can 67, No. 3, 139, 1973.
8210. *B.Reipurth,* Letter, September, 1978.
8211. *Л.В. Рожанский,* Рукопись, 1978.
8212. *D.L.Crawford,* ApJ 133, 860, 1961.
8213. *G.Hill, R.W.Hilditch, E.L.Pfannenschmidt,* Victoria Publ 15, No. 1, 1976.
8214. *Н.Е.Курочкин,* ПЗ 21, № 1, 66, 1978.
8215. *L.A.Balona,* Mem RAS 84, 101, 1977.
8216. *B.A.Gould,* Cord Res 1, 225, 332, 1879.
8217. *B.Ljunggren,* Uppsala Medd No. 151= =Ark Astr 3, No. 37, 535, 1965.
8218. *H.M.Maitzen, H.J.Wood.* AsAp 58, 389, 1977.
8219. *P.M.Corben, R.H.Stoy,* MNASSA 27, No. 1–2, 11, 1968.
8220. *M.W.Feast, B.S.C.Robertson, R.M. Catchpole,* MN 179, 499, 1977.
8221. *A.F.J.Moffat, N.Vogt,* AsAp Suppl 10, 135, 1973.
8222. *A.F.J. Moffat,* IBVS No. 1265, 1977.
8223. *R.Lake,* MNASSA 23, No. 9, 136, 1964.
8224. *G.Jackisch,* VSS 5, H. 1, 1963.
8225. *O.J. Eggen,* PASP 88, 426, 1976.
8226. *Г.В. Абрамян,* АЦ № 920, 1976.
8227. *A.W.J.Cousins,* MNASSA 32, 43, 1973.
8228. *J.D.Fernie,* PASP 86, 116, 1976.
8229. *A.Longmore, R.Cannon, P.Murdin, D.Malin,* IAU Circ No. 3110, 1977.
8230. *R.F. Wing,* BAAS 6, No. 4, p.1, 427, 1974.
8231. *D.J. Mac Connell, E.Prato C., C.Briceño A.,* IBVS No. 1476, 1978.
8232. *D.J. Mac Connell,* IBVS No. 1340, 1977.
8233. *C.Blanco, F.A.Catalano, G.Strazzulla,* IBVS No. 1194, 1976.
8234. *D.A.Allen,* Sky and Tel 55, No. 6, 484, 1978.
8235. *J.E.Hesser, P.Ugarte,* IAU Circ No. 2911, 1976.
8236. *C. Jamar,* AsAp 70, 379, 1978.
8237. *А.Г. Попов,* Рукопись, 1978.
8238. *S.I. Bailey,* HA 38, 1, 1902.
8239. *Т.А.Евстигнеева,* Рукопись, 1978.
8240. *A.N.Argue,* MN 133, 475, 1966.
8241. *Э.С. Парсамян, И.Янкович,* Бюракан сообщ № 43, 3, 1971.
8242. *P.Th.Oosterhoff,* Leid Ann 17, No. 1, 1937.
8243. *F.Rufener,* AsAp Suppl 26, No. 3, 275, 1976.
8244. *F.Rufener, A.Maeder, G.Burki,* AsAp Suppl 31, No. 2, 179, 1978.
8245. *F.Gieseking,* IBVS No. 980, 1975.
8246. *В.П.Горанский,* АЦ № 1002, 8, 1978.
8247. *J.Classen,* BZ 21, 30, 1939.
8248. *H.E.Bond,* IBVS No. 1160, 1976.
8249. Edinburg Observatory Report 1970, 2.
8250. *S.J.Horan, J.L.Michael, M.A. Seeds,* IBVS No. 896, 1974.

8251. *B.Kehoe*, JAAVSO 5, No. 2, 78, 1977.
8252. *P.Maffei*, IBVS No. 1302, 1977.
8253. Albireo No. 29, 1973.
8254. *D.R.Gies, J.R.Percy*, AJ 82, 166, 1977.
8255. *A.W.J.Cousins*, MNASSA 29, 88, 1970.
8256. *C.Sterken*, IBVS No. 1240, 1977.
8257. *J.R.Percy*, AJ 80, No. 9, 698, 1975.
8258. *A.D.Andrews*, QJRAS 18, 82, 1977.
8259. *N.Sanduleak, C.B.Stephenson, D.J.MacConnell*, IBVS No. 1376, 1978.
8260. *J.E.Hesser, B.M. Lasker, H.E. Neupert*, IAU Circ No. 2876, 1975.
8261. *B.A.Gould*, Cord Res 1, 185, 293, 1879.
8262. *Н.Л.Магалашвили, Я.И.Кумсишвили*, Абаст бюлл №48, 3, 1977.
8263. *H.Kosai*, IAU Circ No. 3188, 1978.
8264. *Э.С.Парсамян*, Бюракан сообщ №49, 8, 1976.
8265. *У.А.Нурманова*, Рукопись, 1978.
8266. *C.J.Smith*, IBVS No. 1085, 1976.
8267. *O.J. Eggen*, PASP 85, 379, 1973.
8268. *E.Zinner*, ErgAN 8, No. 1, 1929.
8269. *С.Ю.Шугаров*, АЦ №949, 1977.
8270. *З.Алксне, В.Озолиня*, Исследование Солнца и красных звезд 4, 5, 1976.
8271. *С.А.Колотовкина*, Рукопись, 1978.
8272. *B.W. Bopp*, MN 166, 79, 1974.
8273. *В.П. Горанский*, АЦ №990, 1978.
8274. *В.Н. Соболев*, Рукопись, 1978.
8275. *P.L. Collins*, IAU Circ No. 3263, 1978.
8276. *P.T.Wallace, B.A.Peterson, P.G. Murdin, I.J.Danziger, R.N. Manchester, A.G.Lyne, W.M. Goss, F.G.Smith, M.J.Disney, K.F.Hartley, D.H.P.Jones, G.W.Wellgate*, Nature 266, 692, 1977.
8277. *G.Romano*, Coelum 28, No. 7–8, 1960.
8278. *R.F.Green, D.O.Richstone, M.Schmidt*, ApJ 224, 892, 1978.
8279. *P.Guthnick, R.Prager*, AN 201, 443, 1915.
8280. *W.E.Kunkel*, Low-luminosity stars, 195, 1969.
8281. *S.Arend*, IAU Circ No. 1379, 1952.
8282. *P.Tempesti*, IBVS No. 1050, 1975.
8283. *R.v.d.R.Wooley, A.R.Sandage, O.J. Eggen, J.B.Alexander, L.Mather, E.Epps, S.Jones*, ROB No. 58, 1962.
8284. *E.W. Burke, H.A.Abt*, PASP 86, No. 513, 677, 1974.

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Konkoly Observatory
Budapest
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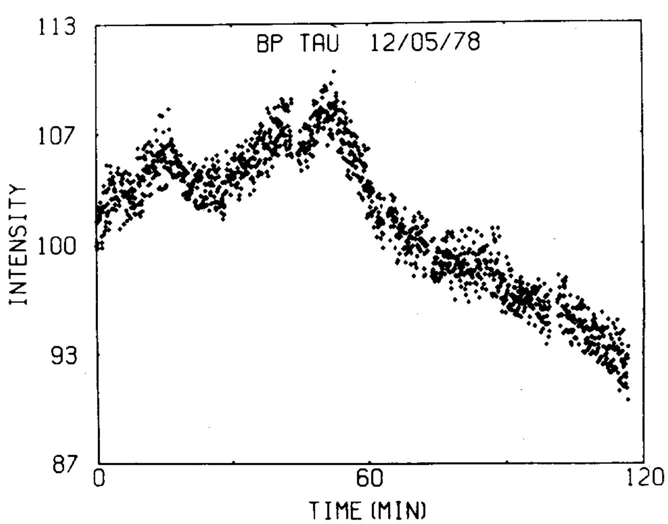
SHORT TIME SCALE BRIGHTNESS FLUCTUATIONS IN BP TAURI

An investigation of short period brightness fluctuations in T Tauri stars has been under way at the Cloudcroft Observatory since November, 1978. The 1.2 meter f/6.5 Newtonian telescope is equipped with a thermoelectrically cooled FW-130 photomultiplier (S-20 surface) housed in a computer controlled single-channel pulse-counting photometer. Differential Johnson U band magnitudes are being obtained for the brighter T Tauri stars on a nightly basis. In addition, several stars are being observed in a high speed mode, consisting of sequential 5 second U band integrations for durations up to 2 hours. Comparison stars are monitored both before and after a high speed time sequence. The observations of Hopp and Surawski (1979) and Kuan (1976) indicate that T Tauri stars show significant variability on time scales less than half



an hour, and our high speed observations are designed to examine the nature of this rapid variability. We report here on short time scale variability in BP Tauri.

Figure 1 shows our results for BP Tauri, an advanced T Tauri star with a strong ultraviolet excess. Relative U band intensity on an arbitrary scale is plotted versus time for nearly two hours of 5 sec integrations. The start time of this observation was UT $06^h26^m05^s$ on 05 December 1978. Comparison stars were constant to ± 0.01 mag during similar observations before and after the BP Tauri observation. Figure 1 shows both systematic brightness changes (15 % intensity decrease during second half of observation) and shorter period "flare-ups" with amplitudes of 5 % and characteristic time scales of 10 minutes. These low-amplitude brightenings are consistent with Kuan's (1976) postulated Balmer continuum producing flares.

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References:

Hopp, U. and Surawski, U. 1979, I.B.V.S. No.1550

Kuan, P. 1976, Astrophys. J. 210, 129

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Budapest
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PHOTOMETRY OF THE RECURRENT NOVA WZ SAGITTAE AT OUTBURST

The recurrent nova WZ Sge was observed during 8 nights from 3 to 23 December 1978 (UT). The observations were made at the Ostrowik station of the Warsaw University Observatory. The 60-cm reflector was used with a conventional single-channel photometer housing an EMI 9781 photomultiplier. The variable was monitored through the B filter, with a few observations obtained through the V. BD +17°4225, with magnitudes V = $8^{m}_{.}755$ and B-V = $+0^{m}_{.}160$ according to Krzeminski and Smak (1971), served as the comparison star. The accuracy of our observations was fairly good although influenced somewhat by the low altitude of WZ Sge above the horizon.

All eight of our light curve are characterized by the absence of narrow minima, so they are radically different from the preoutburst curves, for example, those of Krzeminski and Smak (1971). Only in the light curve of 3 December are the minima clearly seen, but the times of these minima are earlier by 13 minutes than predicted by the preoutburst ephemeris (Robinson et al. 1978).Up to 14 December our observations and those of Heiser and Henry (1979) show two maxima in the light curves: a higher one (primary) and a lower one (secondary) separated by a half period.Gradually with time the secondary became more clearly defined. On 13 December the two maxima were nearly equal in height. Later on the primary maxima disappeared and only the secondary could be seen, as a big hump.

We derived times of maxima from our light curves and the light curves of Heiser and Henry (1979) and used these times along with the times published by Targan (1979b) to study the period of WZ Sge. All these times (O) are listed in Table 1 along with cycle numbers (E) and residuals (O-C) computed from the preoutburst ephemeris

$$JD(hel.) = 2437547.72845 + 0^{d}_{.}0566878455 \cdot E \qquad (1)$$

Table 1

Date (UT) Dec. 1978	Obs.Maxima (O) JD(hel.) 2443800+	Cycle (E) 111000+	Residuals (O-C) (Days)	Cycle (E')	Residuals (O-C') (Days)	Observer
3	S 46.266	108	0.065	-	-	B,U
3	P 46.293	109	0.034	-	-	B,U
6	P 48.503	148	0.034	-	-	H,H
6	P 49.242	161	0.036	-	-	B,U
6	S 49.268	161	0.062	-	-	B,U
6	P 49.298	162	0.036	-	-	B,U
7	P 50.261	179	0.035	-	-	B,U
8	P 51.220	196	0.030	-	-	B,U
8	S 51.244	196	0.054	-	-	B,U
8	P 51.277	197	0.030	-	-	B,U
10	P 52.526	219	0.032	-	-	H,H
12	P 55.496	271	0.054	-	-	H,H
13	S 55.528	271	0.086	-	-	H,H
14	S 57.4767	305	0.1076	0	-0.0008	T
15	S 57.537	306	0.111	1	+0.002	H,H
15	S 58.4496	322	0.1168	17	-0.0005	T
19*	S 62.236	388	0.162	83	+0.010	B,U
19	S 62.4575	392	0.1566	87	+0.0024	T
21	S 64.171	422	0.170	117	0.000	B,U
21	S 64.228	423	0.170	118	-0.001	B,U
21	S 64.285	424	0.170	119	-0.001	B,U
22	S 65.201	440	0.179	135	0.000	B,U
23	S 65.541	446	0.179	141	-0.003	H,H
26	S 69.495	515	0.221	210	+0.002	H,H

P - Primary maximum; S - Secondary maximum; H,H - Heiser and Henry, 1979; T - Targan, 1979b; B,U - Bohusz and Udalski
*-Lower weight; time of this maximum has not been used in deriving the period.

of Robinson et al. (1978). The O-C residuals are plotted versus E in Figure 1. The times of primary maxima are shown as filled circles, those of secondary as open circles. The cross denotes the maximum of Patterson quoted by Targan (1979b).

Looking at Figure 1 one should note that until about 9 December (E=111200) the period can be regarded as constant and equal to its preoutburst value. It is possible that between 6 and 8 December the period was shorter by 0.3 % though this effect may be spurious.The period increased sharply by 1% on or about 10 December (E= 111215). Thus we confirm the period increase noted first by Targan (1979a). Observations from 14 to 26 December indicate that the period remained fairly constant after the increase. The ephemeris giving the best fit to these later times of maximum is

$$JD(hel.)= 2443857.4775+0\overset{d}{.}057213\cdot E' \quad (2)$$

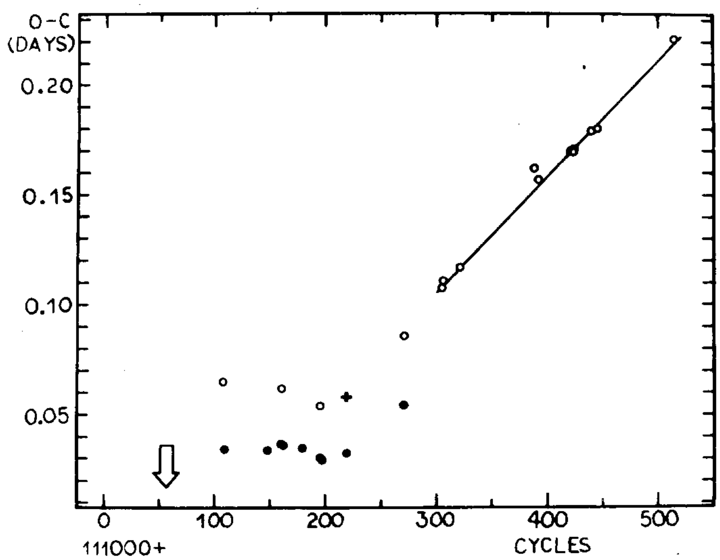

Figure 1: The (O-C) diagram for the maxima of WZ Sge calculated using ephemeris of Robinson et al. (1978). Filled and open circles refer to primary and secondary maxima, respectively. The straight line represents elements: JD(hel.)=2443857.4775+$0^{d}.057213 \cdot E'$. The cross denotes the epoch of maximum of elements given by Patterson (quoted by Targan, 1979b). The arrow indicates the beginning of outburst.

Table 1 gives also cycle number E′ and residuals (O-C′) computed with the above ephemeris. Our value for this new period is close to but a bit shorter than that of Targan (1979b) or that of Patterson as quoted by Targan (1979b). We suggest that the period increase might be connected with the appearance of the superhump thus implying that WZ Sge is a member of the SU UMa subclass of dwarf novae best exemplified by VW Hya (Haefner, Schoembs, Vogt, 1978).

Generally the light curves show an amplitude of about $0^{m}.25$ in B. The composite light curve for 6,7,8 December is plotted in Figure 2. Phases in this figure are computed with the ephemeris

$$JD(hel.) = 2443849.2425 + 0^{d}.056515 \cdot E'' \quad (3)$$

which best satisfies the times of maximum on those three nights.

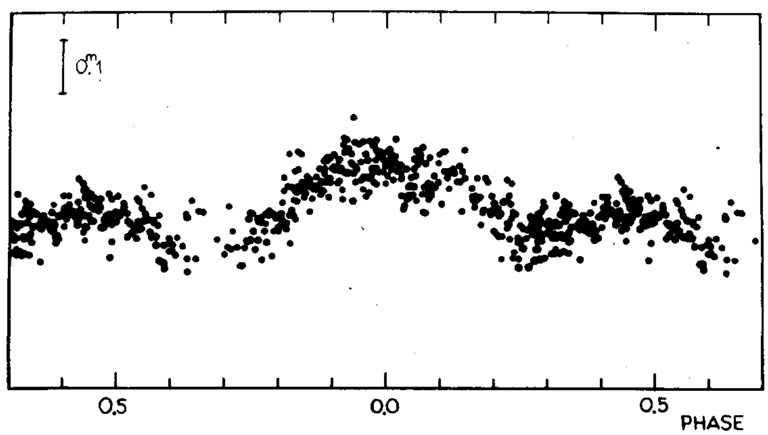

Figure 2: Composite light curve of WZ Sge assembled from nights 6,7,8 December 1978. Phase is calculated from the elements: JD(hel.)= 2443849.2425 + 0^d.056515·E".

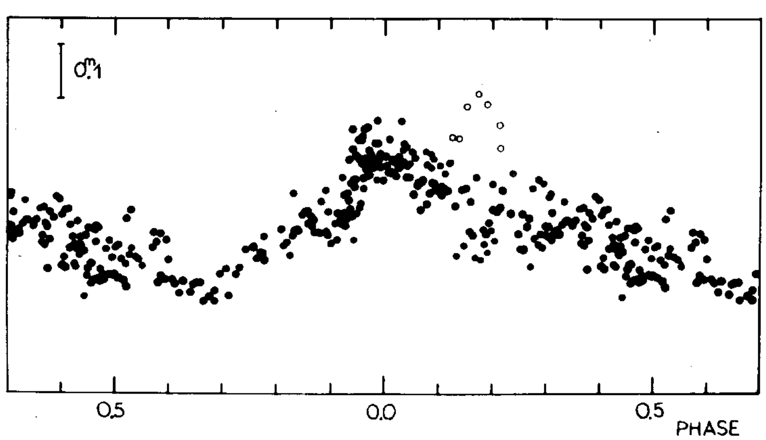

Figure 3: Composite light curve of WZ Sge assembled from nights 19,21,22 December 1978. Phase is calculated from the elements: JD(hel.) = 2443857.4775 + 0^d.057213·E'. Maximum observed on 19 December is denoted by open circles.

Figure 3 shows the analogous curve for 19,21,22 December. Phases in this figure are computed with the elements in Equation (2) and indicate that the new period is satisfactory.

We would like to thank Dr.Whit Ludington for timely passing the information about the nova outburst and Drs. A. Kruszewski, W. Krzeminski, I. Semeniuk for their help in preparing this paper.

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References:

Haefner,R., Schoembs,R., Vogt,N., 1978, ESO Scientific Preprint, No.33

Heiser,A.M., and Henry, G.W., 1979, I.B.V.S. No.1559

Krzeminski, W., and Smak, J., 1971, Acta Astr.,21, 133

Robinson, E.L., Nather, R.E., and Patterson, J., 1978, Ap.J.219, 168

Targan, D., 1979a, IAU Circular, No. 3320

Targan, D., 1979b, I.B.V.S., No.1539

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Budapest
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HR 5343 A NEW DELTA SCUTI TYPE VARIABLE

The star HR 5343 (mv = 5.28) has been found variable when it was used as a comparison star in the photometric observations of the Am star 22 Boo (mv = 5.27). The study of 22 Boo is part of a largest program whose aim is to check the constancy of evolved Am star and whose results will be published elsewhere (Garrido et al. 1979). The star HR 5343 that we reported here as variable was found constant by Breger (1969) inside a limit of 0.002 mag when he observed it during 2.7 and 2.4 hours in two differents nights.

Observations

Observations have been performed during summer 1978 in a photometric station at 2609 m of altitude in Sierra Nevada (Spain). The observing equipment consisting in a 30 cm Cassegrain telescope, a photoelectric photometer equipped with an unrefrigerated EMI 6256 A photomultiplier and an analogical recorder. Only one filter, close to the B of the Johnson's system has been used.

The star has been observed during three nights. The magnitude differences HR 5343-22 Boo are shown in Figure 1. The figure also includes a plot of the magnitude differences between 22 Boo and the second comparison star HR 5346 (mv = 6.30, dF4) as a monitoring of the measurement accuracy. The amplitude of the light variations is about 0.03 mag. and does not change significantly from one night to another.

A period estimation has been obtained from a night by night Fourier analysis of the data. We found periods slightly different for each night with a mean value of 0.04 d.

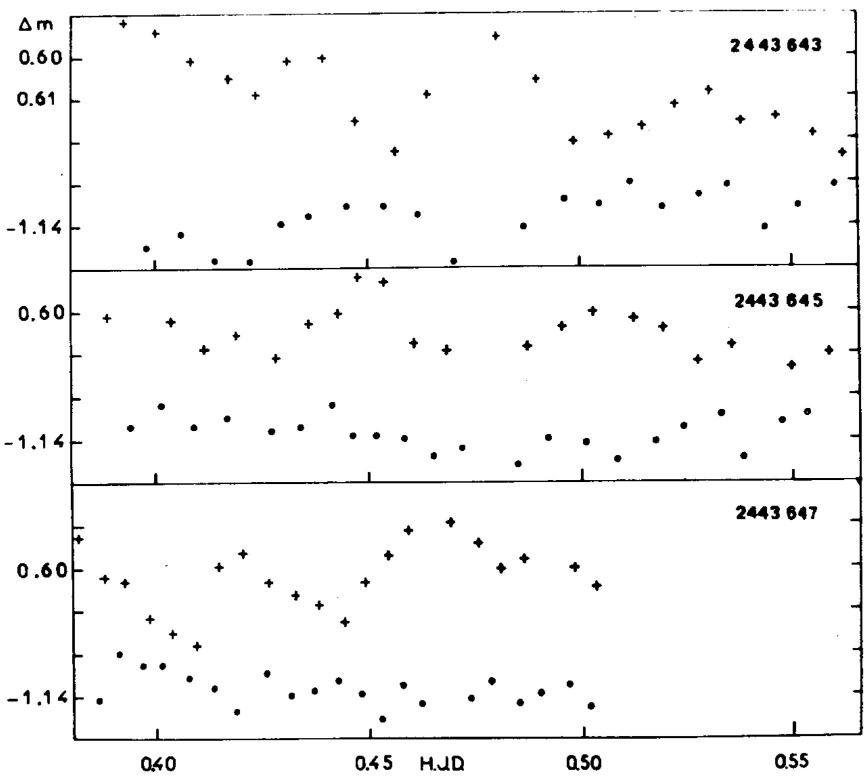

Fig.1 - Light curves showing the magnitude difference HR 5343 - 22 Boo (crosses) and 22 Boo - HR 5346 (points) versus the heliocentric julian date. The number which appears in the corner of each light curve is the julian day of the observation.

Spectral Classification

A photometric calibration of HR 5343 (Philip et al. 1976) gives Mv = 2.54 and log Te = 3.88 which places this star in the extension of the cepheid instability strip close to the main sequence. The period and luminosity found are in agreement with the period-luminosity-color relation for δ Scuti stars, Mv = -3.052 log P + 8.456 (b - y)o - 3.121 ($\pm$ 0.31 mag) (Breger, 1979) which gives Mv = 2.58.

Its classification as Am in the Bright Star Catalogue (Hoffleit, 1964) would indicate that this star contradict the well established fact that main sequence Am stars do not pulsate. However, another spectral classification by Bertaud and Floquet (1967) shows that HR 5343 is a normal F0 IV star having Mv I(λ 4031 - 34) and Ca I (λ 4227) lines weaker than usual. So the classification as Am is probably wrong.

Conclusion

The position of this star in the HR diagram, the value of the period and the shape of the light curves suggest its classification as δ Scuti variable. The value of the pulsational constant, $Q = 0.025$, obtained from $\log Q = -6.454 + \log P + 0.5 \log g + 0.1 M_{bol} + \log Te$ (Petersen and Jorgensen, 1972), corresponds to a pulsation in the first overtone.

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References:

Bertaud, C. and Floquet, M. 1967, J. Obs. 50, 425.

Breger, M. 1969, Astrophys. J., Suppl. Ser. 19, 79.

Breger, M. 1979, preprint.

Garrido, R., Costa, V., Lopez de Coca, P. 1979, preprint.

Hoffleit, 1964, Catalogue of Bright Stars, 3 ed. (New Haven Yale University press).

Petersen, J.O. and Jorgensen, H.E. 1972, Astron. Astrophys. 17, 367.

Philip, A.G.D., Miller, T.M. and Relyea, L.J. 1976, Dudley Obs. Rep. n° 12.

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INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1979 April 16

SOME INTENSE FLARES OF UV CETI

Recent perusal of flare star records at Boyden observatory revealed three intense outbursts from UV Ceti (R.A.=01^h36^m4, declination= $-18^o13'$ (1950), visual magnitude 12,9 at minimum, spectral type dM5,5e) hitherto unreported.

The 41 cm Nishimura reflector was used for these observations, fitted with a Johnson B filter. The detector was an uncooled EMI 6256A photomultiplier tube.

The flare of $\frac{I_{o+f}-I_o}{I_o}$ >8,48 during the observational run on the night of 14 - 15 September was confirmed visually in the 10 cm finder. Reductions from the photometer records were made using a Hewlett Packard Model 9825 microcomputer and digitizer and other computing facilities on the main campus of the Orange Free State university.

The flares reported showed the flash phase followed by a more gradual decline characteristic of UV Ceti type flare stars.

The following table gives a summary of the observations:

03/04 August 1975: Monitoring Time: $00^h40^m08^s$- $03^h00^m27^s$ U.T.

Flare maximum U.T.	$\frac{I_{o+f}-I_o}{I_o}$	$2.5\log(\frac{I_{o+f}-I_o}{I_o})$	$\sigma(mag)=-2.5\log\frac{\lvert\sigma\rvert}{I_o}$	$(m_{lim}-m_o)=\sigma(mag)-1.19$
$01^h48^m15^s$	2.87	1.15	1.76	0.57

14/15 September 1975: Monitoring Time $20^h55^m07^s$-$02^h11^m19^s$U.T.
Interruption in observing from:$00^h07^m45^s$-$00^h12^m45^s$U.T.

$22^h58^m10^s$	>8.48	>2.32	2.45	1.26
23 11 32	2.19	0.86	2.45	1.26

We wish to express our thanks to Prof.F.D.I.Hodgson, the Director of the Institute of Groundwater Studies at the University, for access to his departments Hewlett Packard microcomputer.

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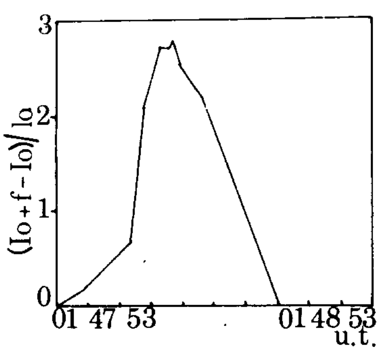
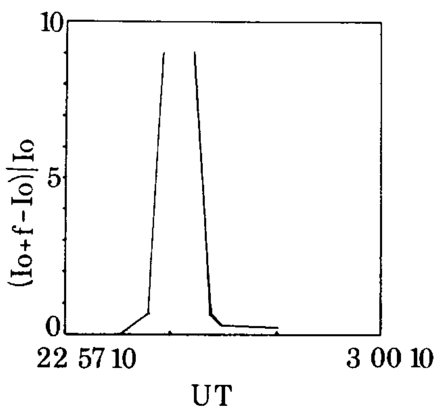
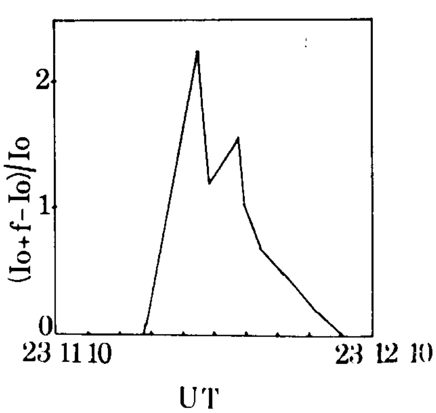
UV CETI
03.04/8/75



UV CETI
14.15/9/75



UV CETI
14/15/9/75



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Konkoly Observatory
Budapest
1979 April 19

LIGHT VARIATIONS OF HD 54475

HD 54475 is an early type star of magnitude V = 5.79 and spectral type B9 according to the Henry Draper Catalogue. In the Michigan Spectral Catalogue it has been classified B3V, a spectral type in accordance with the UBV and *Celescope* ultraviolet photometry of Deutschman et al. (1976). Heck and Manfroid (1975) and Heck (1977) have used HD 54475 as a comparison star for extensive photoelectric *uvby* photometry of Ap stars. Although at least 54 *uvby* observations exist so far, HD 54475 has never been suspected of photometric variability.

In January 1977, photoelectric UBV photometry of HD 54475 has been carried out at La Silla, Chile using the Bochum University 61cm telescope. Observations of HD 54475 relative to HD 55719, HD 54893 and HD 56410 were made on 25 nights between January 3 and January 31. The reduction procedures employed were those described by Stift (1978); combination of 3 to 4 observations for each night leads to an internal precision of $0^m.002$ - $0^m.003$ in B and V.

HD 55719, a known SrCrEu star, remained constant throughout this period within the observational errors; very long-term variations on the $0^m.01$ level appear to be absent, too. HD 54475 on the other hand exhibited low-amplitude variations in both magnitude and colour, the amplitudes ranging from $0^m.02$ in V to $0^m.04$ in U. There is no apparent periodicity in a plot of magnitudes versus Julian Day (Fig. 1); period search programs employing several different methods all yielded negative results. Light variations on a time scale of a few hours like those observed by Elst (1979) in some bright southern B-type stars have to be excluded.

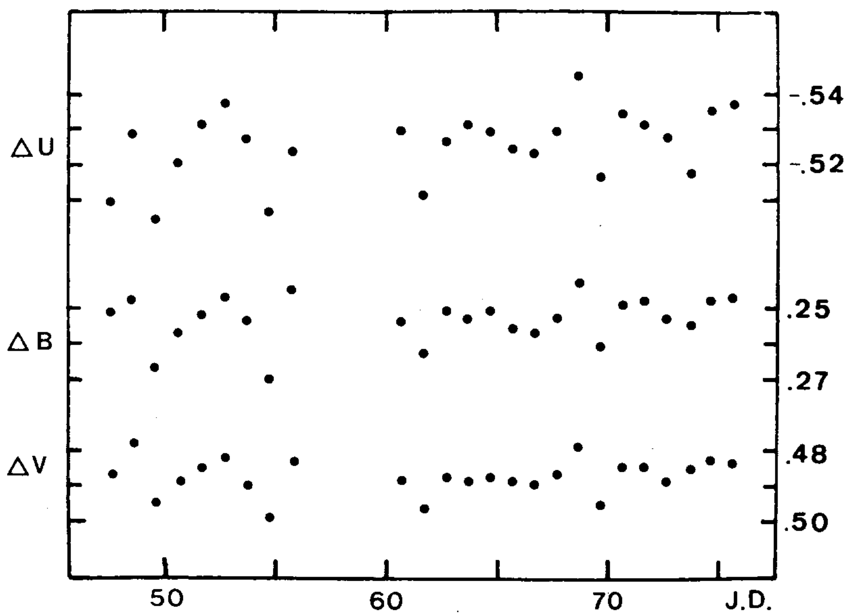

Figure 1: UBV observations of HD 54475 relative to HD 55719 plotted versus J.D. - 2443100.

As a conclusion we note that HD 54475 does not fit in any of the well-established classes of variable stars. Whether this star is an irregular variable or whether it exhibits periodic variations with pronounced beat phenomena has to be the subject of further investigations.

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References:

Deutschman, W.A., Davis, R.J. and Schild, R.E.: 1976, Astrophys. J. Suppl. 30, 97

Elst, E.W.: 1979, Inf. Bull. Var. Stars, No. 1562

Heck, A.: 1977, Astron. Astrophys. Suppl. 27, 47

Heck, A. and Manfroid, J.: 1975, Astron. Astrophys. Suppl. 22, 323

Stift, M.J.: 1978, Astron. Astrophys. Suppl. 32, 343

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Konkoly Observatory
Budapest
1979 April 24

OBSERVATIONS OF V645 CENTAURI AND YZ CANIS MINORIS

V 645 Cen

The flare star V 645 Cen (R.A.$14^h26^m42^s$, declination $-62^\circ 29'$ (1950), 11.3 visual magnitude at minimum, spectral type dM5e) was observed at Boyden Observatory on the night of 16/17 April 1975. The 41 cm Nishimura reflector was used with an uncooled EMI 6256A photomultiplier tube and a standard Johnson B filter. One low intensity flare was noted during the monitoring period from $19^h27^m07^s$ U.T. on 16 April to $03^h42^m15^s$ U.T. on 17 April. (There was an interruption in the observations from $21^h54^m00^s$ U.T. to $22^h01^m30^s$ U.T. on 16 April.)

YZ CMi

The flare star YZ CMi (R.A.$07^h42^m6^s$, declination $+3^\circ 41'$ (1950), 11.6 visual magnitude at minimum, spectral type dM4.5e) was monitored at Boyden Observatory during the night of 22/23 January 1976. Weather conditions were such that worthwile observations were only possible between $19^h21^m00^s$ and $23^h00^m00^s$ U.T. One intense flare was recorded during the period.

Flare star	Flare maximum Universal Time	$\frac{I_{o+f}-I_o}{I_o}$	σ(mag) $= -2.5\log\frac{\lvert\sigma\rvert}{I_o}$	$(m_{lim}-m_o)$ $= \sigma$(mag) $-$ 1.19
V 645 Cen	$02^h53^m15^s$	1.08	2.59	-
YZ CMi	$20^h49^m30^s$	5.14	2.43	1.24

We are greatly indebted to Prof. F.D.I. Hodgson, the Director of the Institute of Groundwater studies at the university, for access to his department's Hewlett Packard Model 9825 microcomputer and digitizer for the reduction of our data.

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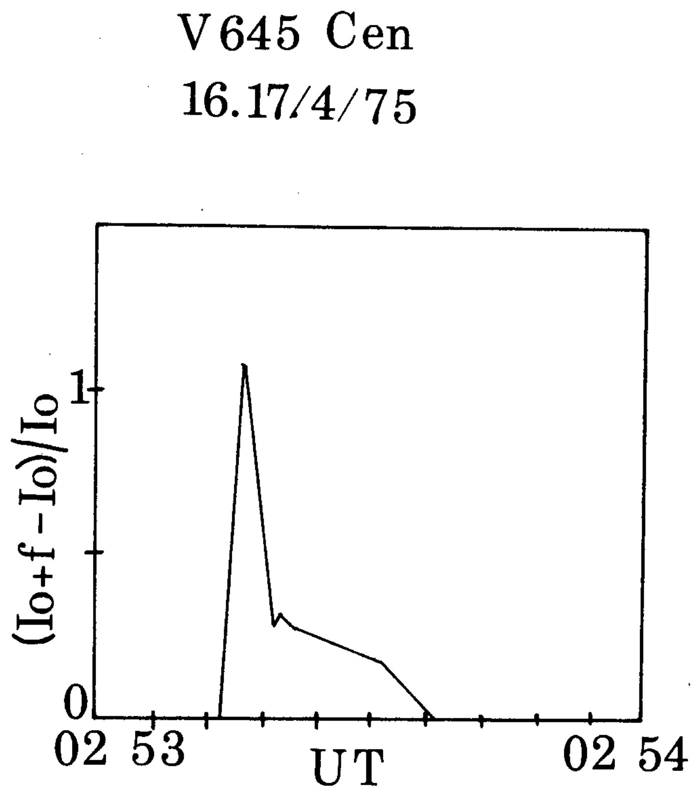
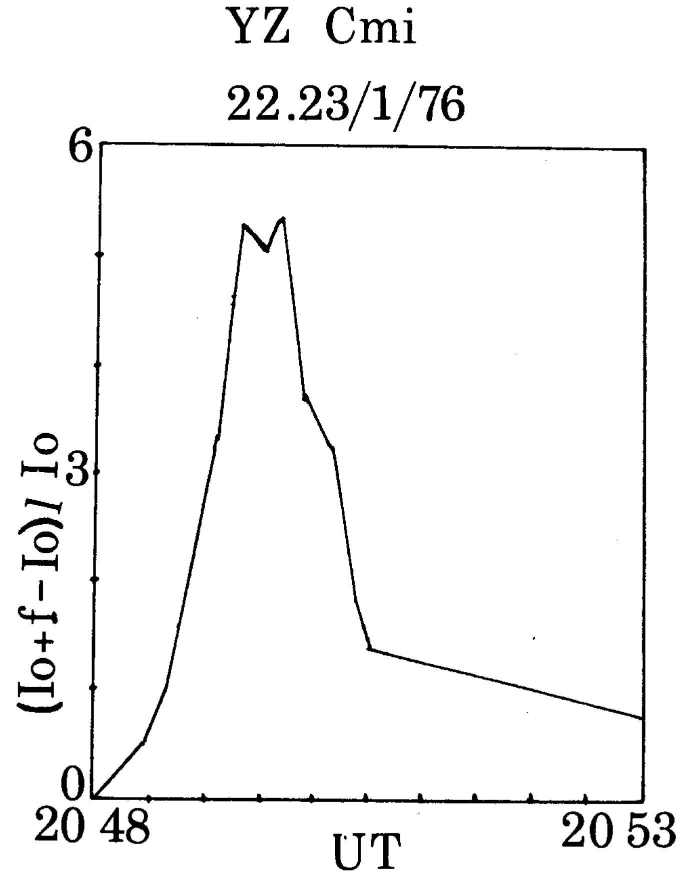

V645 Cen
16.17/4/75
(Io+f - Io)/Io
1
0
02 53
02 54
UT


YZ Cmi
22.23/1/76
(Io+f - Io)/ Io
6
3
0
20 48
20 53
UT

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Number 1588

Konkoly Observatory
Budapest
1979 April 24

FLARE OBSERVATIONS OF UV CETI DURING NOVEMBER 1975

The flare star UV Ceti (R.A.=$01^h36^m24^s$, declination=$-18^o13'$ (1950), visual magnitude 12.9 at minimum, spectral type dM5.5e) was monitored from Boyden Observatory during November 1975.

Of the 17 flares recorded, three were very intense; the outbursts peaking at $18^h15^m32^s$ and $02^h07^m05^s$ on the night of 2-3 November were confirmed visually through the 15 cm finder. Throughout this work the 41 cm Nishimura reflector was used with an uncooled EMI 6256A photomultiplier tube and a Johnson B filter.

Possibly of particular interest are the six spike events noted during the period. Generally they were of 3 to 6 seconds duration with $(I_{o+f}-I_o)/I_o$ values between 1.10 and 2.05. They are significantly shorter in lifespan than UV Ceti flares we have previously recorded.

We are particularly indebted to Prof. F.D.I. Hodgson, Director of the Institute of Groundwater Studies at the University, for making his department's Hewlett Packard Model 9825 microcomputer and digitizer available for the reduction of our photometric data.

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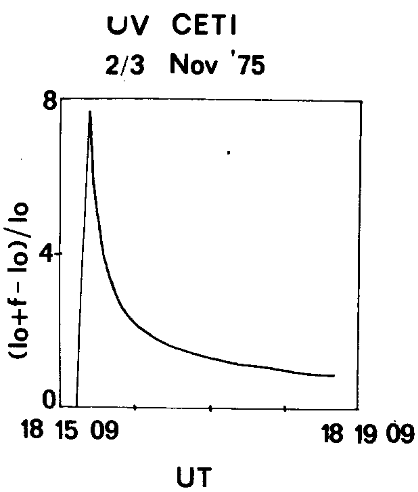
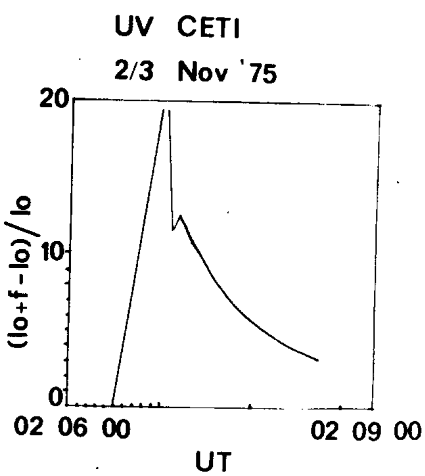
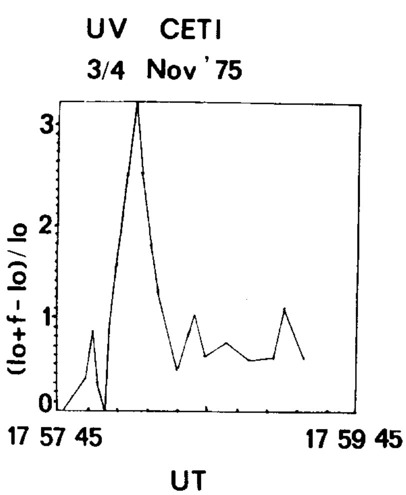
Bloemfontein
Republic of South Africa

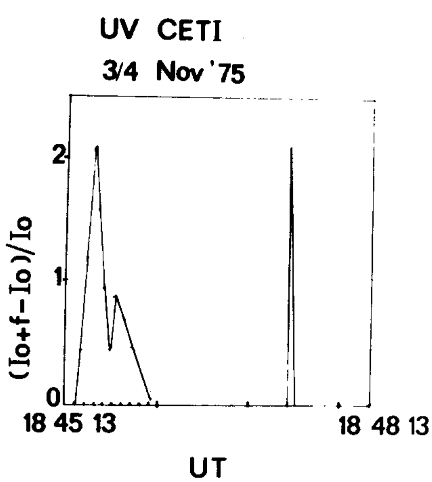
DATE 1975	MONITORING TIME U.T.	FLARE MAXIMUM U.T.	$\frac{I_{o+f}-I_o}{I_o}$	$2.5\log[\frac{I_{o+f}-I_o}{I_o}]$	$\sigma(mag) = -2.5\log\frac{\lvert\sigma\rvert}{I_o}$	$m_{lim}-m_o = \sigma(mag)-1.19$
02/03 Nov	$18^h00^m02^s$ - $21^h32^m18^s$ 21 38 24 - 22 04 24 00 09 29 - 01 12 30 01 13 54 - 02 22 02	+ $18^h15^m32^s$	7.40	2.17	2.19	1.01
		* 23 27 00	1.11	0.11	2.20	1.06
		+ 02 07 05	> 18.59	> 3.17	2.15	0.96
03/04 Nov	17 48 15 - 19 28 07 19 29 09 - 20 59 07 21 04 54 - 20 27 00 20 32 09 - 02 20 11	17 58 15	3.21	1.27	1.89	0.70
		* 18 45 28	2.05	0.78	1.89	0.70
		18 47 40	2.02	0.76	1.89	0.70
		22 53 49	1.18	0.18	1.97	0.78
		* 01 53 24	1.39	0.35	1.97	0.78
04/05 Nov	18 03 00 - 23 07 42 23 12 02 - 02 06 14	22 21 01	1.74	0.60	2.03	0.84
		* 22 23 46	1.10	0.11	2.03	0.84
		01 03 18	1.62	0.52	1.89	0.70
		01 09 12	1.25	0.24	1.89	0.70
05/06 Nov	22 15 06 - 02 01 02	23 32 48	1.15	0.15	1.86	0.67
		* 23 51 41	2.01	0.76	1.86	0.67
		* 01 05 17	1.42	0.38	1.86	0.67
14/15 Nov	17 48 06 - 01 50 06	19 20 51	2.51	1.00	1.31	0.12
29/30 Nov	18 05 21 - 18 45 00 18 49 12 - 19 16 54 19 22 24 - 22 00 19	19 27 38	2.07	0.79	2.28	1.09

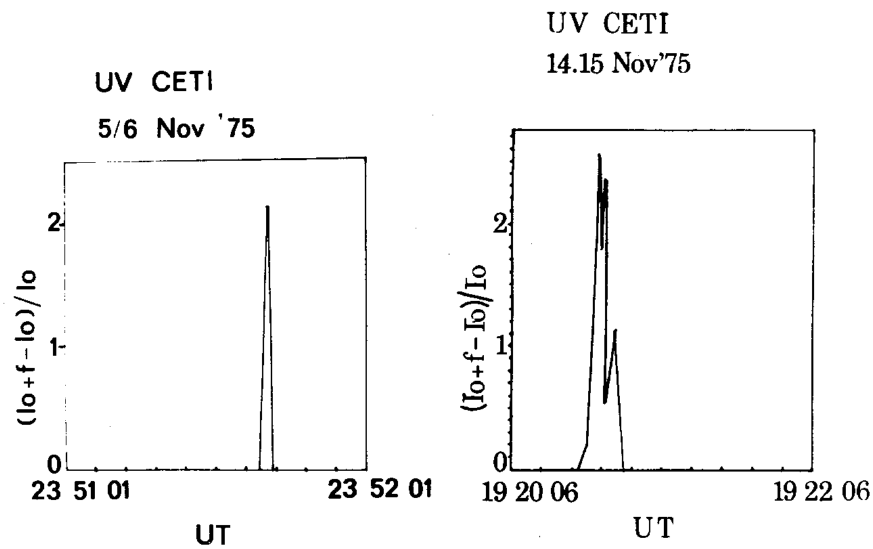
* SPIKE EVENT
\+ CONFIRMED VISUALLY


UV CETI
2/3 Nov '75
8
4
0
(Io+f- Io)/Io
18 15 09
18 19 09
UT


UV CETI
2/3 Nov '75
20
10
0
(Io+f- Io)/Io
02 06 00
02 09 00
UT


UV CETI
3/4 Nov '75
3
2
1
0
(Io+f- Io)/Io
17 57 45
17 59 45
UT


UV CETI
3/4 Nov '75
2
1
0
(Io+f-Io)/Io
18 45 13
18 48 13
UT


UV CETI
5/6 Nov '75
(Io+f − Io)/Io
0
1
2
23 51 01
23 52 01
UT
UV CETI
14.15 Nov'75
(Io+f − Io)/Io
0
1
2
19 20 06
19 22 06
UT

COMMISSION 27 OF THE I. A. U.
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Number 1589

Konkoly Observatory
Budapest
1979 April 26

PHOTOELECTRIC MINIMA OF ECLIPSING VARIABLES

The following list contains minima of the eclipsing variables VW Cephei and KO Aquilae, obtained at the Bucharest Observatory. The table gives the heliocentric minima, the mean error, the difference O-C, the type of filter, the observer and remarks. The O-C is referred for VW Cephei to the Second Supplement to the GCVS (Moscow, 1974) and for KO Aquilae to Suppl. Intern. Annuario Cracoviense (SAC) 1978.

J.D.hel.		O-C	Filter	Observer	Remark
		VW Cephei			
2443766.5225	±0.0005	$+0^{d}.0119$	B	Cr	
766.5226	0.0004	+0.0120	U	Cr	
782.2422	0.0006	+0.0068	V	Su	
782.2451	0.0008	+0.0098	B	Su	
782.2460	0.0004	+0.0106	U	Su	
785.3025	0.0002	+0.0058	U	Op	
785.3052	0.0004	+0.0084	B	Op	
785.3061	0.0005	+0.0093	V	Op	
796.3005	0.0009	+0.0103	V	Cr	
796.3024	0.0009	+0.0122	B	Cr	
822.3216	0.0002	+0.0090	V	Op	
822.3231	0.0004	+0.0105	B	Op	
822.3230	0.0003	+0.0104	U	Op	
835.2703		+0.0161	B	Cr	Min.II
835.2704		+0.0163	V	Cr	Min.II
837.2218	0.0010	+0.0194	V	Su	
837.2230	±0.0005	+0.0206	B	Su	
		KO Aquilae			
2443766.2954	±0.0006	+0.0204	B	Cr	
766.3019	±0.0003	+0.0268	V	Cr	

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ALGENIB IS A SPECTROSCOPIC BINARY

Algenib (γ Peg, 88 Peg, HD 886) is a well-known representative of a group of β Cep stars. Its periodic radial-velocity variations with a period of 0.15175 days were discovered by McNamara (1953). Williams (1954) disclosed small light variations modulated by the same period. Many subsequent studies led to the conclusion that the period has remained constant. McNamara (1955) pointed out a possibility that the γ -velocity of the 0.15-day curve varies but little attention was devoted to this fact in all subsequent investigations.

During the night September 7/8, 1978 we obtained a series of 18 spectrograms of the star using the coudé focus of the Ondřejov 2-m telescope. A very detailed analysis of all velocity and photometric data available in literature was undertaken by us and the study will soon be submitted to Bull. Astr. Inst. Czech. However, one result in worth mentioning right now and should be available to astronomical community before the star will be observable again:

We have revealed a periodic variation of the γ -velocity of Algenib, with a period of 6.83072 days, which seems to indicate that the star is a spectroscopic binary. Modulation with this period is clearly detectable also in OAO 2 photometry of Algenib, kindly communicated to us by Dr. Lesh. In fact, the 6.83-day period is probably responsible for the scatter in OAO 2 data mentioned by Lesh (1976). Both periods are detectable even in more scattered photometry by Magalashvili and Kumsishvili (1970).

Orbital elements of Algenib as a spectroscopic binary are the following:

$P = 6.830713 \pm 0.000169$ days

$T_{max\ RV} = \text{HJD } 2434675.620 \pm 0.092$

$e = 0$ (according to the test suggested by Lucy and Sweeney 1971)

$K = 1.34 \pm 0.11$ km/s

$\gamma = 2.50 \pm 0.09$ km/s

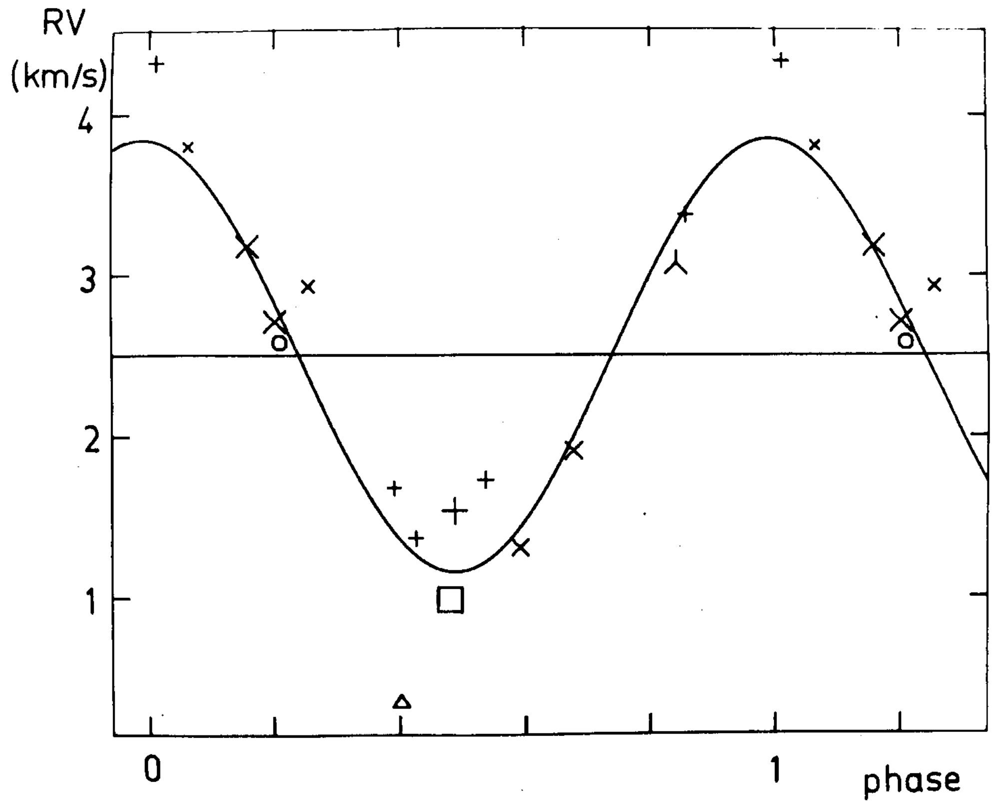
$f(m) = 1.71 \times 10^{-6}\ m_{\odot}$ $\qquad a_1 \sin i = 0.181\ R_{\odot}$

This solution is illustrated by Figure. To obtain reasonable mass for the secondary component, one is led to conclusion that the inclination of orbit must be very low. It means, in turn, that the visible B2 component may be even a normal rapidly rotating B star seen almost pole-on.

Using all available velocities since 1899 we have also derived the following improved ephemeris for the short period,

$$T_{max\ RV} = \text{HJD } \underset{\pm 18}{2414888.6733} + \underset{\pm 15}{0.151750125^d} \times E,$$

which allows to count unambiguously all 0.15-day cycles covered by available data.


RV
(km/s)
4
3
2
1
0
1
phase

We appeal to all spectroscopists and photometrists interested in the field to obtain new series of data during the forthcoming season and to confirm (or disprove) our finding. As to UBV photometry, it would be wise to accept 34 Psc (used by previous observers) as a comparison star, and to reduce all the measurements to the international system.

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References:

Lesh, J.R.,(1976) Astrophys. J. 208, 135

Lucy, L.B., Sweeney, M.A., (1971) Astron. J. 76, 514

Magalashvili, N.L., Kumsishvili Y.I., (1960) Perem. zvezdy 13, 37

McNamara, D.H., (1953) Publ. Astr. Soc. Pacific 65, 144

McNamara, D.H., (1955) Astrophys. J. 122, 95

Williams, A.D. (1954) Publ. Astr. Soc. Pacific 66, 25

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PHOTOELECTRIC PHOTOMETRY OF V711 TAURI DURING 1979

Photoelectric observations of the double star V711 Tauri (HR 1099) were made at Kutztown State College Observatory with the f/14.5 46-cm Cassegrain reflector. An unrefrigerated EMI 6256-SA photomultiplier (S-13 surface) was used in conjunction with a standard V filter. Transformation to standard V magnitude was accomplished using a value of $\epsilon = -0.04$. The comparison star chosen was 10 Tauri, which has been used by most previous observers of V711 Tauri.

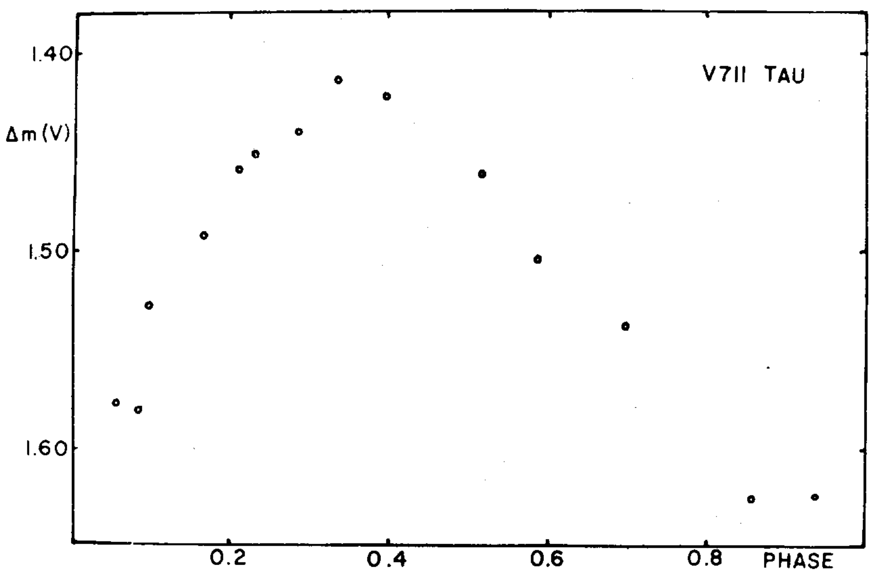
Observations were made on 14 nights from February 2 to March 19, 1979. Each is the mean of three individual readings. Phases have been calculated using the ephemeris:

$$\text{Hel. JD } 2442766.069 + 2^{d}.83782 \text{ E.}$$

The observations are as follows:

Hel. J.D.	Phase	$\Delta m(V)$	Hel. J.D.	Phase	$\Delta m(V)$
2443907.528	0.231	1.452	2443916.501	0.393	1.423
908.537	0.586	1.505	918.501	0.098	1.529
909.509	0.929	1.626	921.520	0.162	1.493
910.519	0.285	1.440	922.517	0.513	1.462
913.494	0.333	1.415	940.519	0.857	1.625
914.520	0.695	1.538	941.521	0.210	1.460
915.545	0.056	1.578	952.525	0.088	1.581

The total amplitude appears to be about 0.20 mag., which is somewhat larger than that reported by Landis et al. (1978) for observations made during late 1976 and early 1977. The mini-



mum of the light curve occurs at about 0.35 phase, and for epoch 1979.15 a value of $\theta(\text{min}) = 0.85$ is obtained. Thus direct migration of the wave minimum, as opposed to the retrograde motion first suspected, is confirmed by this finding.

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Reference:

Landis, H. J., Lovell, L. P., Hall, D. S., Henry, G. W., and Remer, T. R., 1978, Astron. J., vol. 83, p. 176

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Number 1592
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Budapest
1979 April 27

OBSERVATIONS OF TWO LOW-AMPLITUDE DELTA SCUTI STARS: HD 23156 AND HD 73763

We have recently begun a new observational programme at the Konkoly Observatory with the aim of studying low-amplitude short-periodic variables (Delta Scuti and magnetic stars). In the frame of this programme we observed HD 23156 and HD 73763 on January 4,5 and 6,1979(UT) by a one-channel uncooled EMI 9502S photomultiplier attached to the 100 cm Ritchey-Chretien telescope at the mountain station on Piszkéstető. The observational process was controlled by a TPA/i computer. All the observations were made only in yellow light close to the V band of the UBV system. Though the differential magnitudes were left in the instrumental system, the average deviation of these from the standard V values should not be greater than the accuracy of the individual observations, which is about 0.001-0.003 magnitudes. The observed light-curves are shown in Figure 1.

HD 23156 was discovered and classified as a Delta Scuti star by Breger (1972). According to him, it has the shortest period among the Delta Scuti variables. Recently Seeds and Stephens (1977) observed this star and found a period of 0.0205 days against Breger's period of 0.024 days. Using the technique of Fourier analysis of unequally spaced data as developed by Deeming (1975) we did not find any sign of long lived oscillation which would be present throughout the three nights (see Figure 2.). The frequencies and amplitudes of the most prominent oscillations are given in Table 1.

Breger (1969) also reported HD 73763 as a Delta Scuti star with a period of 0.038 days and an amplitude of 0.012 magnitudes in V. The power spectra for the individual nights of observation display a great similarity (see Figure 3.). The data were prewhitened by subtracting out the sinusoid corresponding to the frequency of the main peak. The spectra of the prewhitened data of the individual nights are shown in Figure 4. Altogether five

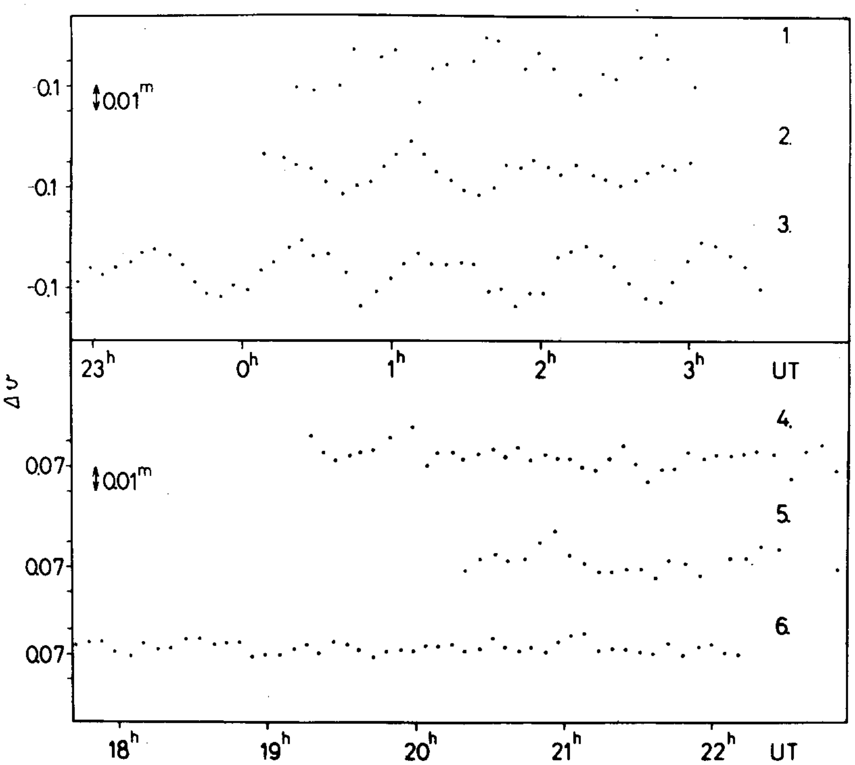

Figure 1: Differential magnitudes (m(var.)-m(comp.) in the instrumental system for HD 73763 (Run 1,2,3,comparison star HD 7389o) and HD 23156 (Run 4,5,6,comparison star HD 23246).The following run numbers were used:1,4 for January 4,1979 (UT),2,5 for January 5,1979 (UT) and 3,6 for January 6,1979 (UT).

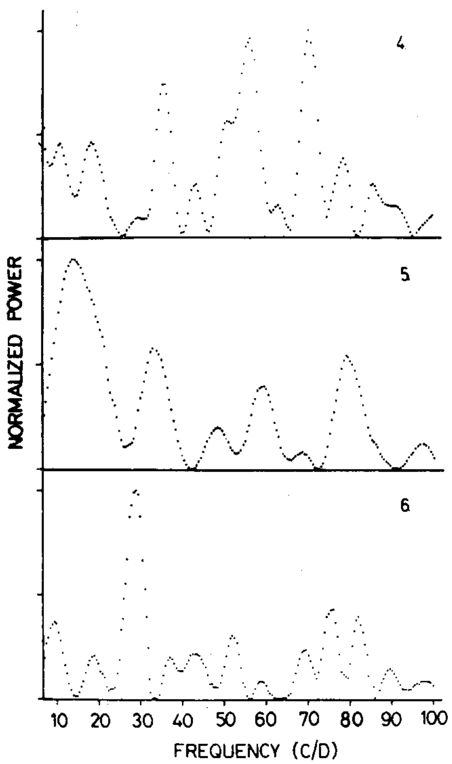

Figure 2: Power spectra of HD 23156 for the individual nights of observation. The power was normalized in each spectrum according to the main peak of the given spectra.

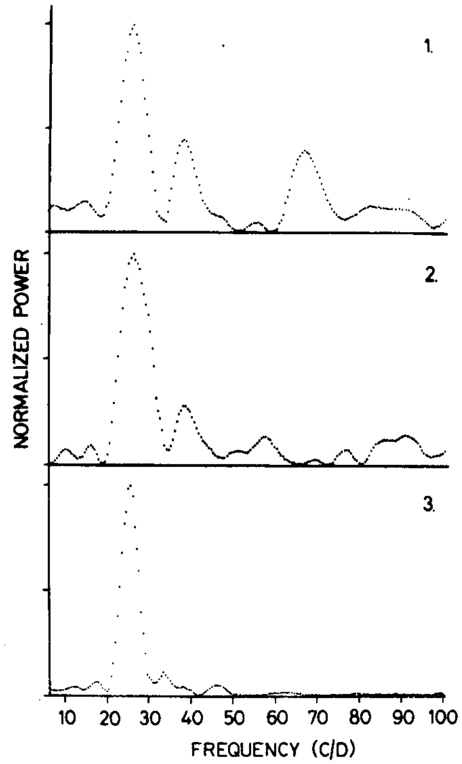

Figure 3: Power spectra of HD 73763 for the individual nights of observation. The power was normalized in each spectrum according to the main peak of the given spectra.

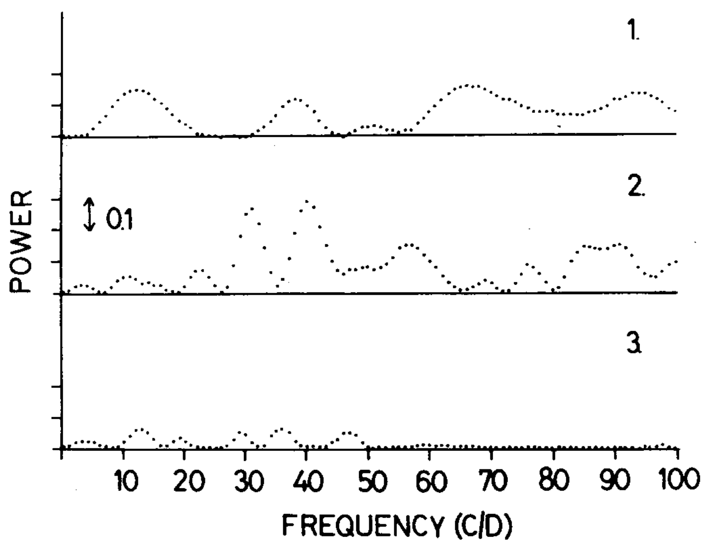

Figure 4: Power spectra of the prewhitened data of HD 73763 for the individual nights of observation.The ordinate is the power relative to the main peak of the spectra of the given original data.

Table 1

Frequencies for HD 23156.The frequencies at which the power was lower than one half of the power at the main peak in the given spectra,were omitted.

Run	Frequency (C/D)	Amplitude (mag.)
4.	35.71 56.18 70.42	0.0024 0.0026 0.0026
5.	14.29 33.44 79.37	0.0040 0.0030 0.0029
6.	29.01	0.0017
Whole data	8.850 18.920 30.758 35.593	0.0018 0.0014 0.0014 0.0013

Table 2

Frequencies for HD 73763.

Run	Frequency (C/D)	Amplitude (mag.)
	Original data	
1.	25.92	0.0072
2.	26.01	0.0055
3.	25.355	0.0092
Whole data	25.7596	0.0071
	Prewhitened data	
1.	11.75 38.14 50.70	0.0033 0.0032 0.0013
2.	10.70 30.80 40.03 49.26	0.0011 0.0031 0.0028 0.0011
3.	12.70 29.30 35.65 46.60	0.0019 0.0016 0.0017 0.0017
Whole data	13.2050 31.4475 38.8140 46.7270	0.0016 0.0011 0.0018 0.0013

frequencies were identified occuring nearly at the same places in the individual spectra.The frequencies and the amplitudes of these waves are listed in Table 2.,together with the frequencies obtained by the analysis of the whole data.

In addition we performed a MEM analysis using Burg's (1975) and Ulrych and Clayton's (1976) algorithm,and a least-squares fit of two sinusoids with arbitrary frequencies.Because of the high noise level both of these methods gave very questionable results, so we leave these frequencies out of consideration.

Finally,for checking the stability of the main period of 0.0388205 days we ordered Breger's and our observations in phase according to this period.Breger's observations fitted very well to our data,showing the stability of this mode.

The multiple periods can not be interpreted as being periods of different modes of radial pulsation.More observations should be made at low noise level in order to test the stability of the frequencies we have found.

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References:

Breger,M.,1969, Ap.J. Suppl.,19,79
Breger,M.,1972, Ap.J.,176,367
Burg,J.P.,1975. Maximum entropy spectral analysis.Ph.D. Thesis, Stanford University,Palo Alto.,Calif.,123 pp.
Deeming,T.J.,1975, Astrophys. Space Sci.,36,137
Seeds,M.A. and Stephens,C.J.,1977, IBVS, No.1273
Ulrych,T.J. and Clayton,R.W.,1976, Phys. Earth Planet. Inter., 12,188

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INFORMATION BULLETIN ON VARIABLE STARS
Number 1593

Konkoly Observatory
Budapest
1979 April 28

PHOTOELECTRIC PHOTOMETRY OF THE DELTA SCUTI STAR HD 4818

HD 4818 has been observed in November 1978 at the Merate Observatory in the framework of the photoelectric researches on Delta Scuti stars (Guerrero et al., 1979). This star has been found variable by Bhatnagar (1973) with period equal to $0^d.1360$ and light amplitude of $0^m.025\pm0.01$.

We observed HD 4818 for three nights in V light: comparison and check stars were HD 4881 and HD 6028, respectively. The results are represented in the Figure: each point is the mean of about eight individual observations (variable minus comparison) and the bars represent two standard errors.

To search for multiple periodicity, these data were then analysed with the Vanicek method (1971). Two sinusoidal components were found unambiguously: $P_1=0^d.0526$ and $P_2=0^d.0396$ with the semi-amplitudes: $A_1=0^m.0018\pm0.0006$ and $A_2=0^m.0028\pm0.0005$. Though these amplitudes are very small, the statistical significance of these peaks in the spectrum against random noise is of 96% and 99.4%, respectively.

The ratio between the two periods, i.e. $(P_2/P_1)=0.753$ suggests that radial pulsational modes are working in HD 4818 (Petersen et al., 1972).

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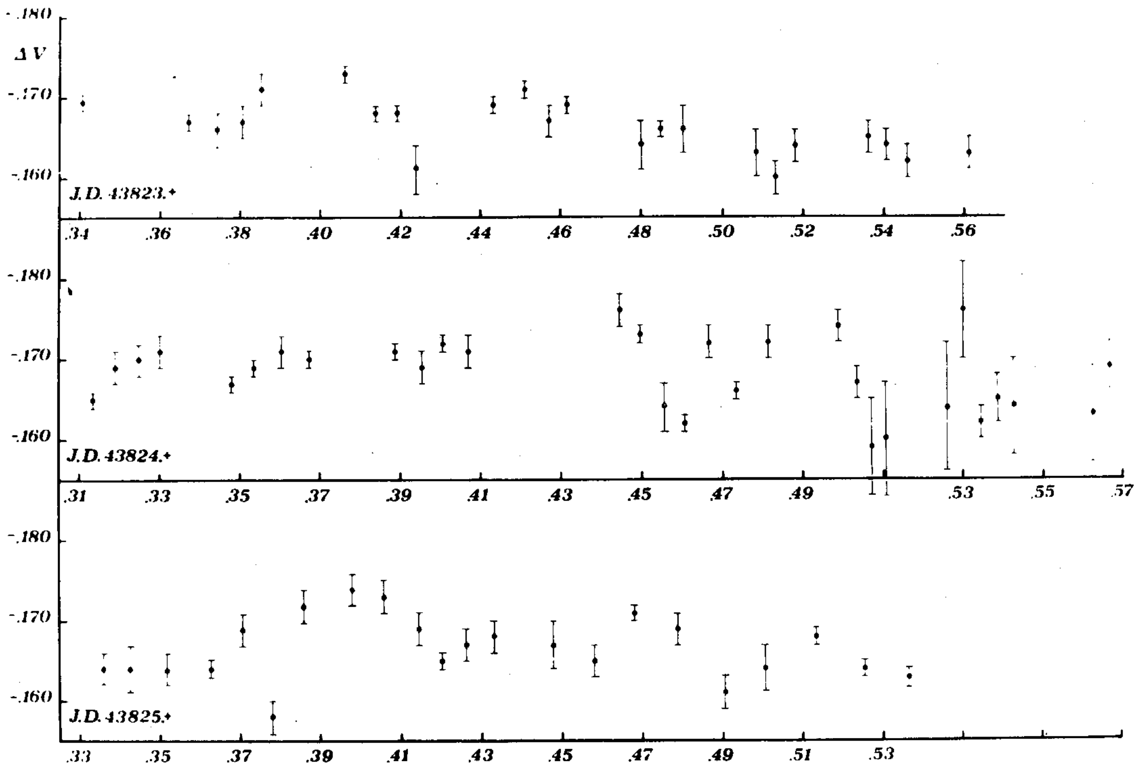
References:

Bhatnagar, A.K., Gupta, S.K. 1973, Inf. Bull. Var. Stars, No.778
Guerrero, G., Mantegazza, L., Scardia, M. 1979, Astron. and Astrophys. Suppl., in press
Petersen, J.O., Jorgensen, H.E. 1972, Astron. and Astrophys. 17, 367
Vanicek, P. 1971, Astrophys. Spa. Sci., 12, 10


-.180
ΔV
-.170
-.160
J.D. 43823.+
.34
.36
.38
.40
.42
.44
.46
.48
.50
.52
.54
.56
-.180
-.170
-.160
J.D. 43824.+
.31
.33
.35
.37
.39
.41
.43
.45
.47
.49
.53
.55
.57
-.180
-.170
-.160
J.D. 43825.+
.33
.35
.37
.39
.41
.43
.45
.47
.49
.51
.53

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Budapest
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ON THE VARIABLE LIGHT CURVE AND PERIOD OF EM CEPHEI

The B 1 IV star EM Cep (HD 208 392) was first discovered by Lynds (1959) to be a periodic variable with a photometric range of 0.15 magnitude and a period of 0.80624 d, and has since then been observed several times. Lynds himself obtained a rather regular U B V light curve, and concluded the variable to be a close - to - contact binary system.

According to the photometry of Johnston (1970), and the more recent observations of Bakos and Tremko (1975), both the maxima and minima seem to undergo considerable changes almost from cycle to cycle, which the latter authors consider to be the result of mass transfer between the components. Rather strong and rapid fluctuations are also found in the photometry of Rachkovskaya (1976). A considerable increase in the period has also been reported (Bakos and Tremko 1975).

The star was therefore reobserved in the fall of 1978. During a course of 8 nights between September 18 and November 20, a complete light curve could be secured with the 36 cm Cassegrain telescope, consisting of about 475 observations in U, B, and V respectively.

From a plot of these data (Fig. 1), it is immediately seen that the light curve has again undergone rather strong and rapid variations. The most obvious effect is a shift of the primary minimum in brightness by nearly $0^{m}.05$ during the observing time interval. The brightness fluctuations near maximum I and minimum II are of almost the same order of magnitude. There is a general impression that the light curve changes alternatingly between two different patterns.

The new minimum times determined from the present observations are given in Table 1. A combination of these data with the epochs of Bakos and Tremko (1975) gives, for the interval 1972 - 1978, a mean period P = 0.80648 d and, as an equally permissible choice, a second value P = 0.80618 d. Validity of the first result would indicate a further increase of the period. The latter value is in satisfactory agreement with Lynds' original period and the results of Rachkovskaya, and therefore, by implying a constant period, seems to be at variance with the conclusions by Bakos and Tremko.

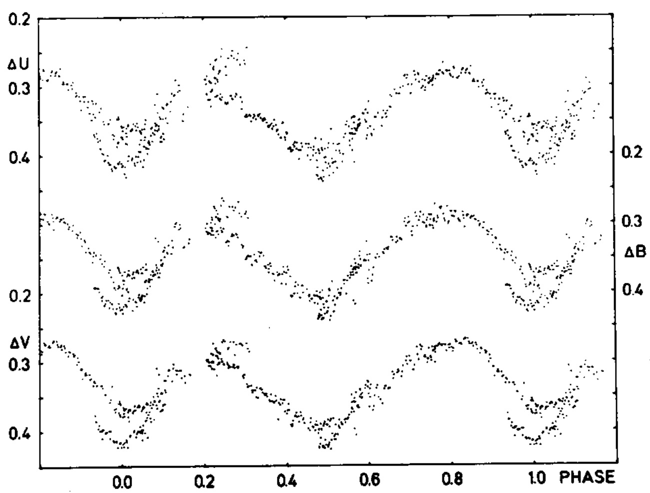

Fig. 1. U B V light curve of EM Cep, relative to HD 208 218

Table 1. Individual minimum times and mean values

J.D.hel. (2443800+)	RMS	Colour	Type of Min.
25.4319	± 0.0018	U	II
25.4327	0.0016	B	II
25.4322	0.0014	V	II
25.4323	0.0009	mean	II
32.3152	0.0027	U	I
32.3130	0.0012	B	I
32.3136	0.0015	V	I
32.3138	0.0009	mean	I

It cannot be excluded, however, that because of the extremely strong brightness variations in the light curve of Bakos and Tremko as well as in the present observations primary and secondary minimum have been confused.

Under these circumstances the predicted increase of the period cannot be considered to be definitely established yet.

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References:

Bakos, G.A., Tremko, J., J.R.astr.Soc.Canada 69, 307 (1975)

Johnston, K., Publ.astr.Soc.Pacific 82, 1093 (1970)

Lynds, C.R., Astrophys.J. 130, 603 (1959)

Rachkovskaya, T.M., Izv.Krym.astrofiz.Obs. 55, 100 (1976)

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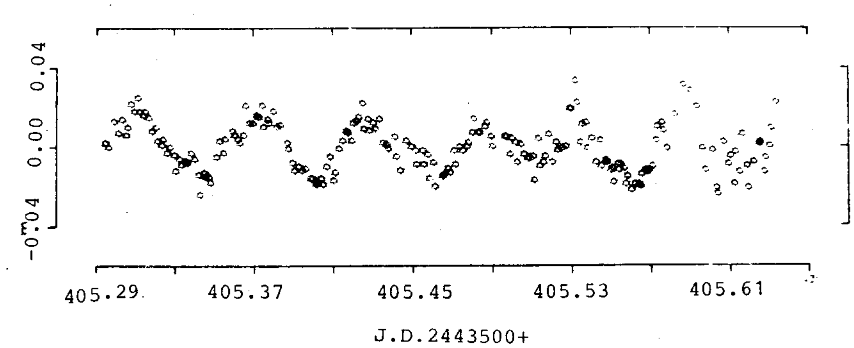
Konkoly Observatory
Budapest
1979 April 28

BD +28°1494: A NEW DELTA SCUTI STAR

Observing the eclipsing binary GW Gem by means of the 102 cm telescope of the Merate Observatory, as comparison stars were used BD +27°1497 and BD +28°1494. The latter was found to vary in brightness.

The light curve obtained in 1979 January 31 is shown in the accompanying Figure. Each point represents a single observation obtained in B light over a 20 sec integration period. These measurements can be used to establish that the variation is periodic and even to derive an approximate period $P=1^h19^m$ and a total amplitude of about 0.035 mag. BD +28°1494 can be classified as a Delta Scuti type variable displaying short period, small amplitude variations and colour (B-V=+0.21) which characterize this class of variables.

A further analysis of the light variations, in particular to see if a second period is present in the pulsator, is to be carried out and will be published elsewhere.



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THE SPECTRUM OF THE SUSPECTED VARIABLE Gl 851.1 (BD+30°4633)

Photoelectric data obtained by Krisciunas (1976) had indicated some peculiarities regarding Gliese 851.1. The star, having spectral type dM0e in Gliese's catalog, was suspected to be variable by a few hundredths of a magnitude. Furthermore, the colors [(B-V) = 1.17, (U-B) = 1.12] were rather blue for the assigned spectral type, and with the listed parallax, the star is a full magnitude below the MS in the color-magnitude diagram.

At Dr. Krisciunas' suggestion, we obtained a 40 Å mm^{-1} spectrogram of the red region of Gl 851.1 at Ritter Observatory on 21 August 1978. The star appears unremarkable in the red; there is no trace of Hα emission, and the spectral type is dM0-1. We note that a recent blue spectral type by Joy and Abt (1974) is simply dM0, thus confirming that no hydrogen emission is visible. The "e" designation in the spectral type in Gliese's catalog then refers to the presence of only Ca II H and K emission. Gl 851.1 is then almost certainly <u>not</u> a BY Draconis variable, as the BY Dra stars of this spectral type all have emission visible at Hα. Though a few dM stars without Balmer emission are known to flare (e.g., SZ UMa), such objects have very low rates of flare activity, and it seems unlikely that Gl 851.1 could be a flare star. The nature of the variability of Gl 851.1 and its atypical color indices and absolute magnitude remain unclear.

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References :

Joy, A.H. and Abt, H.A. 1974, Astrophys. J. Supp., 28, 1.
Krisciunas, K. 1976, J. Am. Assoc. Var. Star Obs., 5, 74.

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Budapest
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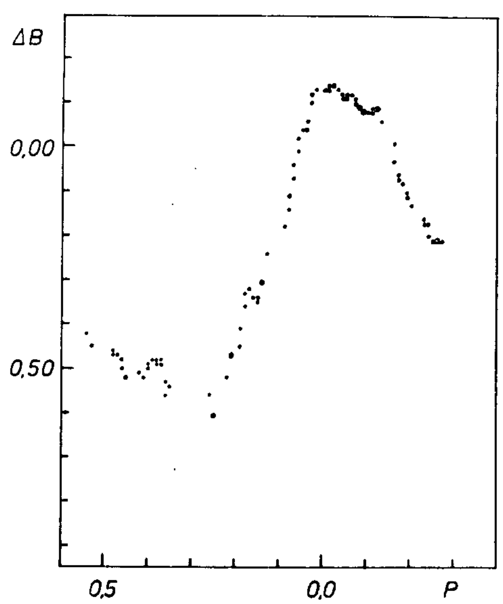
A B LIGHT CURVE OF SZ Lyn

The RR_s star SZ Lyn was observed on 29/30 March 1977 with the 75 cm telescope of the Wilhelm Foerster Observatory, Berlin. A single channel photometer with an uncooled 1P21 multiplier and Schott filters BG12 + GG13 (=B) and a conventional amplifier were used. BD +44°1716 served as a comparison star. A total of 93 B observations were obtained. The time of maximum light was determined by Pogson's method:

E=42378 $t_{max}(J.D._{\odot})$ = 2443 $232^d.4309 \pm 0^d.0008$

$O-C_1 = +0^d.0090$, $O-C_2 = +0^d.0100$, $O-C_3 = +0^d.0086$.



The value of $O-C_1$ is calculated with the linear ephemeris and $O-C_2$ with the sinusoidal ephemeris of Barnes and Moffett (1975). The value of $O-C_3$ is calculated with the sinusoidal ephemeris of van Genderen (1963). These O-C values are so large that they can not be explained by observational error. Thus the ephemeris should be revised. In the light curve one finds unusual great scatter around $0\overset{p}{.}65$ and a hump of about $0\overset{m}{.}06$ at $0\overset{p}{.}12$.

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References:

Barnes III, Th.G., Moffett, Th.J. 1975, Astr.J., 80, 48
van Genderen, A.M. 1963, Bull. Astr. Inst. Netherl., 17, 243

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Budapest
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TWO BRIGHT ECLIPSING BINARIES IN SAGITTARIUS: AN APPEAL TO SKILLED PHOTOMETRISTS

Two very interesting eclipsing binary stars have favorably placed eclipses this coming summer and fall, and a concentrated effort should be made to observe them. Both stars are very bright, fourth magnitude, but the eclipses are shallow, so that skilled photometrists are needed in order to obtain first quality data.

μ Sagittarii (HD 166937, V=$3^m.86$, B8Ia) has long been known to be a single spectrum spectroscopic binary with a period of 180.45 days. Elvey (see Morgan and Elvey, 1938) detected photoelectrically a shallow partial eclipse approximately at the time of conjunction with the B8 supergiant behind the invisible secondary component. The eclipse was not too well covered by Elvey's observations, so the estimated depth of $0^m.14$ in the blue, and the duration of 20 days, are to be considered as only approximate. The eclipse was subsequently observed by Hall (1941) with a photoelectric photometer sensitive in the infrared (effective wavelength about 8,000 A) who found about the same depth and duration.

As far as I know, the eclipses have not been observed since then, i.e. over a period of 38 years. Therefore the predicted eclipse, which is to come on June 3.85 (mid-eclipse) according to Rocznik Astronomiczny 1979, may easily be several days off.

Why is it important to observe μ Sagittarii? In 1978, I observed the star with the spectrographs on board of the satellites IUE and Copernicus (in the latter case, in collaboration with R.S. Polidan). There appears to exist a flux excess at wavelengths 1100 - 1500 A over the level we would expect for a B8 Ia supergiant. Moreover, the Copernicus scans indicate the presence of lines typical for a hotter star, approximately B2 V or even somewhat earlier. Thus it is very probable that the invisible secondary star is the hotter component. I am currently analyzing older observations as well as my own new spectra, which tend to support the existence of a hotter star, showing variations of line strengths and profiles compatible with this assumption.

If the secondary is indeed the hotter star, then the observed eclipse was the secondary eclipse, and there must be another and deeper eclipse. With the somewhat eccentric orbit of μ Sagittarii, this primary eclipse should come about 95 days after the secondary eclipse, i.e. this year it may be expected on about September 7. Its duration may be again some 20 days, but its depth in B should be larger and attain perhaps $0^m.3$ or even slightly more. It may appear surprising that such an eclipse of such a bright star should have passed unnoticed for so many years. But who observes bright stars nowadays? I predicted the preceding primary eclipse for March 10, 1979 (Plavec, 1979), but the star was not favorably placed for observations at that time. A private communication by Dr. Y. Kondo indicates that the far UV flux was considerably lower than usual on March 24, 1979. Considering the uncertainties in timing the mid-eclipse and in the duration of the eclipse, this appears to be a positive result.

An inspection of the Copernicus data from August, 1978 leads R.S. Polidan and me to suspect that there may be atmospheric eclipse effects in the spectrum preceding the bodily eclipse of the blue component. We have in μ Sgr a rare opportunity to determine the mass of a very luminous B8 supergiant, and perhaps even to study its atmospheric structure.

υ (upsilon) Sagittarii (HD 181615/6, V = $4^m.58$) is an even more fascinating object. Its double HD catalog number stems from the fact that the star appears to have a composite spectrum, approximately B8 Ia + F0 Ia, but both spectra appear to be produced in the same atmosphere, which is extremely hydrogen-poor. The star is therefore to be called a single-spectrum spectroscopic binary, and has a period of 138 days. Shallow eclipses were discovered by Gaposchkin (1945). More accurate observations were obtained photoelectrically in 1949 at the Lick Observatory (Eggen et al., 1950).

Both eclipses were observed by Eggen and Kron, and both are shallow. In the blue, the primary eclipse is about $0^m.10$ deep, and the secondary eclipse is about $0^m.05$ deep. In yellow, the depths are about $0^m.08$ and $0^m.06$, respectively. The light variation appears to be rather continuous, so my estimates of the duration of the eclipses are crude guesses only. The primary eclipse may last about 25 days, while the secondary eclipse appears to be broader and lasts perhaps 40 days. This disparity, if real, may be very important for our understanding of the system, as I will indicate below.

The next primary eclipse is predicted, by Rocznik Astronomiczny 1979, for June 6.68, and again for October 22.62. According to Eggen et al. the secondary eclipse follows the primary by 66 days, so that the secondary mid-eclipse can be expected on about August 12, 1979.

The fascinating thing about these eclipses is that -- as in μ Sgr -- the star whose spectrum is normally observed is eclipsed at the secondary eclipse. Thus, again, there should be a hotter component in the system. This hotter component was indeed discovered in the satellite UV by Duvignau, Friedjung and Hack (1979). It is most interesting to note that it appears impossible to assign a unique spectral type to this object: estimates at different wavelengths vary continuously through spectral types B and A. This is precisely what I have found in a number of interacting binary stars studied with the IUE (Plavec and Koch, 1978, 1979). The explanation we offered was that the object is actually a geometrically and optically thick disk surrounding the accreting star, in a binary system where the other component is probably losing mass at a very fast rate. The systems we observed include SX Cas, RX Cas, RW Per, W Ser, W Cru and V 367 Cyg. Another member of this group, β Lyrae, was already studied before (Hack et al., 1977).

It was noted in the case of SX Cas that the secondary eclipse (caused by the disk) is broader than the primary eclipse (Günther, 1960). If the same pattern is found in υ Sgr, then there probably exists a certain similarity between υ Sgr and the other stars listed above.

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References:

Duvignau, H., Friedjung, M., Hack, M.: 1979, Astron.Astroph.71,310
Eggen, O.J., Kron, G.E., Greenstein, J.L.: P.A.S.P., 62, 171
Gaposchkin, S.: 1945, Astron.J., 51, 109
Günther, O.: 1960, Astr. Nachr., 285, 105
Hack, M., Hutchings, J.B., Kondo, Y., McCluskey, G.E.: 1977, Astrophys. J. Suppl., 34, 565
Hall, J.S.: 1941, Astrophys. J., 94, 550
Morgan, W.W., Elvey, C.T.: 1938, Astrophys. J., 88, 111
Plavec, M.: 1979, IAU Circular, No. 3333, 1979 February 26
Plavec, M., Koch, R.H.: 1978, IBVS, No. 1482
Plavec, M., Koch, R.H.: 1979, submitted to Nature, March 5, 1979

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A NEW B V LIGHTCURVE OF THE ECLIPSING BINARY VW CEPHEI

The W UMa star VW Cep is well known to have both a variable period and a variable lightcurve (Kwee, 1966). The older observations show a correlation between the variability of the period and the longtime activities of the lightcurve. VW Cep has a similar period and spectral-type to i 44 Boo which is also well known for variable period and lightcurve disturbances (see, for example, Duerbeck, 1978). For both stars it was suspected that there exist cycles or periods for the observed lightcurve changings. A detailed interpretation of the disturbances of VW Cep by a hot spot and a shell is presented by Pustylnik and Sorgsepp (1976). To carry on the observational work, a new lighcurve of VW Cep was observed on Sept. 23/24 and Sept. 24/25, 1977.

1. The observations

The measurements were taken with the 75 cm telescope of the Wilhelm-Foerster Observatory, Berlin, an uncooled RCA 1P21 multiplier, an usual amplifier and Schott filters BG12+GG13 for the B-band and GG11 for the V-band. As comparison star served BD+75°765(K2) = A, as check star BD+75°755(GO) = B. Schmidt and Schrick (1955) found that A may be slowly variable, but the difference A-B was found to be constant at $\Delta V = -2^{m}.143 \pm 0^{m}.008$ and $\Delta B = -1^{m}.499 \pm 0^{m}.007$ between the two nights. The observations of both nights are drawn in Fig.1 and no systematic differences are found. The observations of Sept. 23/24 cover a primary minimum, the observations of Sept. 24/25 cover the interval from $0^{P}.1$ to $0^{P}.95$. A total of 162 V observations and 146 B observations were obtained.

2. The period

The times of the primary and secondary minimum were determined by Pogson's method:

Min I_o	2443 $410^{d}.4180 \pm 0^{d}.0006$	E :	34177	O-C: $-0^{d}.0949$
Min II_o	411.3952 ± 0.0007		34180,5	-0.0918

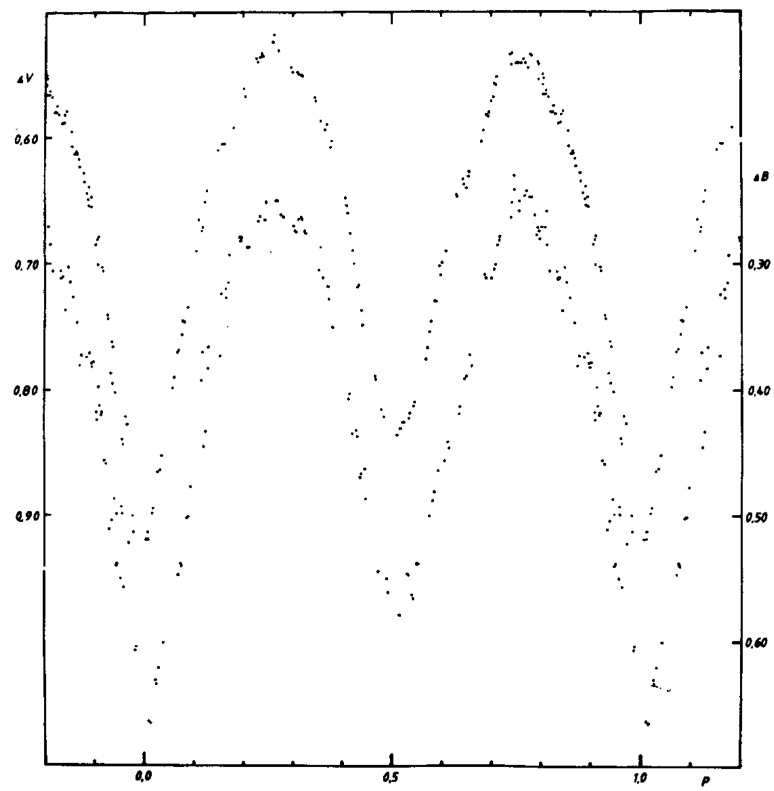

Fig. 1: B and V lightcurve of VW Cep in the sense VW-BD+75°765

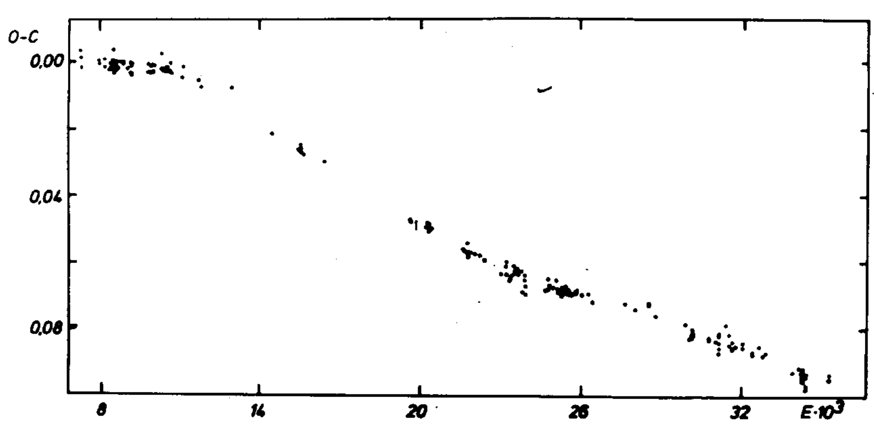

Fig. 2: O-C diagram of VW Cep according to the ephemeris of van't Veer.

Table 1

Minimadeterminations of VW Cep

Epoch	Minimum time$_{\odot}$	O-C	Reference
25169	2440903^{d}3557	-0.0693	Pohl,E.Kizilirmak,A.1972-IBVS 647
26021	1140.4822:	-0.0697:	
26261	1207.277 :	-0.071 :	
26297	1217.298 :	-0.070 :	
26408,5	1248.328 :	-0.072 :	
27659	1596.364	-0.073	Kizilirmak,A.Pohl,E.1974-IBVS 937
27953,5	1678.327	-0.074	
28442,5	1814.426	-0.073	
28496,5	1829.456	-0.072	
29071	1989.344	-0.078	
31489,5	2662.4519	-0.0816	Patkós, L., 1975-IBVS 1065
31504	2666.4844	-0.0847	
31683	2716.3027	-0.0853	Branczewicz,H.,Kreiner,J.M.,1976-IBVS 1119
30670	2434.3686	-0.0833	Pohl,E.Kizilirmak,A.1976-IBVS 1163
30724	2449.3985	-0.0826	
31015	2530.388 :	-0.084 :	
31108,5	2556.407	-0.087	
31109	2556.548	-0.086	
31130	2562.397	-0.081	
31288,5	2606.513 :	-0.079 :	
31550,5	2679.4272	-0.0837	Patkós,L.,1976-IBVS 1200
31554	2680.3996	-0.0854	
31601	2693.4799	-0.0860	
32664,5	2989.4692	-0.0878	
31938,5	2787.4133	-0.0849	Pohl,E.Kizilirmak,A.1977-IBVS 1358
32301,5	2888.4409:	-0.0867:	
32391,5	2913.4887:	-0.0875:	
32883,5	3050.4218	-0.0869	
28735	1895.8309	-0.0758	Scarfe,C.D.Barlow.D.J., 1979-IBVS 1379
29823,5	2198.7773	-0.0785	
30031	2256.8019	-0.0832	
30075	2268.7702	-0.0825	
30078,5	2269.7467	-0.0802	
30154	2290.7587	-0.0812	
30154,5	2290.8973	-0.0817	
31113,5	2557.8039	-0.0820	
31135	2563.7854	-0.0843	
32622,5	2977.7824	-0.0853	
34137	3399.2870	-0.0932	Cristescu,C., 1978-IBVS 1383
34202	3417.3786	-0.0922	
34216	3421.2737	-0.0936	
34216,5	3421.4126	-0.0939	
34227	3424.3332	-0.0956	
34270	3436.3029	-0.0936	
34288	3441.3090	-0.0972	
34313	3448.2663	-0.0978	
34352,5	3459.2635	-0.0942	
35140,5	3678.5786	-0.0936	Niarchos, P.G., 1979-IBVS 1576
35144	3679.5510	-0.0953	
35148	3680.6646	-0.0950	
33825	3312.4522	-0.0928	Ebersberger,J.,Pohl,E.,Kizilirmak,A., 1978-IBVS 1449
34062	3378.4148	-0.0915	
34177	3410.4180	-0.0949	this paper
34180,5	3411.3952	-0.0918	

The given values of minima times are means of the value obtained from the B and V lightcurve. The given O-C value for Min II is calculated under the premises that Min II lies at $0^P.5$. The ephemeris are adopted from van't Veer (1973):

$$\text{Min } I_o = \text{J.D. } 2433\ 898^d.4410 + 0^d.27831793 \cdot E.$$

Fig. 2 shows van't Veer's O-C diagram completed by minima determinations given in Table 1. The figure clearly shows that the period shortening still goes on. Kreiner (1977) showed that all good observed W UMa variable stars change their periods in rather short time and than remain constant. Using all minima of Table 1 with E > 28000, one can find by a linear last square fit the actual value of the photometric period to be $0^d.27831481$ or 0.270 seconds less than van't Veer's value.

3. The lightcurve

Schmidt and Schrick determined three values to describe the lightcurve variability around the extrema:

	B	V
$\Delta_1 m = m_{Min\ I} - m_{Min\ II}$	$+ 0^m.10$	$+ 0^m.086$
$\Delta_2 m = m_{Max\ I} - m_{Min\ II}$	$- 0.31$	$- 0.312$
$\Delta_3 m = m_{Max\ II} - m_{Min\ II}$	$- 0.33$	$- 0.296$

The actual values from our observations are tabulated. A shoulder appears at $0^P.64$ in the V-band, but it is not detected in the B-band. In the light curve of i Boo and W UMa (Duerbeck), shoulders are found which are interpreted by Breinhorst and Reinhardt (1974) as light absorption of a gaseous stream. Except the pronounced feature at $0^P.64$ in the V-band, no similar disturbances are detected. An unusual great scatter in B and V is observed around $0^P.95$. A small asimmetry of Min II may be possible in the bottom of the V lightcurve.

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References:
Breinhorst, R.A.,Reinhardt, M., 1974 - Acta Astron. 24, 377
Duerbeck, H.W., 1978 - Astron.Astrophys. 32, 361
Kwee, K.K., 1966 - Bull.Astron.Inst.Netherl. 18, 448
Kreiner, J.M.,1977,- in:Kippenhahn,R.,Rahe,J.,Strohmeier,W., Veröff.Remeis Sternw. Bd. XI Nr. 121
Pustylnik, I., Sorgsepp, L., 1976 - Acta Astron. 26,319
Schmidt, H., Schrick, K.W., 1955 - Zeitschrift f.Astrophys.37,73
van't Veer, F., 1973 - Astron. Astrophys. 26,357

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SPECTROSCOPIC EVIDENCE FOR THE BINARY NATURE OF THE Ap STAR ET ANDROMEDAE

There are many indications in the literature that the Ap star ET And (= HD 219 749 = HR 8861 = BD +44^{o}4373) is variable with the typical amplitudes ~0.02^{m} (V), ~0.03^{m} (B) and~0.05^{m} (U) - see Renson (1977). Kizilirmak and Wood (1967) found the variability in their Hβ and Hγ photometry: $\Delta\beta$=0.035^{m} and $\Delta\gamma$=0.049^{m}. Several periods of light variability were suggested by various authors, namely 0.723^{d}, 1.616^{d} and 2.604^{d}, but some of these periods must be definitely spurious since they are interrelated by Tanner's (1948) formula. Recently, Sezer (1978) found a period of 0.49925 days from his ubv photometry. Moreover, Panov (1978) claims that he has found short-time variability in UBV with a fundamental period of about 140 minutes and two harmonics at 70 and 35 minutes.

Scarce spectroscopic data published until now (Palmer et al., 1968 and Hube, 1970) revealed some variations in radial velocities. We have obtained 23 high-dispersion spectrograms in coudé focus of the Ondřejov 2m telescope between July 1974 and September 1978 with dispersions from 0.85 to 2.4 nm mm^{-1} in blue and red regions of the spectrum. Radial velocities were determined from the repeated measurements of the hydrogen lines on the Abbe comparator and on the microdensitometer tracings. Probable error of one measurement of unit weight was 3,4 km s^{-1}. Radial velocities were determined by using a code written by Dr. P. Harmanec. The results are given in Table 1 where also the data from Hube's (1970) paper are added.

We have then searched for periodicities in radial velocities in the time interval from 0.5 to 2000 days employing Dr.Harmanec's version of Morbey (1978) method. No periodicities suggested by the photometric data were found. However, the period of about

48 days is clearly present in the data.

Table 1

J.D. 2400 000.0+	RV_{obs} (km s^{-1})	O–C (km s^{-1})	Cycle No.	Phase
36461.6860	15.0	5.6	-150	0.735
36470.6900	33.0	-0.5	-150	0.921
36509.5710	14.0	5.4	-149	0.726
36535.5960	- 7.0	7.2	-148	0.265
37864.8490	6.0	-8.1	-121	0.783
37867.8220	15.0	-6.7	-121	0.845
38990.7850	-14.0	-6.2	- 97	0.093
38993.7690	-12.0	1.9	- 97	0.154
39059.5670	-15.0	-10.1	- 96	0.516
42251.4414	0.7	1.3	- 30	0.595
42251.5331	0.3	0.9	- 30	0.597
42427.2617	-17.3	-2.7	- 26	0.235
42631.5417	- 5.4	1.9	- 22	0.464
42631.5743	- 8.9	-1.6	- 22	0.465
42636.5434	5.6	7.9	- 22	0.568
43016.3858	-12.9	-4.2	- 14	0.431
43016.5254	- 7.8	0.8	- 14	0.434
43389.5535	-15.4	-1.5	- 6	0.157
43393.4036	- 8.1	6.5	- 6	0.236
43448.4113	- 5.0	5.9	- 5	0.375
43454.3076	- 8.0	-2.2	- 5	0.497
43747.3747	- 7.9	-5.5	0	0.564
43748.4595	- 5.0	-3.9	0	0.587
43748.6060	- 8.9	-7.9	0	0.590
43757.4098	16.0	3.0	0	0.772
43757.5355	15.0	1.8	0	0.775
43760.4967	24.0	3.5	0	0.836
43760.6078	28.0	7.2	0	0.838
43767.4261	30.0	-4.3	0	0.980
43768.3011	27.0	-1.5	0	0.998
43768.5886	32.4	6.4	1	0.004

Thus the radial velocity data from Table 1 were used for the calculation of the spectroscopic binary orbit by a code written by Dr. J. Horn.

Elliptical orbit for a single-line spectroscopic binary yields the following elements (p.e. are quoted throughout):

Period = (48.304 ± 0.007) days

T (epoch of periastron passage) = (2 443 720.11 ± 0.64) J.D.

T (max. RV) = 2 443 718.00 J.D.

T (min. RV) = 2 443 730.10 J.D.

T (pri. min.)= 2 443 721.76 J.D.

T (sec.min.) = 2 443 708.11 J.D.

ω = (49.8^{o} ± 6.0^{o})

ε = (0.50 ± 0.05)

K_1 = (25.7 ± 2.0) km s^{-1}
V_o = $(+2.6 \pm 0.7)$ km s^{-1}
f(m) = 0.0554 $M_\odot$
a_1 sin i = 14.8 x 10^6 km

Phases in Table 1 are computed from the time of periastron passage and O-C are referred to the above-mentioned elements; (see also Fig.1 where dots represent Hube's data and open circles refer to our Ondřejov measurements).

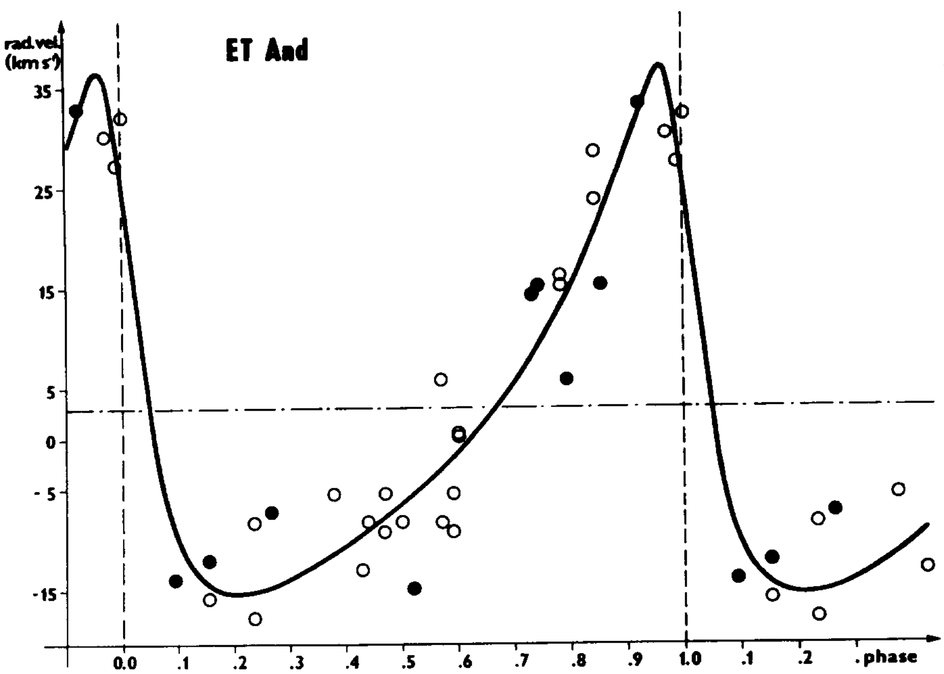

Fig. 1. Radial velocity curve of the Ap star ET And.

Further spectrographic observations, particularly in phases 0 to 0.1, would help to improve the orbit and to clarify whether the rather high eccentricity found in our solution is intrinsic. Photometry of the star extended over a long time span would be obviously most useful.

We are much obliged to Drs. P. Harmanec and J. Horn for the permission of using their computing codes and for consultations.

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References:

Hube, D.P., 1970: Mem. Roy. Astron. Soc. 72, 233

Kizilirmak, A., Wood, H.J., 1967: Astron.J. 72, 727

Morbey, C.L., 1978: Publ. D.A.O. XV, No.4, 105

Palmer, D.R., Walker, E.N., Jones, D.H.P., Wallis, R.E., 1968: Roy.Obs.Bull.No.135

Panov, K., 1978: Publ.Astron.Inst.Czechosl.Acad.Sci.No.54, 19

Renson, P., 1977: Astron. Astrophys. 54, 277

Sezer, C.,1978: I.B.V.S. No.1384

Tanner, R.W., 1948: J. Roy. Soc. Canada 44, 177