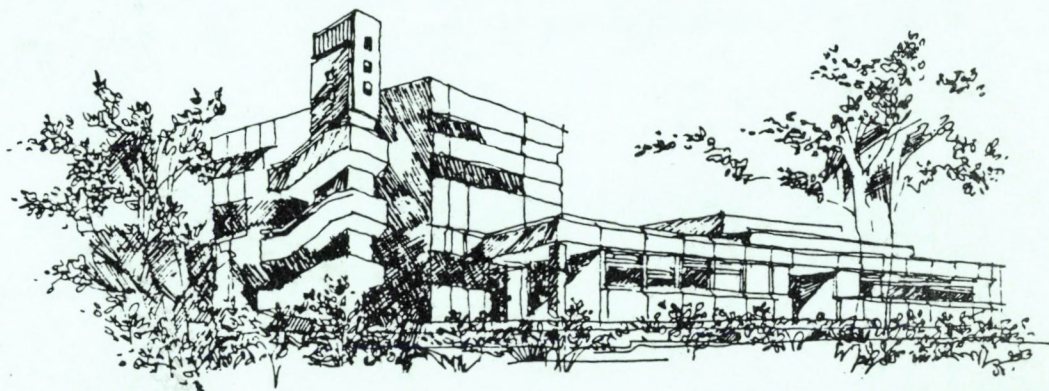


# ATOMKI

## ANNUAL REPORT

### 1985



INSTITUTE OF NUCLEAR RESEARCH  
OF THE HUNGARIAN ACADEMY OF SCIENCES  
DEBRECEN, HUNGARY



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**ANNUAL REPORT**  
**1985**

**ATOMKI**

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## PREFACE

In this annual report we give a summary of the activities in the Institute of Nuclear Research of the Hungarian Academy of Sciences by presenting the abstracts of publication appeared or submitted in 1985. The papers, lectures, conference contributions in different areas of research and development reflects the versatility of research activities in the Institute.

Although the results in these publications constitute the basic accomplishments, the most significant event of the year was the completion of the cyclotron laboratory. The 105 cm cyclotron, the data acquisition and computer centre became operational at the end of the year. After the opening ceremony on November 15 ten research projects started on the new machine. These projects cover basic nuclear and atomic physics and applied research ranging from analytical applications to isotope production.

The importance of the cyclotron laboratory, however, it not confined to the Institute. This machine is the first of its kind in Hungary, and it permits and obliges us to broaden our cooperations with other research institutions and industrial research and development laboratories. The real significance of the cyclotron laboratory should be apparent also on the pages of the annual reports of the coming years.

Thanks are due to Mrs. A. Darin for collecting the material for this Report.

J. Pálinkás

## CONTENTS

Nuclear Physics	5
Atomic Physics	26
Analytical Applications	39
Earth Sciences and Environmental Research	55
Development of Methods and Instruments	72
Hebdomadal Seminars in ATOMKI	88
Author Index	94

NUCLEAR PHYSICS

QUANTIFICATION OF THE CLUSTERING PROPERTIES OF NUCLEAR STATES

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\*Kernforschungszentrum Karlsruhe

Submitted to Ann. Phys. N.Y.

The term nuclear clustering is used in various senses, which are defined only in broad qualitative terms. We quantify its definition adopting the viewpoint of the microscopic cluster models, which describe the nuclear states as antisymmetrized products of cluster intrinsic and relative wave functions. We define clustering as the property, of nuclear states, that they overlap with such cluster-model states. As a quantitative measure of a particular type of clustering, we use the norm square of the projection of the wave function onto the particular cluster-model subspace, and we call this quantity the amount of clustering. This quantity differs from the familiar spectroscopic factor in that the spectroscopic factor involves a projection onto a non-antisymmetrized cluster subspace.

We have pointed out that the amount of clustering is analogous but not identical to a quantum mechanical probability, and that the probability of finding two clusters locally cannot be defined. The cluster-model component of the wave function is proved to have a variational property, which facilitates the computation of the amount of clustering.

The model dependence of the amount of clustering  $S$  and its relationship to the corresponding spectroscopic factor  $s$  is illustrated by calculations for the  $\alpha+d$ ,  ${}^5\text{He}+p$  and  $t+\tau$  clustering in the ground state (g. s.) and first excited  $1^+$ ,  $2^+$ ,  $3^+$  triplet of  ${}^6\text{Li}$ . One of the models considered is a pure  $\alpha+d$ , and the other is a mixed  $\{\alpha+d, {}^5\text{He}+p\}$  cluster model. The table below gives sample results.

State	Model	$\alpha+d$ clustering		${}^5\text{He}+p$ clustering		$t+\tau$ clustering	
		$S$	$s$	$S$	$s$	$S$	$s$
g.s.	$\alpha+d$	1	1.073	0.534	0.631	0.539	0.485
	mixed	0.969	1.041	0.612	0.708	0.535	0.482
$1^+, 2^+, 3^+$	$\alpha+d$	1	1.069	0.495	0.597	0.513	0.461
	mixed	0.942	1.013	0.631	0.736	0.537	0.482

It is concluded that the spectroscopic factor is also characteristic, though only in a relative sense, of the clustering contents of different states or models of the same nucleus, but it cannot be used for comparisons between different nuclei or clusterings.



DWBA ANALYSES OF ( ${}^7\text{Li}, t$ ) REACTIONS WITH REALISTIC POTENTIAL OVERLAP

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\*\* Meerut University, India

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J.Phys. G: Nucl.Phys. 11(1985)1199-1206

Finite-range DWBA analyses have been performed for ( ${}^7\text{Li}, t$ ) reactions with the use of a microscopic potential overlap for the  $\alpha+t$  system. The use of the microscopic potential overlap improves the agreement between the spectroscopic factors extracted and those taken from theoretical calculations.

MICROSCOPIC FORM FACTORS FOR CLUSTER TRANSFER REACTIONS

R. G. Lovas

4th Int. Conf. on Clustering Aspects of Nuclear Structure and Nuclear Reactions Chester, 23-27 July, 1984, eds. J.S. Lilley and M.A. Nagarajan, Reidel, Dordrecht (1985) 231-244

QUASIELASTIC CLUSTER KNOCK-OUT REACTIONS AND THE MICROSCOPIC CLUSTER MODEL

R. Beck\*, F. Dickmann\* and R. G. Lovas

\* Kernforschungszentrum Karlsruhe, D-7500 Karlsruhe, BRD

Nucl. Phys. A446(1985)703-726

ON FLIESSBACH'S APPROACHES TO DIRECT REACTIONS

R. G. Lovas

Z. Physik A 322(1985)589-596

ORTHOGONALITY-CONDITION MODEL FOR BOUND STATES WITH A  
SEPARABLE EXPANSION OF THE POTENTIAL

K. F. PÁL

J. Phys. A 18(1985)1665-1674

RESONANT STATE IN MOMENTUM REPRESENTATION

B. Gyarmati, A. T. Kruppa and Z. Papp

Phys. Rev. C 35(1985)2317-2320

THE DESCRIPTION OF ROTATING CHARGED SYSTEMS BASED ON THE  
SEPARABLE EXPANSION OF THE POTENTIAL

Z. Papp

PhD thesis (supervisor: B. Gyarmati), ATOMKI, Debrecen, 1985.  
Submitted to Kossuth University, Debrecen (In Hungarian)

RESONANT OR BOUND STATE SOLUTION OF THE SCHRÖDINGER EQUATION  
IN DEFORMED OR SPHERICAL POTENTIAL

A. T. Kruppa and Z. Papp

Comput. Phys. Commun. 36(1985)59-78

$^{12}\text{C}+^{12}\text{C}$  RESONANCES WITHIN THE NUCLEAR VIBRON MODEL

J. Cseh

Phys. Rev. C 31(1985) 692-693.

ANALYSIS OF FRAGMENTED GQR IN THE  $^{24}\text{Mg}$  NUCLEUS

J. Cseh, I. Fodor\*

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J. Phys. G. 11 (1985) 103-112.

## COMPLEX SCALING IN THE DESCRIPTION OF NUCLEAR RESONANCES

B. Gyarmati and A.T. Kruppa

Submitted to Phys. Rev. C

The powerful approximation method based on the separable expansion of the potential has been used to solve the Schrödinger equation belonging to complex rotated Hamiltonian with nuclear short-ranged and nuclear short-ranged+Coulomb potential. It is shown that for potentials analytic in a proper domain of the complex  $r$ -plane (e.g. Woods-Saxon potential up to its first pole) solving the rotated Schrödinger equation on real harmonic oscillator wave function basis is equivalent with solving the original equation on complex harmonic oscillator wave function basis. For non-analytic potentials (e.g. nuclear charged-sphere Coulomb potential which is discontinuous in the complex  $r$ -plane) the equivalence does not hold and it is the latter version that gives the correct solution. It is demonstrated that the method leads to an accurate determination of the resonance energy and (for not very broad resonances) of the wave function as well.

## BOUND AND RESONANT STATES IN COULOMB-LIKE POTENTIALS

Z. Papp

Submitted to J. Phys. A

## SEPARABLE EXPANSION OF THE POTENTIAL AND ITS APPLICATION IN NUCLEAR AND ATOMIC PHYSICS

B. Gyarmati

Thesis for the Doctor of Physical Sciences Degree, ATOMKI, Debrecen, 1985. Submitted to the Hungarian Academy of Sciences (In Hungarian)

GAMOW SEPARABLE APPROXIMATIONS FOR REALISTIC N-N INTERACTIONS.  
I. THE SINGLE CHANNEL CASE

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Bielefeld 1. FRG

Submitted to Phys. Rev. C

A separable approximation for the  $^1S_0$ ,  $^1P_1$ ,  $^3P_0$  and  $^3P_1$  channels of the N-N Reid soft core and Argonne potentials, based on the use of Gamow states is presented. The on and off-shell scattering amplitudes obtained from these separable forms are compared with the corresponding exact ones. Excellent agreement is obtained, which makes the Gamow separable approximation a successful and unambiguous method to construct separable approximations for local realistic N-N interactions.

TWO PARTICLE TRANSFER REACTIONS LEADING TO GIANT PAIRING  
RESONANCES

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\*\*\*Dto. de Fisica da Universidade, 3000 Coimbra, Portugal

\*\*\*\*Department of Theoretical Physics Royal Institute of  
Technology S-10044 Stockholm 70

Submitted to Nucl. Phys.

The triplet of  $\tau=1$   $0^+$  two-particle states in the lead region such that the state  $\tau_z=1$  is  $^{210}\text{Pb}(\text{gs})$  are analysed. It is found that these three states have the same pairing-collective features. However, the states with  $\tau_z \neq 1$  are built upon high lying single-particle configurations. They can be considered pairing giant resonances. The pairing giant resonances are found to be strongly excited states in two-particle transfer reactions.

## HOLE PAIRING GIANT RESONANCES

M.W. Herzog\*, R.J. Liotta\* and T. Vertse

\*Research Institute of Physics, Stockholm,

Submitted to Phys. Lett. B

A two-hole pairing collective (TDA) state built upon deep lying single-hole states is calculated to be strongly excited in the reaction  $^{208}\text{Pb}(p,t)^{206}\text{Pb}$ . This state lies at about 12 MeV of excitation energy above  $^{206}\text{Pb}(\text{gs})$ . It is a "hole pairing giant resonance".

## QUASIMOLECULAR RESONANCES IN TERMS OF DIPOLE OR QUADRUPOLE INTERACTING BORONS

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\*Department of Physics, University of Jyväskylä,  
SF-40100 Jyväskylä

Submitted to Phys. Rev. C

The energy-spectrum of the  $^{12}\text{C}+^{12}\text{C}$  resonances are described with the IBM-1 (quadrupole) model. The Hamiltonians corresponding to the three dynamical symmetries and to the general case of the model are used. The results are compared with the similar calculations within the nuclear vibron (dipole) model. Based on the present experimental data no chain can be made between the dipole and quadrupole descriptions, but in both cases the best fit is quite close to the dynamical symmetry corresponding to a soft vibrator.

## DETERMINATION OF END POINT ENERGIES OF POSITRON SPECTRA WITH HIPERPURE GERMANIUM DETECTORS

N. Ganbaatar\*, V.G. Kalinnikov\*, K.A. Mezilev\*, Yu.N. Novikov\*,  
A.M. Nurmuhamedo\*, A. Potempa\*, V.P. Osipenko\*, F. Tárkányi  
and J. Yurkovski\*

\*Leningrad Nuclear Physics Institute

Report No.1083, Leningrad Nuclear Phys. Institute, 1985

PROTON-NEUTRON MULTIPLLET STATES IN  $^{114}\text{In}$

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Submitted to Nucl. Phys.

The  $\gamma$ -ray spectrum of the  $^{114}\text{Cd}(p,\gamma)^{114}\text{In}$  reaction was measured with Ge(Li) and Ge(HP) spectrometers at 4.8, 5.3, and 7.0 MeV bombarding proton energies. The energies ( $E_\gamma$ ) and relative intensities ( $I_\gamma$ ) of more than 170  $\gamma$ -ray transitions in  $^{114}\text{In}$  have been determined. The electron spectrum of the reaction was measured with a combined magnetic plus Si(Li) spectrometer. Internal conversion coefficients of 38 transitions in  $^{114}\text{In}$  were determined for the first time. The multipolarity of transitions (fig. 1), level scheme of  $^{114}\text{In}$  (fig. 2),  $\gamma$ -ray branching ratios, level parity and spin values have been deduced. The energies of several  $^{114}\text{In}$  proton-neutron multiplets were calculated on the basis of the parabolic rule derived from the cluster-vibration model. The comparison of experimental and theoretical results provided classification of about 18 multiplet states in  $^{114}\text{In}$ . The experimental level scheme has been compared also with former theoretical calculations.

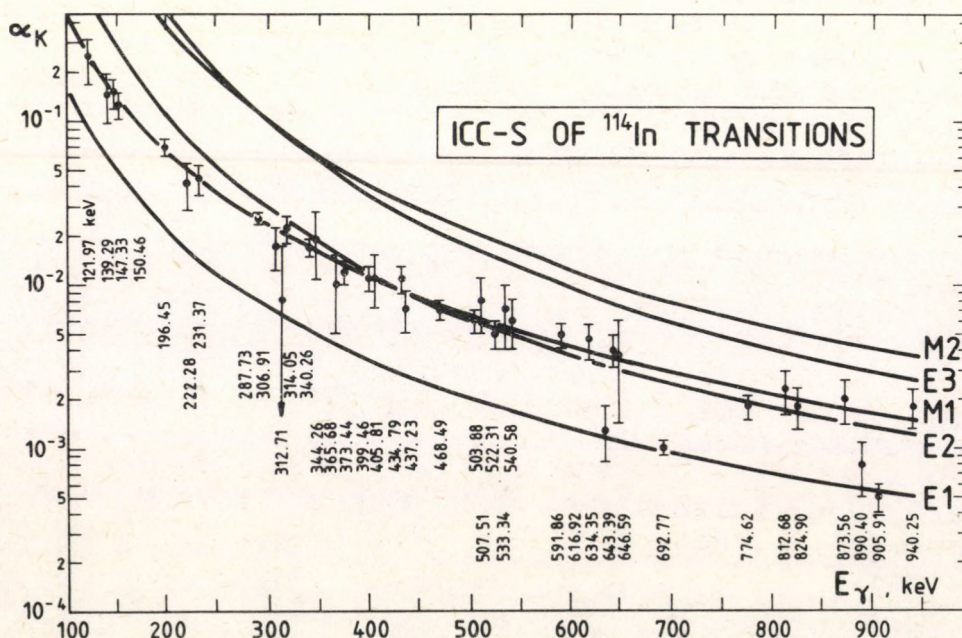


Fig. 1. The experimental  $\alpha_K$  internal conversion coefficients of  $^{114}\text{In}$  transitions (dots with error bars) as a function of  $\gamma$ -ray energy ( $E_\gamma$ ). The curves show theoretical results.

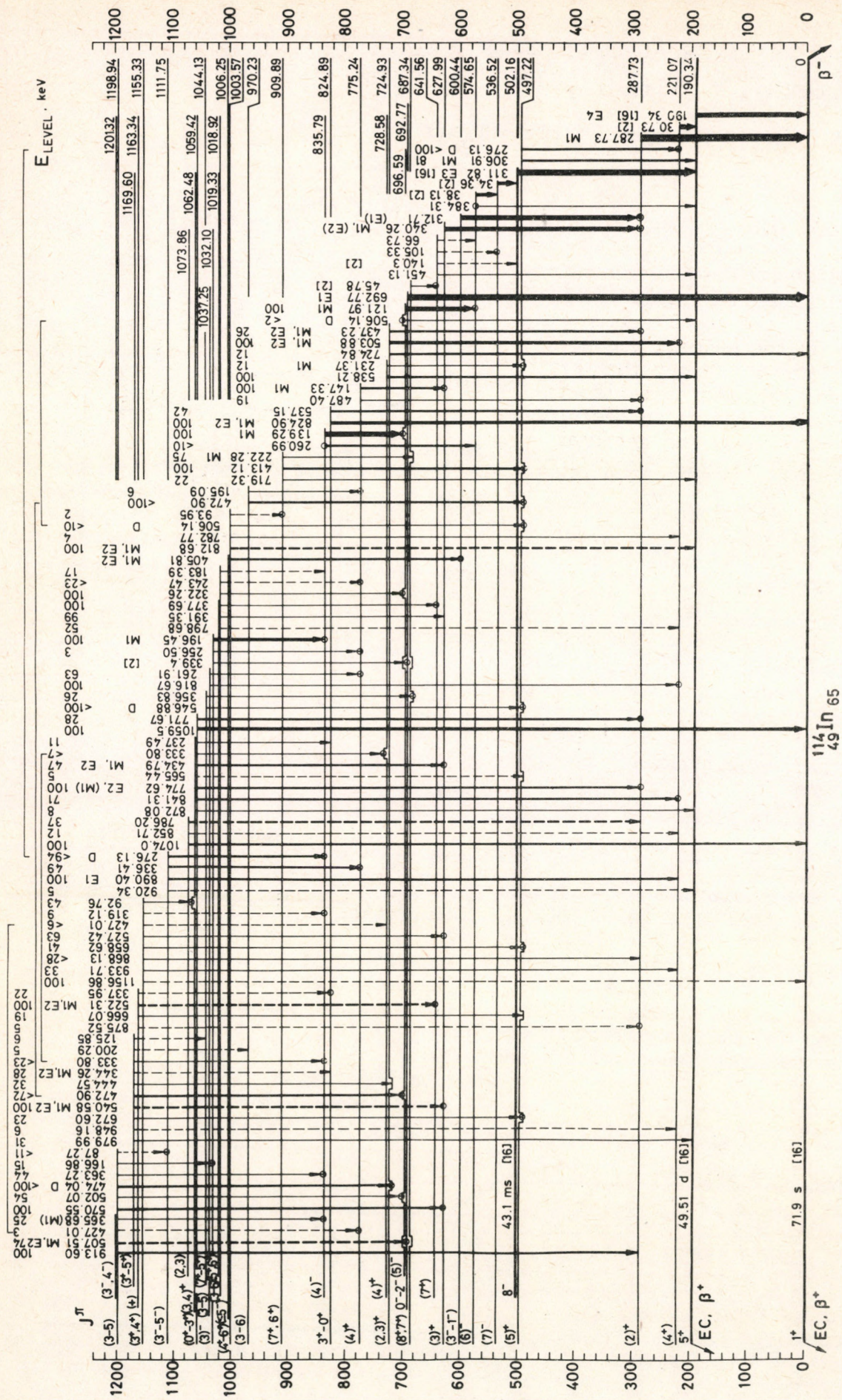


Fig. 2. The proposed level scheme of  $^{114}\text{In}$  below 1203 keV

# A NEW EFFECT IN INTERNAL CONVERSION

A. Krasznahorkay, T. Kibédi and Zs. Dombrádi

Submitted to the Zeitschrift für Physik A

When a heavy charged particle penetrates into a low Z atom, the ionization probability of the K-shell can reach several times ten percents. At the same time in the low Z region, the filling time of the K-shell vacancy ( $10^{-15}$  s) [1] may be longer than or comparable with the shortest lifetimes of the excited states in the atomic nucleus. In such cases the internal conversion of the nuclear transitions takes place before the complete filling of the K-shell, and since the ICC is proportional to the number of electrons in the given shell, it results in a decreased ICC value.

To demonstrate this in-beam effect we measured the ICC of the 1041 keV pure M1 transition of  $^{18}\text{F}$  in the  $^{16}\text{O}(^3\text{He}, p)^{18}\text{F}$  reaction, since the lifetime of the 1041 keV level of the  $^{18}\text{F}$  is  $\tau_{18} = (2.7 \pm 0.7)$  fs [2] which is comparable with the K-shell vacancy lifetime of the  $^{18}\text{F}$  atom ( $\tau_a = 3.3$  fs [1]).

The corresponding parts of the  $\gamma$ -ray and electron spectra are shown in Fig. 1.

The ICC-s obtained for a few  $^{18}\text{F}$  transitions are summarized and compared with the theoretical ones in Table 1. Only the ICC of the 1041 keV transition deviates significantly from its theoretical value. As the presence of any nuclear effect is not likely in this low A region, the in-beam effect is expected to be the only reason of the deviation.

1/ K. Morita, N. Hara, and Y. Mitsushima  
Nucl. Instr. and Meth. 153 (1978) 309

2/ J. Keinonen, H. B. Mak, T. K. Alexander  
G. C. Ball, W. G. Davies, J. S. Forster  
and I. V. Mitchell  
Phys. Rev. C23 (1981) 2073

3/ I. M. Band, M. B. Trzhaskovskaya and  
M. A. Listengarten, At. Data Nucl.  
Data Tables 18 (1976) 433

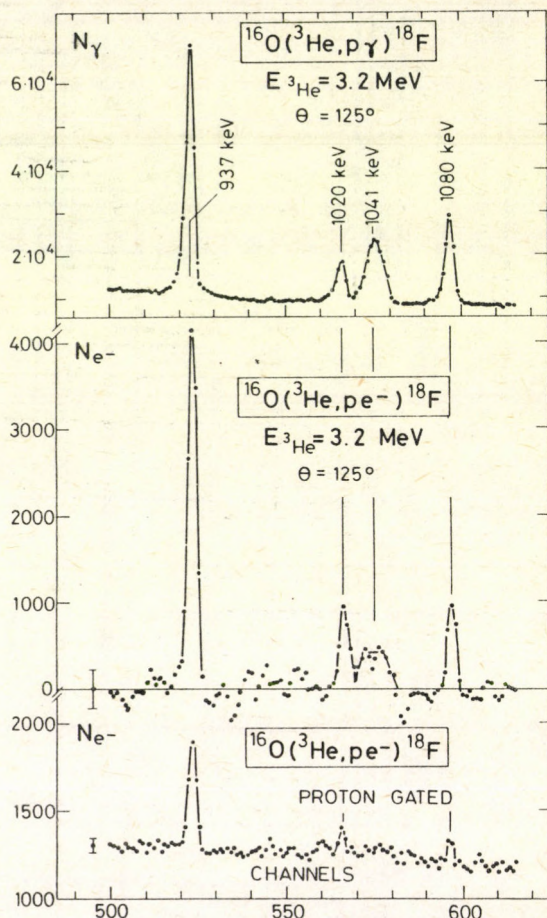


Fig. 1. Parts of the  $\gamma$ -ray, singles conversion electron and proton gated conversion electron spectra. From the singles electron spectrum the background was subtracted and the spectrum was smoothed.

Table 1. Theoretical total ICC-s for  $^{18}\text{F}$  transitions ( $\alpha_0$ ) [3] and the total experimental per theoretical ICC ratios.

E (keV)	$\alpha_0$ $\times 10^{-6}$	$\alpha(\text{EXP})/\alpha_0$	
		SINGL.	COINC.
937	10.1	1.00	1.00
1020	8.52	1.17 $\pm$ 0.32	1.1 $\pm$ 0.4
1041	5.39	0.73 $\pm$ 0.18	<0.65
1080	3.36	1.11 $\pm$ 0.29	0.7 $\pm$ 0.4



APPLICATION OF INTERACTING BOSON MODELS TO THE  $^{12}\text{C}+^{12}\text{C}$  SYSTEM

Z. Fekete

Diploma thesis (Supervisor: J. Cseh), ATOMKI, Debrecen, 1985.  
Submitted to Kossuth University, Debrecen  
(In Hungarian)

THE  $^{23}\text{Na}(p,\gamma)^{24}\text{Mg}$  REACTION AT SUBBARRIER ENERGIES INTERPRETED  
IN TERMS OF THE DIRECT-SEMIDIRECT MODEL

M. Kicinska-Habior\*, P. Decowski\*, T. Matulewicz\*, B. Sikora\*,  
J. Töke\*, J. Cseh, E. Somorjai

\*Institute of Experimental Physics, University of Warsaw

Proceedings of 15<sup>th</sup> Mikolajki Summer School on Nuclear Physics  
Mikolajki, 1983, eds.: Z. Wilhelmi, M. Kicinska-Habior, Univ.  
Warsaw, 25-34.

RADIATIVE PROTON CAPTURE TO THE FIRST EXCITED STATE OF  $^{29}\text{P}$   
NUCLEUS AT SUBBARRIER ENERGIES

T. Matulewicz\*, D. Dabrowska\*, P. Decowski\*, M. Kicinska-Habior\*  
B. Sikora\*, J. Töke\*, E. Somorjai

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Acta Physica Polonica B16 (1985) 785-788

Differential cross sections at  $0^\circ$  and  $90^\circ$  measured for  
 $^{28}\text{Si}(p,\gamma)^{29}\text{P}$  reaction at proton energy range 2.3-2.9 MeV have  
been analyzed in terms of the direct-semidirect capture model  
extended by the effective potential approach. Spectroscopic  
factor of the first excited state of  $^{29}\text{P}$  nucleus was found to  
be  $0.10 \pm 0.05$ .

ANALYSIS OF THE PROCESS  $^{28}\text{Si}(p,p_0)^{28}\text{Si}$  and  $^{28}\text{Si}(p,p_1)^{28}\text{Si}$  IN  
THE EXCITATION ENERGY REGION  $9.195 < E_x < 10.474$  MeV

Z. Veress\*, Z. Máté

\*Bajcsy-Zsilinszky Endre Technical School, Ujfehértó

Abo Akademi, Accelerator Laboratory, Report, Abo, Finland, 1985

SIGNATURE-DEPENDENT PROTON ALIGNMENTS AT HIGH ROTATIONAL  
FREQUENCY AND THE PERSISTENCE OF PROTON PAIRING CORRELATIONS

J. Simpson\*, P.D. Forsyth\*, D. Howe\*, B.M. Nyakó, M.A. Riley\*,  
J.F. Sharpey-Schafer\*, J. Bacelar\*\*, J.D. Garrett\*\*, G.B.  
Hagemann\*\*, B. Herskind\*\*, A. Holm\*\* and P.O. Tjøm\*\*\*

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DK-2100. Copenhagen, Denmark

\*\*\*Institute of Physics, University of Oslo, Oslo, Norway

Phys. Rev. Lett. 54 (1985) 1132-1135

Band crossings are observed in the yrast  $\alpha = -\frac{1}{2}$  and  $+\frac{1}{2}$   
negative-parity decay sequences in  $^{157}\text{Ho}$  at  $h\omega = 0.48$  and  
 $\sim 0.54$  MeV, respectively. These band crossings are interpreted  
as the alignment of the second and probably the third pair of  
 $h_{11/2}$  quasiprotons. This is the first identification of delayed  
crossings involving the second aligning nucleon. These crossings  
show that sizable proton-pair correlations must remain for  
these configurations up to high rotational frequencies  
 $h\omega \sim 0.5$  MeV.

AMBIGUITIES IN PIGE CAUSED BY DIFFERENT REACTIONS

Á.Z. Kiss, E. Koltay, B. Nyakó, E. Somorjai, E. Antilla\* and  
J. Raisänen

\*Department of Physics University of Helsinki SF-00170  
Helsinki 17, Finland

Capture Gamma Ray Spectroscopy and Related topics, 1984, Int.  
Symp., Knoxville, Tennessee, ed. S. Raman, American Institute  
of Physics, New York, 1985. p.851

COMPARATIVE STUDIES ON THE PRODUCTION OF  $^{75}\text{Br}$

S.M. Qaim\*, Z. Kovács, G. Blessing\*, G. Stöcklin\*

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Journal of Labelled Compounds and Radiopharmaceuticals 21  
(1984) 1271

MASSES OF RADIOACTIVE NUCLEI IN THE REGION OF MASS NUMBERS  
A=136÷154

V.P. Afanasjev\*, Yu.S. Blinnikov\*\*, N. Ganbaatar\*\*\*\*,  
V. Zeleznakov\*\*, V.G. Kalinnikov\*, J. Kormicki\*\*\*, K.A. Mezilev\*\*,  
Yu.N. Novikov\*\*, A.M. Nurmuhamedov\*\*\*\*\*, V.N. Pantelejev\*\*,  
A.G. Poljakov\*\*, A. Potempa\*\*\*, B.P. Osipenko\*, J. Yurkovski\*\*\*\*\*  
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\*\*\*\*Mongolian St. Univ., Ulan-Bator, Mongolia

\*\*\*\*\*Tashkent St. Univ., Tashkent, USSR

\*\*\*\*\*Inst. for Nuclear Research, Warsaw, Poland

Leningrad Nuclear Physics Institute, Report No.1083 (1985)  
(in Russian)

PRODUCTION OF  $^{75}\text{Br}$  VIA THE  $^{76}\text{Se}(p,2n)^{75}\text{Br}$  REACTION AT A  
COMPACT CYCLOTRON

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Jülich GmbH, D-5170 Jülich, F.R.G.

International Journal of Applied Radiation and Isotopes  
36 (1985) 635-642

Excitation functions were measured by the stacked-foil technique for the reactions  $^{76}\text{Se}(p,n)^{76}\text{Br}$ ,  $^{76}\text{Se}(p,2n)^{75}\text{Br}$ ,  $^{76}\text{Se}(p,3n)^{74}\text{mBr}$ ,  $^{76}\text{Se}(p,pn)^{75}\text{Se}$ ,  $^{76}\text{Se}(p,\alpha)^{73}\text{As}$ ,  $^{76}\text{Se}(p,\alpha n)^{72}\text{As}$ ,  $^{76}\text{Se}(p,\alpha 2n)^{71}\text{As}$  and  $^{76}\text{Se}(p,^3\text{He}+2pn+pd)^{74}\text{As}$  on 96.48 % enriched  $^{76}\text{Se}$  up to  $E_p = 40$  MeV. The optimum energy range for the production of  $^{75}\text{Se}(p,2n)^{75}\text{Br}$  reaction at our compact cyclotron is  $E_p = 24 \rightarrow 21.5$  MeV, the calculated thick target yield of  $^{75}\text{Br}$  amounting to 32 mCi/ $\mu\text{Ah}$  and the expected level of  $^{76}\text{Br}$ -impurity to 2.0%. A thin layer of metallic  $^{76}\text{Se}$  on Al-backing was used as target in combination with a water-cooled rotating target head. A dry distillation technique for the separation of radio-bromine from irradiated targets was developed; radiochemical yields of about 40-52% were obtained. Using a 50.2 mg/cm<sup>2</sup> thick target ( $E_p = 24 \rightarrow 21.85$  MeV), an irradiation time of 1.25 h at a nominal proton beam current of 15  $\mu\text{A}$  and a distillation time of 30 min at 300°C, about 160 mCi of  $^{75}\text{Br}$  (at EOB) is produced. The total loss of  $^{76}\text{Se}$  after irradiation and distillation process is <1%. The levels of  $^{76}\text{Br}$  and  $^{77}\text{Br}$  impurities in  $^{75}\text{Br}$  are <3% and 0.15%, respectively.

THE EFFECT OF THE PROPERTIES OF SLOWING MEDIA ON NUCLEAR  
LIFETIMES DERIVED FROM DSA MEASUREMENTS

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\*\*Department of Physics, University of Helsinki SF-00170  
Helsinki 17, Finland

Acta Phys. Hung. 58 (1985) pp.11-21

FINE STRUCTURE OF THE RMS RADIUS

L. Végh

Acta Physica Hungarica 58 (1985) 29-34

INVESTIGATIONS ON INTERNAL ELECTRON-POSITRON PAIR PRODUCTION

T. Fényes

Fiz. Szem. 35 (1985) 6-10  
(In Hungarian)

THEORETICAL NUCLEAR PHYSICS RESEARCH IN ATOMKI

B. Gyarmati

Fiz. Szem. 24 (1985) 10-17  
(In Hungarian)

CLUSTER MODELS

A.T. Kruppa

Lecture, 1985 Winter School on Nuclear Physics Miskolc,  
January 21-25, 1985. ATOMKI Közl. 27 (1985) 261-275  
(In Hungarian)

## ELEMENTS OF THE INTERACTING BOSON APPROXIMATION

J. Cseh

Lecture, 1986 Winter School on Nuclear Physics, Miskolc,  
January 21-25, 1985. ATOMKI Közl. 27 (1985) 147-163  
(In Hungarian)

## MODELS OF ODD-ODD NUCLEI I. SPHERICAL NUCLEI

T. Fényes

Lecture, 1985 Winter School on Nuclear Physics Miskolc,  
January 21-25, 1985. ATOMKI Közl. 27 (1985) 165-182  
(In Hungarian)

## IN-BEAM GAMMA-RAY SPECTROSCOPY

Zs. Dombrádi

Lecture, 1985 Winter School on Nuclear Physics Miskolc,  
January 21-25, 1985. ATOMKI Közl. 27 (1985) 183-205  
(In Hungarian)

## THE MEASUREMENT OF THE LIFETIMES OF EXCITED NUCLEAR STATES

A. Krasznahorkay

Lecture, 1985 Winter School on Nuclear Physics Miskolc,  
January 21-25, 1985. ATOMKI Közl. 27 (1985) 207-219  
(In Hungarian)

## IN-BEAM INTERNAL CONVERSION ELECTRON SPECTROSCOPY

T. Kibédi

Lecture, 1985 Winter School on Nuclear Physics Miskolc,  
January 21-25, 1985. ATOMKI Közl. 27 (1985) 221-238  
(In Hungarian)

GAUSSIAN APPROXIMATION TO LOW ENERGY QUARK-LEPTON SYSTEMS

Z. Árvay

The X. European Symposium on the Dynamics of Few-Body Systems  
Balatonfüred, Hungary, 3-7 June 1985

THE SEPARABLE EXPANSION OF THE POTENTIAL AND THE GAMOW STATE

B. Gyarmati

Invited talk, 8th Symposium on Nuclear Physics, Oaxtepec  
Mexico, January, 8-11, 1985.

HIGHLY EXCITED LEVELS OF  $^{40}\text{Ar}$  FROM THE REACTION  $^{36}\text{S}(\alpha, \gamma)^{40}\text{Ar}$

M. Józsa, J. Keinonen\*, Á.Z. Kiss, E. Koltay, B. Nyakó and  
E. Somorjai

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Proceedings of Symposium on Electromagnetic Properties of High  
Spin States AFI 85, Stockholm, May 28-31, 1985. Ed.: A. Kerek

LEVEL STRUCTURE OF  $^{116}\text{Sn}$

Z. Gácsi, X. Shi\*, Z. Zhou\* and J.L. Weil\*

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Bulletin of the American Physical Society. The 1985 Spring  
Meeting of the APS Crystal City, VA, USA, 24-27 April, 1985  
Ed.: W.W. Havens, Jr.

GIANT PAIRING RESONANCES

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Talk, Symposium on Electromagnetic Properties of High Spin  
States AFI 85, Stockholm, May 28-31, 1985

SEARCH FOR DYNAMICAL SYMMETRY IN THE  $^{12}\text{C}+^{12}\text{C}$  RESONANCES

J. Cseh

Talk, X. European Symposium on the Dynamics of Few-Body Systems  
Balatonfüred, 3-7 June 1985.

APPRAISAL OF MACROSCOPIC CLUSTER MODELS

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10th European Symposium on the Dynamics of Few-Body Systems  
Balatonfüred, 3-7 June, 1985

DECOMPOSITION OF  $^6\text{Li}$  INTO  $\alpha+d$

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10th European Symposium on the Dynamics of Few-Body Systems  
Balatonfüred, 3-7 June, 1985

MICROSCOPIC COLLECTIVE MODELS

R.G. Lovas

Lecture, Winter School on Nuclear Physics of the Roland Eötvös  
Physical Society Miskolc, 21-25 January, 1985. ATOMKI Report,  
27 (1985) 135-145

MODELS OF ODD-ODD NUCLEI. II. TRANSITIONAL NUCLEI

T. Fényes

Lecture, Winter School on Nuclear Physics of the Roland Eötvös  
Physical Society, Miskolc, 21-25 January, 1985. ATOMKI Report,  
27 (1985) 431-445

COULOMB EXCITATION OF HIGH SPIN STATES IN MEAN-ELECTRIC-FIELD APPROXIMATION

L. Végh

Proceedings of Symposium on Electromagnetic Properties of High Spin States, Stockholm, 28-31 May, 1985. p. 211

OFF-SHELL TWO-BODY T-MATRIX IN HARMONIC OSCILLATOR BASIS

Z. Papp

Talk, 10th European Symposium on the Dynamics of Few-Body Systems, Balatonfüred, 3-7 June 1985, Hungary

GAMOW SEPARABLE APPROXIMATION FOR REALISTIC N-N INTERACTIONS

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Talk, 10th European Symposium on the Dynamics of Few-Body Systems, Balatonfüred, 3-7 June, 1985

COMPLEX SCALING IN THE DESCRIPTION OF NUCLEAR RESONANCES

B. Gyarmati and A.T. Kruppa

Talk, 10th European Symposium on the Dynamics of Few-Body Systems, Balatonfüred, 3-7 June, 1985.

THE CRANKING SHELL MODEL

T. Vertse

Lecture, Winter School on Nuclear Physics, Miskolc, 21-25 January 1985. (In Hungarian)



ELECTRON SCATTERING FROM  ${}^6\text{Li}$

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Kernphysik III.

Lecture, Kernforschungszentrum Karlsruhe Institute für  
Kernphysik III. 3 December 1985

CLUSTERING IN  ${}^6\text{Li}$

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Kernphysik III.

Lecture, Kernforschungszentrum Karlsruhe, Institut für  
Kernphysik III. 26 November 1985

RESONANCES IN PARTICLE-ROTOR SYSTEM

Z. Papp

Talk, 7th International Summer School on Nuclear Physics  
21-30 September 1985, Várna

STRUCTURE STUDY OF ODD-ODD TRANSITIONAL NUCLEI

T. Fényes

Talk, 7th International Summer School on Nuclear Physics,  
Neutron Physics and Nuclear Energy, 22-29, 1985, Várna

INTERACTING BOSON APPROXIMATION IN NUCLEAR PHYSICS

J. Cseh

Lecture, College on Representation Theory of Lie Groups  
Trieste, 4 November - 6 December 1985.

MOMENTS OF INERTIA AND DEDUCED SHAPES IN THE Xe-Nd REGION

J. Gizon\*, V. Barci\*, H. El-Samman\*, A. Gizon\*, R. Kossakowski\*,  
S. Elfström\*\*, L. Hildingsson\*\*, D. Jerrestam\*\*, W. Klamra\*\*,  
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Talk, Niels Bohr Centennial Symposium: Nuclear Structure, 1985  
Copenhagen 20-24 May 1985

LOW-ENERGY BEHAVIOUR OF THE NUCLEON OPTICAL POTENTIAL: THE  
NUCLEON EFFECTIVE MASS

B. Gyarmati

Talk, Facultad de Ciencias, Universidad Nacional Autonoma de  
Mexico, January 16, 1985

DECAY SCHEME OF  $^{120}\text{Sn}$  FROM  $(n, n'\gamma)$  RESULTS

X. Shi\*, J.L. Weil\*, Z. Gácsi, J. Sa\* and Z. Zhou\*

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Talk, The 1985 Fall Meeting of the APS, American Physical  
Society, 28-30 October, 1985

PRODUCTION OF  $^{11}\text{C}$  and  $^{13}\text{N}$  NUCLIDES FROM MELTED  $\text{B}_2\text{O}_3$  TARGET

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Talk, Workshop on Gas-Targetry Heidelberg, DKFZ, Institut für  
Nuklearmedizin 2-4 October 1985

ON THE VALIDITY OF THE DISCONTINUOUS STOPPING TECHNIQUE IN  
DOPPLER SHIFT ATTENUATION MEASUREMENTS

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Submitted to Acta Physica Hungarica

Monte Carlo calculations have been performed to investigate some quantitative features of the slowing process underlying nuclear life-time determination in Doppler Shift Attenuation Method (DSAM). Kregar et al's numerical method developed for a simplified description of the process was found to be applicable in strongly limited intervals of recoil velocity and life-time only.

CENTER - OF - CHARGE COULOMB INTERACTION IN ATOMIC AND  
NUCLEAR REACTIONS

L. Végh

Talk, 10th European Symposium on the Dynamics of Few-Body Systems, Balatonfüred, 3-7 June, 1985, Hungary

PIXE - PHYSICAL BASIS AND METHODICS

E. Koltay

Lecture, Advanced Interregional Training Course on Elemental Analysis by Nuclear Techniques. Institute of Atomic Energy, Beijing, 14 May 1985

ELECTRON OPTICS AND ANALYTICAL CAPABILITIES OF PROTON  
MICROBEAM DEVICES

E. Koltay

Lecture, Advanced International Training Course on Elemental Analysis by Nuclear Techniques. Institute of Atomic Energy, Beijing 14 May 1985

ATOMIC PHYSICS

**L<sub>3</sub>-SUBSHELL ALIGNMENT CALCULATIONS IN THE SECOND ORDER BORN APPROXIMATION FOR LIGHT- AND HEAVY-ION IMPACT ON Au**

L. Sarkadi

Submitted to J. Phys. B: At.Mol.Phys.

The L<sub>3</sub>-subshell alignment parameter for <sup>1</sup>H, <sup>2</sup>H, <sup>4</sup>He, and <sup>14</sup>N impact ionization of gold has been calculated in the energy range of 0.15-2 MeV/amu using an improved version of the recent second order L-shell ionization model of Sarkadi and Mukoyama [1]. The calculations show that the second order contribution is significant even for light ions, and that its inclusion brings the theory into a better agreement with the experiment. For nitrogen ion impact, in accordance with the observations of the heavy-ion experiments, the present model predicts sign reversal and large positive values for the alignment parameter at low collision velocities (see Fig.1.). To get further improvements in the description of the collision induced L<sub>3</sub>-subshell alignment the need for coupled-channel calculations is emphasized.

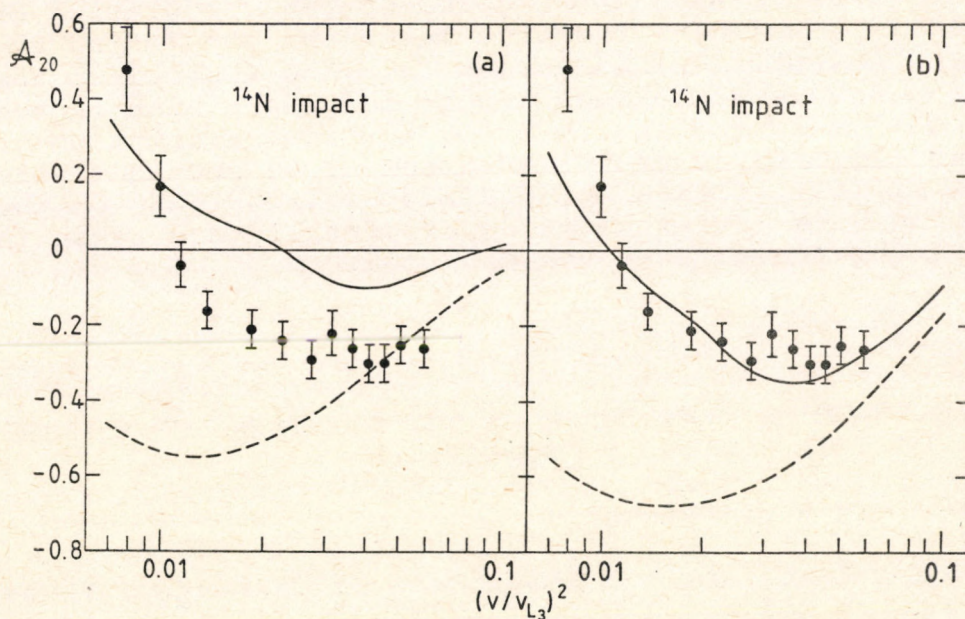


Fig.1. L<sub>3</sub>-subshell alignment of gold induced by nitrogen ions as a function of the relative collision velocity. The experimental data are from Pálinkás et al. [2]. Theory: - - - -, first order approximation; ———, second order approximation. The curves have been calculated (a) without and (b) with the inclusion of the binding effect.

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- [2] J. Pálinkás et al., J. Phys. B: At.Mol. Phys. 17 (1983) 131

ALIGNMENT OF He- AND H-LIKE P STATES OF 48 MeV FOIL-  
EXCITED Mg IONS

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Phys. Rev. A 31 (1985) 598-606

The angular distributions of the  $1P$ ,  $3P$ , and  $2P$  lines of 2 MeV/amu Mg projectiles excited by collision with carbon and aluminum atoms in thin foils have been measured with a pivoted plane-crystal Bragg spectrometer. Both the polarizations of these lines and the reflection properties of the ammonium dihydrogen phosphate (ADP) diffraction crystal have been determined. The  $\sigma_0/\sigma_1$  cross-section ratios for populating the  $2p(|m|=0)$  and  $2p(|m|=1)$  states in the  $1s2p$  He-like and the  $2p$  H-like configurations were deduced from the polarization values and compared with the coupled-states calculation of Reading et al., assuming that the mechanism populating these states is the capture of electrons from the K shell of the target. The agreement between theory and experiment is very good for carbon excitation, but for aluminum excitation the theory significantly overestimates the cross section ratio. The influence of foil tilting and cascade contributions on the polarization were investigated experimentally and taken into account in the analysis of the measurements.

PROJECTILE VELOCITY DEPENDENCE OF THE ALIGNMENT OF He-LIKE  
2P STATES OF FOIL EXCITED S PROJECTILES

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Phys. Lett. A110 (1985) 298-300

The alignment of the 2P states of 32 and 105 MeV  $1s2p$  He-like S ions excited by passage through a thin carbon foil has been determined from the ratio of the intensities of the  $1s2p(2^1P_1)-1s^2(1^1S_0)$  and the  $1s2p(2^3P_1)-1s^2(1^1S_0)$  lines. The experimental results give good agreement with the one and a half centered atomic orbital expansion calculation of Reading et al. and grossly disagree with the Oppenheimer-Brinkmann-Kramers approximation.

ALIGNMENT OF He- AND H-LIKE P STATES OF HEAVY IONS PRODUCED  
BY ION-ATOM COLLISIONS

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Nucl. Instr. and Meth. A240 (1985) 498-504

The alignment of the 2P states of He- and H-like 48 MeV Mg and He-Like 32 and 105 MeV S ions excited by thin carbon foils and the alignment of the 2P states of He-like Ne recoil ions produced by 1.35 MeV/amu Ar ion impact is discussed. The alignment of the Mg ions is deduced from the angular distributions of the He- and H-like X-ray lines measured with a pivoted plane-crystal Bragg spectrometer. The alignment of the S ions has been determined from the  $I(^3P)/I(^1P)$  ratio in the He-like X-ray spectrum measured with a curved crystal spectrometer. The experimental results are compared with the Oppenheimer-Brinkmann-Kramers (OBK) approximation the first Born-approximation (BA) and the coupled states calculation (OHCE) of Reading et al. The OHCE generally gives good agreement with the experimental data, while the OBK grossly disagrees with them.

The alignments and the relative population of the  $2^3P$  and  $2^1P$  states of He-like Ne recoil ions have been deduced from the relative intensity and polarizations of the  $^3P$  and  $^1P$  X-ray lines measured with a curved crystal polarimeter. By comparing the alignments and the relative populations of these states, the relative contributions of  $1s-2p$  excitation and multielectron ionization to the production of  $1s2p$  He-like state have been determined to be 37% and 63%, respectively.

DESIGN AND CALIBRATION OF AN X-RAY POLARIMETER FOR ION-ATOM  
COLLISION STUDIES

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Nucl. Inst. and Meth. B10/11 (1985) 904-906

The design and calibration of a system for the measurement of the polarization of X-rays from ion-atom collision in a gas target cell is described. The performance of the system was tested by measuring the polarization of the  $KL^1$  satellite lines of Al induced by 5.5 MeV He ion impact.

DELAYED EMISSION OF 2p-1s AND 3p-1s x-RAYS FROM 40 MeV NEON IONS FOLLOWING BEAM-FOIL EXCITATION

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\*Cyclotron Institute and Department of Chemistry, Texas A&M University, College Station, Texas 77843

Phys. Rev. A 32 (1985) 2674-2677

The decay curves for the delayed emission of 2p-1s and 3p-1s transitions in 40 MeV He- and H-like Ne projectiles excited by passage through a thin carbon foil have been measured. The decay curves, when compared to theoretical calculations, indicate that the  $\ell$  distribution is uniform in the high-n Rydberg states. Various structural features in the delayed x-ray emission spectra of 40 MeV Ne and 48 MeV Mg ions have also been examined.

ON THE PERTURBED-STATIONARY-STATE THEORY OF INNER-SHELL IONIZATION BY HEAVY CHARGED PARTICLES

L. Sarkadi

Nucl.Instr. and Meth. B9 (1985) 127-131

The question of the adiabaticity in the perturbed-stationary-state (PSS) description of the ion-induced inner-shell ionization of atoms is investigated. A simple method is proposed to include the effect of the nonadiabaticity of the perturbed atomic states which increases with increasing collision velocity. Calculations show that the effect is not negligible, and its inclusion improves the agreement between theory and experiment.

SECOND ORDER CALCULATIONS FOR L-SHELL IONIZATION OF GOLD BY NITROGEN ION IMPACT

L. Sarkadi and T. Papp

Acta Physica Hungarica 58 (1985) 75-82



INVESTIGATION OF L-SUBSHELL IONIZATION OF GOLD BY LOW VELOCITY PROTON BOMBARDMENT

K. Kiss, T. Papp, J. Pálinkás, L. Sarkadi and B. Schlenk

Acta Physica Hungarica 58 (1985) 69-74

AUGER ELECTRON SPECTRA IN 5.5 MeV amu<sup>-1</sup> Ne<sup>q+</sup> AND Ar<sup>q+</sup> ION IMPACT ON Ne

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J. Phys. B 18 (1985) 275-287

A study of the Ne K Auger spectra induced by 5.5 MeV/amu<sup>-1</sup> Ne<sup>3+</sup>, Ne<sup>10+</sup>, Ar<sup>6+</sup> and Ar<sup>17+</sup> heavy ions on Ne is presented. Some average quantities (the centroid energy of the KLL Auger spectra the average number of L vacancies produced simultaneously with the K vacancy, the effective charge of the projectile in the actual process, the satellite to total intensity ratio) characterising the KL<sup>n</sup> ionisation process have been extracted from these spectra. Relative K-shell ionisation cross sections and KLM and KLL cross section ratios have also been evaluated.

The deduced experimental Z<sub>eff</sub> values have been compared with the results of PWBA and BEA calculations. A simple model calculation is made in an attempt to interpret the variation of the probability for the ejection of an L-shell electron (P<sub>L</sub>) as a function of Z<sub>eff</sub>/v<sub>p</sub>. Some statements regarding individual lines and groups in the Auger spectra are made.

AUGER ELECTRON SPECTRA IN 5.5 MeV/amu Ne<sup>q+</sup> AND Ar<sup>q+</sup> ION IMPACT ON Ne

I. Kádár, S. Ricz, V.A. Shchegolev\*, B. Sulik, D. Varga, J. Végh, D. Berényi and G. Hock

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Nucl. Instr. and Meth. B9 (1985) 451-458

POTENTIAL SEPARABLE EXPANSION METHOD AND ITS RELATION TO THE  
SIEGERT METHOD AND THE COMPLEX ROTATION TECHNIQUE

B. Gyarmati and A.T. Kruppa

Submitted to Phys. Rev. A

It is demonstrated on the example of an atom-physical model potential that the performance of the approximation method for determining resonances, based on a separable expansion of the potential (PSE method), is comparable with that of the Siegert method and of the complex rotation technique. In fact it is shown that, when converged, the PSE method with a real harmonic oscillator wave function basis is equivalent to the complex variational method with a trial function set containing a Siegert function; if the potential is dilation analytic the PSE method with a complex oscillator-wave-function basis amounts to solving the complex rotated Schrödinger equation with the real PSE method and rotating back the obtained wave function. The results are tested against the ones yielded by direct numerical integration and against the complex virial theorem.

CHARACTERIZATION OF MULTIPLE IONIZATION PROCESSES BY MEANS OF  
AUGER SPECTRA MEASURED IN  $\text{Ne}^{3+}$ ,  $\text{Ne}^{10+}$ ,  $\text{Ar}^{6+}$  (5.5 MeV/u) - Ne  
COLLISIONS

I. Kádár, S. Ricz, V.A. Shchegolev\*, D. Varga, J. Végh,  
D. Berényi, G. Hock and B. Sulik

\*Joint Inst. for Nucl. Res. Dubna

Submitted to Phys. Lett.

IDENTIFICATION AND THE ANGULAR DISTRIBUTION OF THE  $\text{KL-LL}_{2,3}$   
 $\text{L}_{2,3}$  FROM THE 5,5 MeV/u  $\text{Ne}^{3+}$ -Ne COLLISION PROCESS

S. Ricz, I. Kádár, V.A. Shchegolev\*, D. Varga, J. Végh,  
D. Berényi, G. Hock and B. Sulik

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Submitted to J. Phys. B

## FORWARD ELECTRON EJECTION IN $H^+$ , $He^+$ , $He^{++}$ -He COLLISIONS

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Submitted to J. Phys. B

The dependence of the parameters (width, intensity, shape) of ECC and ELC cusps has been studied as a function of impact velocity (from 2 to 5 a.u.) in the case of simple collision systems  $H^+$ ,  $He^+$ ,  $He^{++}$ -He. An approximately linear increase of the width (FWHM) is found in both cases. There is no difference within the limit of the error for  $He^{++}$  (ECC) and for  $He^+$  (ELC). Regarding the cusp-shape a similar symmetry (ELC) and asymmetry (ECC) have been observed as in the case of heavy ion projectiles. None of the theories describes satisfactorily the experimental absolute cross sections of ECC-cusp ( $He^{++}$ ) while in case of  $He^+$  projectile (ELC) a rather good agreement with theory can be seen in the higher velocity region. The deviation at lower velocities might be explained by an ECC effect to be present, even in the case of  $He^+$ . Concerning the dependence of the cusp-yield on the Z value of the projectile,  $Z^{2,5\pm 0,3}$  was obtained from the yield in  $H^+$ -He and  $He^{++}$ -He collisions.

## COMPARISON OF ELC AND ECC PROCESSES IN LIGHT ION-ATOM COLLISION

Á. Kövér, Gy. Szabó, D. Berényi, L. Gulyás, K.O. Groeneveld\*,  
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Poster, 17th ICPIG, Budapest, 8-12, July, 1985

## MULTIPLE IONIZATION OF NEON IN HEAVY ION-ATOM COLLISION

I. Kádár, S. Ricz, D. Varga, J. Végh, D. Berényi, G. Hock  
and B. Sulik

Talk, Synthesis and Structure of Exotic Nuklei and Atoms  
Várna, 1985. 15-19.

HIGH RESOLUTION SPECTRA OF AUGER ELECTRONS FROM 5.5 MeV/amu  
Ne<sup>3+</sup>→Ne and Ar<sup>6+</sup>→Ne COLLISIONS

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Lecture, of the 2nd Workshop on High-Energy Ion-Atom Collision  
Processes Debrecen, Hungary, Aug. 27-28. 1984. Invited lectures  
and contributed papers. Ed.: D. Berényi and G. Hock  
pp. 171-178

A STUDY OF THE ELECTRON SPECTRA AROUND 0° FOR SIMPLE COLLISION  
SYSTEMS IN THE 0.8-2.4 MeV IMPACT ENERGY REGION

Á. Kövér, E. Szmola\*, Gy. Szabó, G. Hock, D. Berényi, L. Gulyás,  
E. Koltay, M. Burkhard\*\* and K.-O. Groeneveld\*\*

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Lecture, 2nd Workshop on High-Energy Ion-Atom Collision  
Processes Debrecen, Hungary, Aug. 27-28. 1984. Invited lectures  
and contributed papers. Ed.: D. Berényi, G. Hock  
pp. 263-268

COMPARISON OF CALCULATIONS OF EFFECTIVE CHARGES IN ION-ATOM  
COLLISIONS

G. Hock, B. Sulik, J. Végh, I. Kádár, S. Ricz and D. Varga

Nucl. Instr. and Meth. A240 (1985) 475-482

ELASTIC SCATTERING OF ELECTRONS ON He, Ne, Ar IN THE IMPACT  
ENERGY REGION FROM 1000 TO 3000 eV

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Acta Physica Hungarica 58 (1985) 63-68

GEOMETRICAL ENCOUNTER PROBABILITY MODEL IN THE DESCRIPTION OF  
MULTIPLE IONIZATIONS BY FAST HEAVY IONS

B. Sulik and G. Hock

Lecture, 2nd Workshop on High-Energy Ion-Atom Collisions  
(Aug. 27-28, 1984, Debrecen), Hungary. Invited lectures and  
contributed papers. Ed.: D. Berényi, G. Hock, Budapest, 1985  
Akadémiai Kiadó, 183-190.

INVESTIGATION OF THE MULTIPLE IONIZATION EFFECT ON THE  $L_3$ -  
SUBSHELL ALIGNMENT

T. Papp

Lecture, 2nd Workshop on High-Energy Ion-Atom Collisions  
(Aug. 27-28, 1984, Debrecen) Hungary. Invited lectures and  
contributed papers. Ed.: D. Berényi, G. Hock, Budapest, 1985.  
Akadémiai Kiadó, p.97-103

MEAN-ELECTRIC-FIELD APPROXIMATION TO MULTIPLE IONIZATION IN  
DISTANT COLLISIONS

L. Végh

Phys. Rev. A32 (1985) 199-206

IONISATION IN MEAN-ELECTRON-FIELD BORN APPROXIMATION

L. Végh

Lecture, 2nd Workshop on High-Energy Ion-Atom Collision  
Processes, Debrecen, Hungary, Aug. 27-28. 1984. Invited  
lectures and contributed papers. Ed.: D. Berényi, G. Hock  
Budapest, 1985. Akadémiai Kiadó, pp.191-196

INTERPLAY OF ATOMIC AND NUCLEAR PROCESSES

L. Végh

Lecture, 1985. Winter School on Nuclear Physics, Miskolc,  
21-25 January, 1985. (In Hungarian)

TARGET IONIZATION AND PROJECTILE ELECTRON LOSS IN SIMPLE COLLISION SYSTEMS

J. Schader\*, M. Burkhard\*, P. Latz\*, H.J. Frischkorn\*, P. Koschar\*, D. Berényi, K.O. Groeneveld\*, D. Hofmann\*, Á. Kövér and Gy. Szabó

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Talk, Second European Conference on Atomic and Molecular Physics, Free University, Amsterdam, The Netherlands, April 15-19, 1985. Eds.: A.E. de Vries, M.J. van der Wiel, Book of Abstracts, p.430.

ZERO DEGREE ELECTRON SPECTRA FROM  $H^0$ ,  $H_2^+$ ,  $He^+$ ,  $H^+$  AND  $He^{++} \rightarrow He$  COLLISION SYSTEMS AT 0.3 TO 0.6 MeV/u

A. Kövér, Gy. Szabó, M. Burkhard\*, P. Koschar\*, O. Heil\*, J. Schader\*, J. Kemmler\*, W. Lotz\*, G. Schüssler\*, D. Hofmann\*, K.O. Groeneveld\* and D. Berényi

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Talk, Second European Conference on Atomic and Molecular Physics, Free University, Amsterdam, The Netherlands, April 15-19, 1985. Eds.: A.E. de Vries, M.J. van der Wiel, Book of Abstracts, p.432

A STUDY OF AUGER ELECTRON SPECTRA FROM ION-ATOM COLLISIONS OF THE HEAVY ION BEAM OF THE CYCLOTRON U-300

D. Varga

Lecture, JINR, Dubna, Okt. 30, 1985

CUSP AND THE ENERGY-LOSS OF ELECTRONS IN FOLIEN

Gy. Szabó

Lecture, Institut für Kernphysik, Frankfurt, 2 November, 1985

AUGER ELECTRONS FROM HIGH ENERGY HEAVY ION COLLISIONS

D. Berényi

Invited lecture, International Conference on X-ray and Inner Shell Processes in Atoms, molecules and Solids, Leipzig, Aug. 20-24, 1984. Proceedings, Leipzig, 1984, K. Marx Universität, p. 207-217

ELECTRONS FROM HIGH ENERGY ION-ATOM COLLISIONS

D. Berényi

Lecture, 1985 Winter School on Nuclear Physics, Miskolc, 21-25 January 1985. (In Hungarian)

INVESTIGATIONS INTO ION-ATOM COLLISIONS

D. Varga

Fiz. Szem. 35 (1985) 13-15  
(In Hungarian)

DESCRIPTION OF FEW QUARK-LEPTON SYSTEMS IN A GAUSSIAN APPROXIMATION

Z. Árvay

JINR Preprint, Dubna, E4-85-295, 1985

CALIBRATION OF A NOVEL-DESIGNED ELECTRONSPECTROMETER, AND THE STUDY OF ELASTIC ELECTRON REACTING ON He, Ne AND Ar GASES

J. Herbák

Ph. D. thesis (supervisor: Á. Kövér) ATOMKI, Debrecen, 1984  
Submitted to Kossuth University, Debrecen, (In Hungarian)

STUDY OF THE M-SHELL IONIZATION OF U BY 200-600 keV PROTON IMPACT

J. Seres

Diploma thesis (supervisor: B. Schlenk), ATOMKI Debrecen, 1985  
Submitted to Kossuth University, Debrecen  
(In Hungarian)

PERSPECTIVES AND APPLICATIONS OF ION-ATOM COLLISION RESEARCH

D. Berényi

Invited lecture, Hungarian - Austrian - Yugoslavian Third Joint Vacuum Conference Debrecen, 7-9 october, 1985, Hungary Program and Abstracts, p.28.

A NEW UV PHOTOELECTRON SPECTROMETER FOR INVESTIGATION OF MOLECULAR ELECTRONIC STRUCTURES

T. Veszprémi\*, Gy. Zsombok\*, L. Nyulászi\*, L. Kövér, Á. Kövér and I. Cserny

\*Technical University of Budapest, H-1521 Hungary

Invited lecture, Hungarian - Austrian - Yugoslavian Third Joint Vacuum Conference Debrecen, 7-9 october, 1985, Hungary Program and Abstracts, p.32

DEPENDENCE OF THE ECC "CUSP" YIELD ON THE PROJECTILE Z FROM THE STUDY OF THE SIMPLEST COLLISION SYSTEM

D. Berényi, Á. Kövér, Gy. Szabó, L. Gulyás, K.O. Groeneveld\*, D. Hofmann\* and M. Burkhard

\*Institute for Nuclear Physics of J.W. Goethe Univ. Frankfurt/M

Talk, ICPEAC-XIV. International Conference on the Physics of Electronic and Atomic Collisions Palo Alto, July 24-30, 1985. Book of Abstracts, p.530

COMPARISON OF ELC AND ECC PROCESSES IN LIGHT ION-ATOM COLLISION

Á. Kövér, Gy. Szabó, D. Berényi, L. Gulyás, K.O. Groeneveld\*, D. Hofmann\* and M. Burkhard\*

\*Institute for Nuclear Research of the University of Frankfurt/M., D-6000 Frankfurt am Main, August-Euler-str. 6, FRG

17th International Conference on Phenomena in Ionized Gases, Budapest, 8-12 July 1985. Contributed papers, eds.: J.S. Bakos and Zs. Sörlei, p.395



ANALYTICAL APPLICATIONS

EXPERIMENTAL AND THEORETICAL CALIBRATION OF A PIXE SETUP FOR  
K AND LX-RAYS

I. Borbély-Kiss, E. Koltay, S. László, Gy. Szabó and L. Zolnai  
Nucl. Instr. and Meth. B12 (1985) 496-504

K and L line calibration has been performed for a PIXE setup by the independent use of experimental and theoretical methods. In the former case, thin film standards of known thicknesses were applied, while in the latter one cross section values were derived from different theoretical models.

Program REV5S and PIXEKL developed here were used for spectrum evaluation and concentration determination, respectively. They proved to be reliable and especially appropriate for routine serial evaluation of spectra measured on samples of nearly identical matrices.

As a result of the work, an accurate calibration of the setup has been obtained and it was shown that experimental and theoretical techniques used lead to calibration curves which fit each other reasonably well.

DETERMINATION OF ELEMENTAL CONSTITUENTS IN HIGH VOLTAGE  
INSULATOR BOROSILICATE GLASSES UNDER PROTON BOMBARDMENT

I. Borbély-Kiss, M. Józsa, Á.Z. Kiss, E. Koltay, B. Nyakó,  
E. Somorjai, Gy. Szabó and S. Seif El-Nasr\*

\*Teacher's College for Woman, Samia (Kuwait)

Journal of Radioanalytical and Nuclear Chemistry, Articles,  
92 (1985) 391-398

It is demonstrated that combined PIXE and PIGE measurements are suitable for the accurate determination of the elemental concentration of glass samples. Borosilicate glasses used as high voltage insulators in Van de Graaff accelerators and tested for the relevant physical properties have been analyzed. A correlation between concentrations and physical properties has been found, supporting the additivity rule.

INVESTIGATION OF TRACE ELEMENT OF HIGH PARITY ALUMINUM BY  
CHARGED PARTICLE ACTIVATION ANALYSIS

S. Takács

Ph. D. thesis (supervisor: I. Mahunka), ATOMKI, Debrecen, 1985  
Submitted to Kossuth University, Debrecen, (In Hungarian)

EXPERIMENTAL AND THEORETICAL CALIBRATION OF A PIXE SET-UP  
FOR K AND L X-RAYS

I. Borbély-Kiss, E. Koltay, S. László, Gy. Szabó and L. Zolnai

Submitted to Nucl. Instr. and Meth. B

DETERMINATION OF TRACE AND BULK ELEMENTS IN PLASMA AND  
ERYTHROCYTES OF HEALTHY AND DIABETIC PREGNANTS BY PIXE METHOD

S. Gödény\*, I. Borbély-Kiss, E. Koltay, S. László and Gy. Szabó

\*Department of Obstetrics and Gynecology, University  
Medical School of Debrecen

Submitted to Nucl. Instr. and Meth. B

PIXE analysis of blood samples from healthy and diabetic pregnant women was carried out. Eleven elements were detected, S, Ca, P, K, Cl, Fe, Zn, Cu, Rb and Br in red blood cells, S, Ca, P, K, Cl, Fe, Zn, Cu, Ni, Br in the plasma. The concentrations of P, S, Ni, Cu were higher, while those of K, Fe, and Zn were lower in diabetic plasma than in controls. Significantly higher concentrations were measured for P, S, Cl, Fe, Zn and Rb diabetic erythrocytes compared to normals. Statistical evaluation of the results also indicated significant alteration in the changes of concentrations throughout the pregnancy. Diabetes also resulted changes in most of the correlation between the concentrations of elements observed in normal pregnancy.

THE APPLICATION OF EMPIRICAL CORRECTION METHOD FOR XRF  
ANALYSIS OF COPPER ALLOYS

P. Kovács and M. Kis-Varga

Submitted to X-Ray Spectrometry

An empirical  $\alpha$ -correction program applied in a copper alloy analyser system (type ATOMKI-XRFA-5) is described. The energy dispersive XRF equipment is used in a copper smelting work. With an excitation source of 3.7 GBq Am-241 the concentration of eight elements (Mn, Fe, Ni, Cu, Zn, Pb, Sn, Sb) in brass, red brass, bronze and albronzes alloys are determined with acceptable accuracy.

THE APPLICATION OF THE PROTON INDUCED X-RAY EMISSION METHOD  
IN ANALYSING HORTICULTURAL SAMPLES

I. Borbély-Kiss, E. Koltay, M. Pankotai\*, Gy. Szabó and  
L. Zolnai

\*Institute of Vegetable Growing, University of Horticulture

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July, 3-5, 1985 (In Hungarian)

THE APPLICATION OF THE PROTON INDUCED X-RAY EMISSION METHOD  
IN ANALYSING HORTICULTURAL SAMPLES

I. Borbély-Kiss, E. Koltay, M. Pankotai\*, Gy. Szabó and  
L. Zolnai

\*Institute of Vegetable Growing, University of Horticulture

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July, 3-5, 1985 (In Hungarian)

SAMPLING AND PIXE ANALYSIS OF ATMOSPHERIC AEROSOLS

E. Koltay

Seminar Lecture at the Institute of Atomic Energy Beijing,  
May 16, 1985

METHODS AND TECHNIQUES IN QUANTITATIVE PIXE ANALYSIS

L. Zolnai

Advanced Interregional Training Course on Data Processing and  
Interpretation in X-Ray Fluorescence Analysis, Zagreb,  
Yugoslavia, 11 November - 13 December 1985, Institute "Ruder  
Bosovic"

EVALUATION OF PIXE-SPECTRUM

Gy. Szabó, I. Borbély-Kiss, E. Koltay and L. Zolnai

Seminar talk, Institut für Kernphysik, Frankfurt, aug. 20, 1985

METHODS AND PRACTICE OF SEMICONDUCTOR X-RAY DETECTOR  
EFFICIENCY CALIBRATION

L. Zolnai

Advanced Interregional Training Course on Data Processing and Interpretation in X-Ray Fluorescence Analysis, Zagreb, Yugoslavia, 11 November - 13 December 1985, Institute "Ruder Boscovic"

INTRODUCTION TO QUANTITATIVE XRF ANALYSIS

L. Zolnai

Advanced Interregional Training Course on Data Processing and Interpretation in X-ray Fluorescence Analysis, Zagreb, Yugoslavia, 11 November - 13 December 1985, Institute "Ruder Boscovic"

EVALUATION OF SPECTRA MEASURED IN PIXE

L. Zolnai

Advanced Interregional Training Course on Data Processing and Interpretation in X-Ray Fluorescence Analysis, Zagreb, Yugoslavia, 11 November - 13 December 1985. Institute "Ruder Boscovic"

BASIC CORRECTION ALGORITHMS IN QUANTITATIVE XRF ANALYSIS

L. Zolnai

Advanced Interregional Training Course on Data Processing and Interpretation in X-Ray Fluorescence Analysis, Zagreb, Yugoslavia, 11 November - 13 December 1985, Institute "Ruder Boscovic"

ERROR SOURCES IN QUANTITATIVE XRF ANALYSIS

L. Zolnai

Advanced Interregional Training Course on Data Processing and Interpretation in X-Ray Fluorescence Analysis, Zagreb, Yugoslavia, 11 November - 13 December 1985, Institute "Ruder Boscovic"

MEASUREMENTS OF RELATIVE THICK TARGET YIELDS FOR PIGE ANALYSIS  
ON LIGHT ELEMENTS IN THE PROTON ENERGY INTERVAL

Á. Z. Kiss, E. Koltay, B. Nyakó, E. Somorjai, A. Anttila\*, and  
J. Räsänen\*

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Helsinki 17, Finland

Journal of Radioanalytical Chemistry, Articles, 89 (1985)  
123-141

A SURVEY OF THE POSSIBLE INDUSTRIAL APPLICATIONS OF THE  
DEBRECEN CYCLOTRON

F. Ditrói, S. Takács and F. Tárkányi

ATOMKI Közl. 27 (1985) 123-131 (In Hungarian)

DEVELOPMENT OF THE ELECTRONICS OF ELECTROSTATIC ELECTRON-  
SPECTROMETERS AND THEIR APPLICATION TO THE STUDY OF SURFACE  
OXID LAYERS ON STAINLESS STEEL SAMPLES

I. Kádár

Thesis for the Candidate of Physical Sciences degree, ATOMKI,  
Debrecen, 1984. Submitted to the Hungarian Academy of  
Sciences (In Hungarian)

APPLICATION OF THE X-RAY FLUORESCENCE METHOD FOR ENVIRONMENTAL  
POLLUTATION MEASUREMENTS

J. Bacsó

Lecture, First Italo-Hungarian Symposium on Spectrochemistry:  
Environmental Protection and Spectrochemistry, Roma, September  
5-9, 1983. Annali dell' Istituto Superiore di Sanità, (eds.:  
S. Caroli, A. Alimonti and F. Petrucci, Istituto Superiore di  
Sanità, Roma, 1983, 605-612.

DATA AND DATA SOURCES IN QUANTITATIVE XRF ANALYSIS

L. Zolnai

Advanced Interregional Training Course on Data Processing and Interpretation in X-Ray Fluorescence Analysis, Zagreb, Yugoslavia, 11 November - 13 December 1985, Institute "Ruder Boscovic"

APPLICATION OF ENERGY DISPERSIVE X-RAY SPECTROMETER FOR ANALYSIS OF METAL ALLOYS

M. Kis-Varga

Talk, Nuclei, Atoms and Electrons as Tracers, Visegrád, 4-6 November, 1985. (In Hungarian)

APPLICATION OF XRF IN THE INVESTIGATION OF CORONARY HEART DISEASES (CHD) AND IN Ca METABOLIC BALANCE

J. Bacsó

Meeting on semiconductor detectors, Dubna, 22-25 September, 1985 (In Russian)

ON THE NATURE OF RELATIONSHIP BETWEEN THE MINERAL CONCENTRATION IN HAIR AND INTERNAL TISSUES

J. Bacsó

Talk, 2nd Research Co-ordination Meeting on "Significance of Hair Mineral Analysis as a Means for Assessing Internal Body Burdens of Environmental Mineral Pollutants", München, September 2-5, 1985

APPLICATION X-RAY EMISSION ANALYSIS IN STUDY OF HEART AND CARDIOVASCULAR DISEASES

J. Bacsó

Talk, Nuclei, atoms and electrons as tracers, Visegrád 4-6 November, 1985. (In Hungarian)

PRELIMINARY RESULTS ON MINERAL CONCENTRATION IN HUMAN HAIR  
AND INTERNAL TISSUES

J. Bacsó, B. Dezső\*, I. Szigeti\*\* and I. Uzonyi

\*Medical University Pathological Department, Debrecen

\*\*Country Hospital "Joseph Hollós" Kecskemét, Institute of  
Pathology

2nd Research Co-ordination Meeting on "Significance of Hair  
Mineral Analysis as a Means for Assessing Internal Body Burdens  
of Environmental Mineral Pollutants", München, September 2-5  
1985.

DETERMINATION OF Ca AND OTHER TRACE ELEMENTS IN HUMAN HAIR  
AND AORTIC TISSUE

J. Bacsó, G. Lusztig\*, A. Pál\*, I. Uzonyi

\*Hollós J. Hospital, Kecskemét

The Congress of the Hungarian Society of Pathologists,  
Debrecen, 1985. 23-24, August (In Hungarian)

THE USE OF HAIR AS A BIOPSY TISSUE FOR CALCIUM

J. Bacsó, I. Uzonyi and S.A. Katz\*

\*Rutgers- the State University of New-Jersey, Camden,  
NJ. 08102 USA

2nd International Symposium on the Biology and Toxicology of  
Metals Using Nuclear Analytical Methods Brookhaven Nat. Lab.  
May 20-22, 1985

NUCLEAR-ANALYTICAL POSSIBILITIES OF A CYCLOTRON FOR  
AGRICULTURAL PURPOSES

F. Ditrói, S. Takács and F. Tárkányi

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July 3-5, 1985. (In Hungarian)



INVESTIGATION OF K AND Ca METABOLISM BY MEASUREMENT OF K AND Ca CONCENTRATION IN HUMAN HAIR

J. Bacsó, I. Uzonyi and P. Kovács

Isotopenpraxis 21 (1985) 324-327 (In Russian)

The paper briefly outlines the main features of the hair analyses, their results and conclusions. Isotope excited XRF analysis was used for the determination of Ca content of scalp hairs of individuals belonging to different groups, as well as of Ca and K content of two patients's beard.

Relying on the frequency distribution of Ca concentrations obtained in different groups it is supposed that the hair Ca level can be used for the prediction of diseases connected with Ca metabolism disorder. The influence of stressors seems to be verified by the high K level during strong mental burden and low K level in quiet circumstances of life.

ON THE APPLICATIONS OF X-RAY EMISSION ANALYSIS OF MONITORING THE ENVIRONMENTAL POLLUTION

T. Cziczó\*, J. Bacsó, M. Kertész\*, J. Szeili\*, F. Medve\*\* and M. Kis-Varga

\*National Health Authority, Budapest

\*\*Health and Anti-Epidemic Authority of Hajdu-Bihar, Debrecen

Egészségtudomány, 29 (1985) 276-289

CHANNELING EFFECTS IN POLYCRYSTALLINE COPPER A SERIOUS IMPEDIMENT TO QUANTITATIVE AUGER ANALYSIS

F.E. Doern\*, L. Kövér, and N.S. McIntyre\*

\*Surface Science Western, University of Western Ontario  
London, Ontario

Surface and Interface Analysis 6 (1984) 282-285

POTENTIALITIES OF THE PIXE METHOD

E. Koltay

Seminar Lecture at the National Laboratory of Engineering and Industrial Technology, Sacavem, Portugal, 25 June 1985

ESCA INVESTIGATION OF AEROSOL POLLUTION EMITTED BY  
POWER PLANTS

L. Kövér and J. Tóth

New Results in Atomic Energy and Nuclear Research,  
Budapest, Hungary

XPS INVESTIGATION OF Pt-Si INTERFACES FORMED DURING HEAT  
TREATMENTS IN DIFFERENT (H<sub>2</sub>, O<sub>2</sub>) ATMOSPHERES

L. Kövér, J. Tóth and L. Dávid\*

\*Enterprise for Microelectronics, H-1325 Budapest, Hungary

Submitted to Vacuum

Surface and interface structures of Pt-Si samples were analyzed by means of XPS depth profiling by using sequential Ar ion sputtering. Pt layers of 50 nm thickness were evaporated onto n-type Si wafers, then treated at temperatures in the region of 450-600°C in H<sub>2</sub> or O<sub>2</sub> atmospheres for 30-45 min. In the case of samples treated in O<sub>2</sub>, silicon can be identified in oxidized form at the Pt-silicide interfaces contrary to the samples treated in H<sub>2</sub>, where this interface is vanishing. In all cases SiO<sub>2</sub> is found to be present in the uppermost layer of the samples.

SURFACE ETHYLIDYNE ON PLATINUM BLACK: EVIDENCES FROM SURFACE  
ANALYSIS AND CATALYTIC MEASUREMENTS

Z. Paál\*, E.R. Fülöp\*, D. Marton\*\*, L. Kövér and J. Tóth

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Budapest, Hungary

\*\*Institute of Physics, Technical University, Budapest,  
Hungary

Submitted to Vacuum

Secondary Ion Mass Spectra of Pt-black exposed to ethylene at 633 K contain a PtC<sub>2</sub>H<sub>3</sub> cluster identified tentatively with adsorbed ethylidyne like that reported for single crystal surfaces. This may be oxidized on the surface to give C-CHO species. The catalytic properties of ethylene pretreated Pt are, to some respect, superior in hydrocarbon transformations than those pretreated in air and hydrogen.

DEVELOPMENT OF ENERGY-DISPERSIVE X-RAY SPECTROMETER AND ITS  
INTERDISCIPLINARY APPLICATIONS

J. Bacsó

Thesis for the Candidate of Physical Sciences degree, ATOMKI,  
Debrecen, 1984. Submitted to Hungarian Academy of Sciences,  
Budapest. (In Hungarian)

DETERMINATION OF LIVING-AREA EXPOSURES OF RADON AND RAOON  
FISSION FRAGMENTS USING SOLID STATE TRACK DETECTORS

B. Paripás

Ph.D. thesis (Supervisor: G. Somogyi) ATOMKI, Debrecen, 1985  
Submitted to Kossuth University, Debrecen (In Hungarian)

CAN WE USE CR-39 TRACK DETECTOR FOR NITROGEN MAPPING?

G. Somogyi, Zs. Varga, I. Hunyadi, K. Freyer\*, H.C. Treutler\*

\*Zentralinstitut für Isotopen und Strahlenforschung,  
Leipzig, NDK

14th Int. Symp. on Autoradiography Reinhardsbrunn (NDK) 1984.  
Nov. 19-23, (ed.: H.C. Treutler, ZfI-Mitteilungen, Leipzig,  
1985. 103, 116

SOME NEW NUCLEAR METHODS AND THEIR APPLICATIONS IN  
AGRICULTURAL RESEARCH AND PRACTICE

D. Berényi

Acta Agronomica Academiae Scientiarum Hungaricae 33,  
(1984) 285-293

ON DETERMINATION OF Ca IN HAIR AND ITS USE FOR INVESTIGATION  
OF CORONARY HEART DISEASE AND Ca-METABOLIC RATE

J. Bacsó

Talk, Second Hungaro-Italian Symposium on Spectrochemistry  
Natural Materials and Spectral Analysis, Budapest, 10-14 June  
1985. ATOMKI Report, p.416

SURFACE LAYER STRUCTURE ANALYSIS OF STAINLESS STEEL TUBING  
USED IN LWR PRIMER CIRCUIT - AN ESCA STUDY

L. Kövér, J. Tóth, I. Cserny and M. Róder\*

\*Central Research Institute for Physics, Institute of Atomic  
Energy Research, H-1525 Budapest, P.O.Box 49, Hungary

Talk, Hungarian - Austrian - Yugoslavian Third Joint Vacuum  
Conference, 7-9 october, 1985, Debrecen, Hungary,  
Program and Abstracts, p.66

XPS INVESTIGATION OF Pt-Si INTERFACES FORMED DURING HEAT  
TREATMENTS IN DIFFERENT (H<sub>2</sub>, O<sub>2</sub>) ATMOSPHERES

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Talk, Hungarian - Austrian - Yugoslavian Third Joint Vacuum  
Conference, 7-9 october, 1985, Debrecen, Hungary,  
Program and Abstracts, p.55.

SURFACE ANALYSIS OF AIR POLLUTANTS COLLECTED IN POPULATED  
AREAS

L. Kövér, J. Tóth, J.B. Schág\* and F. Medve\*\*

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\*\*Sanitary Station (KÖJÁL), H-4024 Debrecen,  
Tóthfalusi tér 5/6, Hungary

Talk, Hungarian - Austrian - Yugoslavian Third Joint Vacuum  
Conference, 7-9 october, 1985, Debrecen, Hungary,  
Program and Abstracts, p.68.

DERIVATOGRAPH-QMS SYSTEM IN GEOCHEMICAL RESEARCH

Gy. Szöőr\* and S. Bohátka

\*Kossuth University, Department of Mineralogy and Geology,  
Debrecen, Hungary

Proceedings of 8th Int. Conf. on Thermal Analysis, Bratislava,  
Aug. 19-23, 1985. 1 (1985) 395-398

USE OF QUADRUPOLE MASS SPECTROMETERS IN PLANT PHYSIOLOGY

B. Schlenk

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July 3-5, 1985. (In Hungarian)

STUDIES ON THE RADIATION SUSCEPTIBILITY OF DIPLOID AND  
TETRAPLOID SUDAN GRASSES USING NEUTRON IRRADIATION

J. Lazányi\*, P. Bornemisza-Pauspertl and M. Csatlós

\*University for Agricultural Sciences, Karcag, Hungary

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July 3-5, 1985. (In Hungarian)

EFFECT OF FAST NEUTRONS ON THE PLANTS OF LUPINUS  
MUTABILIS L

M. Ratkos\*, F. Borbély\*, M. Csatlós and P. Bornemisza-Pauspertl

\*Research Centre of Seed Production, Nyiregyháza, Hungary

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July 3-5, 1985. (In Hungarian)

EFFECT OF FAST NEUTRONS ON THE VARIABILITY OF OYBEAN

Z. Fazakas\*, K. Pásztor\*, K. Egri\* and P. Bornemisza-Pauspertl

\*University for Agricultural Sciences, Debrecen, Hungary

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July 3-5, 1985 (In Hungarian)

CHANGE OF THE INTERNAL GAS COMPOSITION IN WHEAT STALKS AND  
ITS POSSIBLE RELATIONSHIP TO THE GRAIN YIELD AND ADAPTABILITY

F. Sági\*, L. Mózsik\*, B. Schlenk, P. Bornemisza-Pauspertl,  
M. Csatlós and G. Langer

\*Cereal Research Institute, Szeged, Hungary

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July 3-5, 1985. (In Hungarian)

PRODUCTION OF RADIOACTIVE ISOTOPES FOR AGRICULTURAL RESEARCH

P. Mikecz, Z. Kovács and F. Tárkányi

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July 3-5, 1985. (In Hungarian)

STUDY OF TRANSPORT PROCESSES IN SOILS AND PLANTS BY MICRO-  
RADIOGRAPHIC AND RADIOABSORPTION METHODS

T. Varró\*, J. Gelencsér\* and G. Somogyi

\*Kossuth University, Debrecen, Hungary

Talk, 13th Meeting on Physics and Biophysics in Agriculture,  
Debrecen, July 3-5, 1985. (In Hungarian)

INTERNAL GAS COMPOSITION OF THE WHEAT STALK AS RELATED TO  
YIELDING POTENTIAL AND ADAPTABILITY

P. Bornemisza-Pauspertl, F. Sági\*, B. Schlenk, M. Csatlós,  
L. Mózsik\* and G. Langer

\*Cereal Research Institute, Szeged, Hungary

Talk, 2nd Hungarian Congress on Plant Physiology  
Szeged, July, 2-4, 1985. (In Hungarian).

## STUDIES ON NITROGEN MAPPING BY VARIOUS CR-39 TRACK DETECTORS

G. Somogyi, Zs. Varga, I. Hunyadi, K. Freyer\* and H.Ch. Treutler\*

\*Central Institute of Isotope and Radiation Research,  
Leipzig, GDR

Talk, 13th Int. Conf. on Solid State Track Detectors, Rome  
September 23-27, 1985. Submitted to Nuclear Tracks

## SURFACE ANALYSIS OF Pt-BLACK BY XPS

L. Kövér, J. Tóth and Z. Paál\*

\*Institute of Isotopes of the Hungarian Acad. of Sci.,  
H-1525 Budapest, Hungary

Poster, European Conference on Applications of Surface and  
Interface Analysis, 14-18. October 1985. Veldhoven (Hollandia)

## A NEW EQUIPMENT FOR ANGLE RESOLVED ELECTRON SPECTROSCOPY OF GASES AND SOLID SURFACES

L. Kövér, Á. Kövér, I. Cserny, T. Veszprémi\* and Gy. Zsombok\*

\*Technical University, Budapest, Hungary

Poster, European Conference on Applications of Surface and  
Interface Analysis 14-18, October, 1985. Veldhoven (Hollandia)

## ELECTRON SPECTROSCOPY: RESULTS AND POSSIBILITIES

L. Kövér

Talk, Nuclei, Atoms and Electrons as Tracers Scientific  
Session in Memory of Georg Hevesy, Visegrád, November 4-6, 1985

## NOBLE GAS MASS SPECTROMETRY

K. Balogh

Talk, Meeting of the Hungarian Chemical Society, Budapest,  
January 22-23, 1985. (In Hungarian)

SURFACE LAYER STRUCTURE ANALYSIS OF STAINLESS STEEL TUBING  
USED IN LWR PRIMARY CIRCUIT - AN ESCA STUDY

L. Kövér, J. Tóth, I. Cserny and M. Róder\*

\*Central Research Institute for Physics, Institute of  
Atomic Energy Research, H-1525 Budapest, Hungary

Submitted to Vacuum

Results of surface analysis are presented, investigating the structure of passive layers developed on the surface of stainless steel tubes treated in a LWR (light water cooled nuclear reactor) primary circuit and tested in model experiments using different aqueous media and pretreatment methods. Ar<sup>+</sup> ion XPS depth profiles show remarkable differences in surface layer structures for different treatments.

THE CONCENTRATION OF TRACE AND MACROELEMENTS IN HORTICULTURAL  
SAMPLES MEASURED BY PIXE METHOD

I. Borbély-Kiss, E. Koltay, M. Pankotai\*, Gy. Szabó and  
L. Zolnai

\*Institute of Vegetable Growing, University of Horticulture  
Budapest, Hungary

Talk, 16th Annual Meeting of European Society of Nuclear  
Methods in Agriculture, Warsaw, sept. 9-13, 1985

QUADRUPOLE MASS SPECTROMETRIC MEASUREMENTS IN INDUSTRIAL  
FERMENTATIONS

J. Szilágyi\*, S. Bohátka, G. Langer and Gy. Sántha\*

\*BIOGAL Pharmaceutical Works, H-4042 Debrecen, Hungary

Talk, Hungarian - Austrian - Yugoslavian Third Joint Vacuum  
Conference, 7-9 october, 1985, Debrecen, Hungary,  
Program and Abstracts, p.32.

DEPENDENCE OF THE RESIDUAL RESISTIVITY OF GALLIUM ON THE  
CONCENTRATION OF LEAD IMPURITY

D. Novák, K. Botos, M. Mészáros\* and I. Somosi\*\*

\*Research Institute of Aluminium Industry, Budapest

\*\*Factory of Aluminous Earth, Ajka

Fizika metallov i metallovedeniye 59 (1985) 607-609



EARTH SCIENCES AND ENVIRONMENTAL RESEARCH

MIOCENE VOLCANIC ROCKS FROM BOREHOLES IN TRANSTIBISCIA  
(HUNGARY) AND THEIR K/Ar CHRONOLOGY

V. Széky-Fux\*, Z. Pécskay and K. Balogh

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Submitted to Bull. de L'Acad. Serbe des Sciences et des Arts,  
Beograd

Transtibiscia (the so called Tiszántul of Hungary) broke into blocks along fractures and dislocations before the transgression of the Miocene sea. The uneven surface of these was filled with Miocene layers reaching thicknesses of several 1000 m in certain areas. The elevation of the margins and the subsidence of the basin had started previously and reached their maximum in the Miocene. Along the fractures and dislocations magmatic material erupted and filling of the subsided areas created volcanic masses of several 100 to several 1000 m thicknesses. In north Transtibiscia, in the area Nyírség, the Miocene is dominated by volcanics and it is only at the southern margin that their percentage diminishes or is missing. The andesite and rhyolite volcanics are present in almost every borehole. There is, however, a marked difference in their occurrence. The andesite volcanism is bound to fissure volcanoes controlled by volcano-tectonic directions. The rhyolite volcanism is distributed areally over a large area, erupted to the surface via great number of volcanic centres of varying size. Propylitization, chloritization were observed throughout the andesite complex. In Transtibiscia the oldest Miocene volcanic rocks are the rhyolites known from borehole Kisujszállás ÉK-1. According to their K/Ar ages measured on biotites and feldspars (17.9-18.5 My) they can be classed as Ottnangian. East of this area (from localities Nádudvar and Kaba to Nyírmártonfalva) the Miocene volcanic activity started with andesites in the Karpatian stage. As measured on biotite, the age of these andesites is  $17.1 \pm 0.5$  My. The andesites were followed by rhyolitic and rhyodacitic tuffs. Rhyolites and rhyodacites connected to the Middle Rhyolite Tuff level at the end of the Karpatian. The Badenian stage is characterized by alternating production of rhyolitic tuffs and andesites. Boreholes Nyiregyháza and Gelénes-1 cut in a great thickness Badenian and Sarmatian rhyolitic formations. At the Hungarian-Soviet boundary the rhyolitic volcanic activity lasted till the end of the Sarmatian. The dacite of Nagy Hill at Tarpa is unquestionably Pannonian. Borehole Komoró-I penetrated a great thickness of andesites and dacites filling the Sarmatian. Borehole Nagyecsed-I cut andesites of more than 3000 m thickness. The volcanism started here in the Badenian and terminated around the Sarmatian-Pannonian boundary. These andesites show affinity to the Vihorlat-Gutin range.

The Miocene volcanism in Transtibiscia lasted for about 8 My from the Ottnangian to the Pannonian.

## K/Ar DATING OF POST-SARMATIAN ALKALI BASALTIC ROCKS IN HUNGARY

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Submitted to Acta Mineralogica-Petrographica, Szeged

The systematic K/Ar chronologic study of post-Sarmatian alkali basaltic rocks in Hungary started in 1978. Since then about 250 determinations were carried out on samples representing the majority of occurrences. This work enabled us to establish a numerical time scale for the evolution of basaltic volcanic activity and to estimate the absolute ages of biostratigraphic units. In order to discover the possible disagreement of radiometric and geologic ages, which are caused by incomplete degassing, presence of xenolites and radiogenic argon loss, the isochron methods were used on cogenetic rocks and/or on fractions of different magnetic susceptibility and/or density of a single piece of basalt. The oldest basalts erupted in the Lower Pannonian s.l. in the Danube-Tisza Interfluvium Region. Their ages fall in the range of 8.1-10.4 My. The indicated age for the Lower-Upper Pannonian s.l. boundary is a bit younger than 8 My, but due to the absence of basalts in the lower part of Upper Pannonian s.l., this age estimation is uncertain. In Transdanubia, in the Balaton Highland, Bakony Mts. and Little Plain the oldest basaltic rocks are tuffs in the Pa<sub>1</sub><sup>1</sup> (Congeria unguiculaprae) level, these are unsuitable for dating. The oldest eruptive basalts are 5.5-6.0 My old, these are in a stratigraphically undefined position. Most of the basalts are younger than 5 My and volcanism terminated about 3 My ago. The age of boundary between the Pa<sub>2</sub><sup>2</sup> (Congeria balatonica) and Pa<sub>2</sub><sup>3</sup> (Unio wetzleri) levels changes in space. The deposition of Pa<sub>2</sub><sup>3</sup> sediments started 4.5 My ago (or even earlier) in certain areas and in other places the end of the Pa<sub>2</sub><sup>2</sup> level is younger than 4 My. At the village of Bár (southeastern part of Transdanubia) jumillite overlies early Pleistocene red clay. Its age is 2.17±0.17 My. This shows that deposition of sediments, classed traditionally as Pleistocene in Hungary, started prior to 1.8 My.

In North-Hungary, around town Salgótarján, basalts are 2.0-2.5 My old. Since they lie on eroded Oligocene and Miocene surfaces, their K/Ar data can not be related to the age of Pliocene-Pleistocene boundary.

Rb-Sr DATING OF BASEMENT ROCKS FROM THE SOUTHERN FORELAND OF THE MECSEK MOUNTAINS, SOUTHEASTERN TRANSDANUBIA, HUNGARY

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Submitted to Acta Mineralogica-Petrographica, Szeged

Rb-Sr total rock and biotite age determinations have been carried out on samples from the borehole Baksa-2 disclosing sillimanite-grade metamorphic rocks of the Görcsöny Ridge at the northern termination of the Drava Basin in southeastern Transdanubia.

The  $331 \pm 13$  Ma total rock isochron age is tentatively interpreted as the time of  $D_1$  deformation immediately coupled to the dominant, kyanite-staurolite grade first (Barrowian) phase of metamorphism. The overprinting second (andalusite-cordierite type) metamorphic episode is placed between the age brackets of 331 and 315 Ma, followed by regional emergence and low-temperature retrograde effects probably due to prolonged uplift under low velocity conditions.

OXYGEN EFFECT IN DUAL RADIATION ACTION

L. Végh

Submitted to Radiation Research

We have constructed a dual radiation action model which takes into account the oxygen and radiomodifier compound effect. The basic assumption of the description is that these radiomodifier agents have an influence only over the sublesion production. It is suggested that the  $\alpha^2/\beta$  ratio is independent of the presence of oxygen and radiomodifier compounds. The dependence of the lesion production on the oxygen concentration and the LET value of the irradiation is presented. The  $\alpha^2/\beta$  invariance and the calculated dose response curves are in satisfactory agreement with the experimental data.

K/Ar AGE OF MESOZOIC MAGMATIC ROCKS IN SEVERAL REGIONS OF HUNGARY

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Annual Report of the Hungarian Geological Institute of 1985, Budapest

Rb/Sr ISOTOPIC AGES OF GRANITOIDE ROCKS FROM THE SPIS-GEMER METALLIFEROUS MOUNTAINS, EASTERN SLOVAKIA, AND THEIR INTERPRETATION

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Submitted to Mineralia Slovaca

Detailed Rb-Sr isotopic age studies have been carried out on whole rock and biotite samples from several granitic bodies, as well as on material from hydrothermally altered zones not uncommon in the mineralized part of the Spis-Gemer Metalliferous Mountains.

Total rock isochron ages have been determined for the Hnilec ( $290 \pm 40$  Ma); Zlatá Idka ( $251 \pm 16$  resp.  $223 \pm 32$  Ma) and Hummel ( $270 \pm 64$  resp.  $246 \pm 25$  Ma) granites. No isochron could be obtained for the Betliar granite, but the distribution of data in an isochron diagram suggests a Paleozoic origin with a strong secondary overprint of indeterminate age. On the neosome of the Podsulova magmatite an isochron age of  $142 \pm 6$  Ma, on the hydrothermally altered zone of Dlhá Dolina isochron ages of  $151 \pm 14$  and  $146 \pm 6$  Ma have been obtained, pointing to an important period of activation during the Late Jurassic.

Biotite Rb-Sr ages cluster around 100 Ma, with a maximal value of  $142 \pm 4$  Ma, brought into connection with Alpine nappe overthrust.

In accordance with K-Ar ages obtained in other laboratories a tentative scheme for the magmatic-metamorphic development of the Gemerides is proposed.

INDIRECT EFFECT IN DUAL RADIATION ACTION

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Submitted to Radiation Research

We have constructed a dual radiation action model which takes into account the indirect effect in the sublesion production. The basic parameter of the model is the ratio of sublesion numbers induced by the indirect and direct attacks, respectively. The dependence of the lesion production on the radical scavenger concentration is given and the scaling properties of the linear-quadratic equation is discussed. The model predicts that for lesion production the indirect effect increases with the increase of the absorbed dose. The calculated dose response curves are in satisfactory agreement with the experimental data.

K/Ar DATING OF NEOGENE VOLCANIC ACTIVITY IN HUNGARY: EXPERIMENTAL TECHNIQUE, EXPERIENCES AND METHODS OF CHRONOLOGICAL STUDIES

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ATOMKI Közlemények 27 (1985) 277-288

Construction and essential parameters of an argon extraction line and a magnetic mass spectrometer developed in the institute of Nuclear Research of the Hungarian Academy of Sciences for K/Ar dating are described. The mass spectrometer is controlled by a microcomputer and it is suitable for static measurement of noble gas isotopic ratios. The accuracy of instruments was checked by repeated analysis of the interlaboratory standards Asia 1/65 (Soviet) and GL-O (French). The sensitivity of the instruments is sufficient to measure the K/Ar age of the youngest terrestrial volcanic material if the enrichment of radiogenic argon reaches several percent, but they are still inadequate to date individual mineral grains.

Experiences of chronological studies on Miocene intermediate and acid lavas and tuffs as well as on Pliocene basalts are summarized. Great attention is paid to the ascertainment of the geological reliability or radiometric ages. Experiences concerning the frequency, character and reason of geological errors for the different rock types are reviewed and methods of sample selection used for the recognition of unreliable ages are outlined.

The isochron methods are used mostly for dating Pliocene basalts. The method introduced first by Fitch et al. (1976) is preferred, i.e. when the isochrons are defined by different fractions of a single basalt sample. The limitations of the pure mathematical treatment of the experimental data are pointed out and geological interpretation of the isochron ages is discussed. The uncertainty of error estimation of isotopic ratio and potassium concentration measurements is emphasized. A method is described for estimating the error of the slope of the fitted straight line which does not result unacceptably precise ages when the number of measurements is great and the measurement error is overestimated.

K/Ar DATES FROM THE EOCENE/OLIGOCENE BOUNDARY STRATOTYPES IN HUNGARY

K. Balogh

Discussiones Palaeontologicae, 31 (1985) 43-51 (In Hungarian)

MIOCENE VOLCANISM AND CHRONOLOGY OF THE TOKAJ MTS.

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Proceedings of the 13th Congress of the Carpatho-Balcanian  
Geological Association Kraków, Sept. 5-10, 1985  
Geol. Inst. Kraków, 1 (1985) 401-403

PETROLOGY AND K/Ar CHRONOLOGY OF COVERED NEOGENE VOLCANIC  
ROCKS IN THE TRANS-TISZA REGION, HUNGARY

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8th Congress of the Regional Committee on Mediterranean  
Neogene Stratigraphy Budapest, Sept. 15-22, 1985  
Abstracts, p.542-543

CONTRIBUTIONS TO THE CHRONOLOGICAL STUDY OF THE NEOGENE  
VOLCANIC PROCESSES IN THE CALIMANI AND HARGHITA MOUNTAINS  
(EAST CARPATHIANS, ROMANIA)

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8th Congress of the Regional Committee on Mediterranean  
Neogene Stratigraphy Budapest, Sept. 15-22, 1985  
Hungarian Geological Survey Budapest, 1985, p.452-453

K/Ar DATING OF POST-SARMATIAN ALKALINE BASALTIC VOLCANIC  
ACTIVITY IN HUNGARY

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8th Congress of the Regional Committee on Mediterranean  
Neogene Stratigraphy Budapest, Sept. 15-22, 1985  
Hungarian Geological Survey Budapest, 1985. p.82-83

RADIOMETRIC CHRONOLOGY OF MIOCENE VOLCANISM IN THE  
TRANS-TISZA REGION

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Proceedings of the 13th Congress of the Carpatho-Balcanian  
Geological Association Kraków, Sept. 5-10, 1985  
Geol. Inst. Kraków, 1 (1985) 390-391

K/Ar AGE AND PETROGRAPHY OF MESOZOIC MAGMATIC ROCKS IN SEVERAL  
REGIONS OF HUNGARY

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Proceedings of the 13th Congress of the Carpatho-Balcanian  
Geological Association Kraków, Sept. 5-10, 1985  
Geol. Inst. Kraków, 1 (1985) 362

REVIEW OF K/Ar CHRONOLOGIC STUDIES OF TERTIARY AND  
QUATERNARY BASALTIC ROCKS IN HUNGARY

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Proceedings of the 13th Congress of the Carpatho-Balcanian  
Geological Association Kraków, Sept. 5-10, 1985  
Geol. Inst. Kraków, 1 (1985) 367

RECENT CONTRIBUTIONS CONCERNING THE EVOLUTION OF THE  
TAPOLCA-BASIN

K. Balogh, Z. Pécskay, Z. Borsy\* and M. Kozák\*

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Proceedings of the 13th Congress of the Carpatho-Balcanian  
Geological Association Kraków, Sept. 5-10, 1985  
Geol. Inst. Kraków, 1 (1985) 368-369



PRELIMINARY K/Ar DATINGS OF IGNEOUS ROCKS IN THE TERTIARY  
VOLCANIC REGION OF OAS

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8th Congress of the Regional Committee on Mediterranean  
Neogene Stratigraphy Budapest, Sept. 15-22, 1985  
Hungarian Geological Survey Budapest, p.119-120

DATING OF MIOCENE ACIDIC AND INTERMEDIATE VOLCANIC ACTIVITY  
IN HUNGARY

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8th Congress of the Regional Committee on Mediterranean  
Neogene Stratigraphy Budapest, Sept. 15-22, 1985  
Hungarian Geological Survey Budapest, p.258-260

RADIOMETRIC CHRONOLOGY OF MIOCENE VOLCANIC ACTIVITY IN THE  
TOKAJ MTS., HUNGARY

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8th Congress of the Regional Committee on Mediterranean  
Neogene Stratigraphy Budapest, Sept. 15-22, 1985  
Hungarian Geological Survey Budapest, p.450-451

CONTRIBUTIONS TO THE IMPROVEMENT OF NUMERICAL TIME SCALE FOR  
THE CENTRAL PARATÉTHYS NEOGENE

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8th Congress of the Regional Committee on Mediterranean  
Neogene Stratigraphy Budapest, Sept. 15-22, 1985  
Hungarian Geological Survey Budapest, p.595

K/Ar AGE AND PETROGRAPHY OF MESOZOIC MAGMATIC ROCKS IN  
SEVERAL REGIONS OF HUNGARY

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Talk, Working Session of the Hungarian Geological Society,  
Budapest, May 22, 1985

REVIEW OF K/Ar CHRONOLOGIC STUDIES OF TERTIARY AND QUATERNARY  
BASALTIC ROCKS IN HUNGARY

K. Balogh, E. Árva-Sós, Z. Pécskay, Á. Jámor\*, Z. Partényi\*,  
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Talk, Working Session of the Hungarian Geological Society  
Budapest, May 22, 1985.

GEOLOGICAL INTERPRETATION OF RADIOMETRIC AGES

K. Balogh

Talk, Training Course on Stratigraphy, Section of  
Palaeontology and Stratigraphy of the Hungarian Geological  
Society, Mályi, May 20. 1985.

RADIOMETRIC CHRONOLOGY OF MIOCENE VOLCANISM IN THE TRANS-TISZA  
REGION

Z. Pécskay, K. Balogh and V. Széky-Fux\*

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Talk, Working Session of the Hungarian Geological Society,  
Budapest, May 22, 1985.

RADIOMETRIC TIME-SCALE OF CENTRAL PARATETHYS NEOGENE REVISED

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Proceedings of the 8th Congress of the Regional Committee on  
Mediterranean Neogene Stratigraphy, Budapest, Sept. 15-22, 1985

A Rb-Sr AGE STUDY OF CRYSTALLINE ROCKS IN THE SOPRON  
MOUNTAINS, WESTERN HUNGARY

Á. Kovách and E. Svingor

Proceedings of the KBGA, 13th Congress of the Carpatho-Balkan  
Geological Association Kraków, Sept. 5-10, 1985  
Geol. Inst. Kraków, 1 (1985) 383-384

EARLY ALPINE RESETTING OF Rb-Sr AGES IN THE UPPER TRIASSIC  
QUARTZ PORPHYRIES OF THE BÜKK MOUNTAINS, NORTHEASTERN  
HUNGARY

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Proceedings of the 13th Congress of the Carpatho-Balkan  
Geological Association Kraków, Sept. 5-10, 1985  
Geol. Inst. Kraków, 1 (1985) 385-386

GEOCHRONOLOGY OF METAMORPHIC EVENTS IN THE CRYSTALLINE  
BASEMENT OF THE SOUTHERN PART OF THE GREAT HUNGARIAN PLAIN

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Proceedings of the 13th Congress of the Carpatho-Balkan  
Geological Association Kraków, Sept. 5-10, 1985  
Geol. Inst. Kraków, 1 (1985) 387-388

MIOCENE VOLCANISM AND CHRONOLOGY OF THE TOKAJ MTS.

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Talk, Working Session of the Hungarian Geological Society,  
Budapest, May 22, 1985.

A Rb-Sr AGE STUDY OF CRYSTALLINE ROCKS IN THE SOPRON  
MOUNTAINS, WESTERN HUNGARY

Á. Kovách and É. Svingor

Talk, Working Session of the Hungarian Geological Society,  
Budapest, May 22, 1985.

GEOCHRONOLOGY OF METAMORPHIC EVENTS IN THE CRYSTALLINE BASEMENT  
OF THE SOUTHERN PART OF THE GREAT HUNGARIAN PLAIN

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Talk, Working Session of the Hungarian Geological Society,  
Budapest, May 22, 1985.

A Rb-Sr AGE STUDY OF UPPER TRIASSIC QUARTZ PORPHYRIES OF  
THE BÜKK MOUNTAINS

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Talk, Working Session of the Hungarian Geological Society,  
Budapest, May 22, 1985.

DEVELOPMENT AND APPLICATION OF GEOCHRONOLOGICAL METHODS

K. Balogh

Fizikai Szemle, 35 (1985) 20-21 (In Hungarian)

RADIOMETRIC DATES RELATED TO THE AGE OF POST-SARMATIAN FORMATIONS IN HUNGARY

K. Balogh, Á. Jám bor\*

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Chronostratigraphy and Neostatotypes. Miocene of the Central Paratethys. M<sub>6</sub> Pannonian. (eds.: A. Papp, Á. Jám bor, F.F. Steininger), Akadémiai Kiadó Budapest, 1985. 177-183

METHODOLOGICAL ANALYSIS OF K/Ar DATING ON SEDIMENTARY GLAUCONITES FROM HUNGARY

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Annual Report of the Hungarian Geological Institute of 1982 Budapest, 1984. 479-489

INTRODUCTION OF THE K/Ar METHOD IN HUNGARY AND THE RESULTS OF ITS APPLICATIONS

K. Balogh

Thesis for the Candidate of Physical Sciences degree, ATOMKI, Debrecen, 1985. Submitted to the Hungarian Academy of Sciences, Budapest, (In Hungarian)

RADIOACTIVE MATERIALS IN THE ENVIRONMENT

E. Csongor

Fizikai Szemle 35 (1985) 17-20  
(In Hungarian)

## GEOCHRONOLOGICAL INVESTIGATIONS ON THE MIOCENE VOLCANISM OF THE TOKAJ MOUNTAINS

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Submitted to Geologicky Zbornik, Bratislava

The K/Ar dates of acid, intermediate and basic Miocene volcanic rocks obtained from boreholes and surface locations in the Tokaj Mts have been determined. The results of K/Ar datings in accordance with the geological investigations indicate, that volcanic activity started here in the Upper Badenian and terminated in the Pannonian. Thus, the estimated length of volcanic activity is about 5 million years.

In the Tokaj Mts. the close association of acid and intermediate volcanism, both in time and space over the whole Sarmatian stage is manifested in the K/Ar dates, too. The present investigations have verified that intermediate volcanic activity continued unquestionably into the Pannonian, whereas acidic volcanic activity ended probably at the Sarmatian-Pannonian boundary. The youngest known Miocene volcanite in the Tokaj Mts. is the basalt exposed in borehole Sárospatak-10.

## SURFACE ANALYSIS OF AIR POLLUTANTS COLLECTED IN POPULATED AREAS

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Submitted to Vacuum

Aerosol samples were collected from different densely populated areas of the town Debrecen (Hungary), involving the neighbourhood of potential air pollution emitters as well as of some living places. The particle size was limited to  $\lesssim 2-4\mu\text{m}$  using a cascade impactor during sampling. Air pollutants collected were analysed by chemical and surface (bulk) analytical methods (XPS, PIXE, SEM, EMP, IR). The results obtained show a much more detailed picture (regarding elemental and molecular composition as well as morphology) compared to the routine monitoring by chemical methods. In the case of sulfur adsorbed on different (metal) surfaces sulfide was found by XPS dominating contrary to the results of our earlier XPS analysis of aerosol ejected by a coal-fired power plant<sup>4</sup>.

## LOW LEVEL COUNTING FACILITY FOR $^{14}\text{C}$ DATING

E. Csongor and E. Hertelendi

Proceedings, Third Int. Conference on Low Level Country,  
21-25 October, 1985. Bratislava

The construction and performance of a proportional counting system is presented. The system contains a methane filled counter of  $0.83 \text{ dm}^3$  effective volume surrounded with a multi-wire ring guard counter. The whole arrangement is located in a lead shield. Boron loaded paraffine layer is used between the counters and the lead.

The pulses of the detectors are handled by integrated amplifiers, discriminators and anticoincidence units interfaced to a microprocessor controlled data evaluation unit. The system has performed well over more than six years of operation.

## RADIOCARBON DATING AND LATE GLACIAL BLOWN SAND MOVEMENTS IN NE HUNGARY

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Hungary

Proceedings, Third Int. Conference on Low Level Country,  
21-25 October 1985. Bratislava

A large area of the NE Part of the Great Hungarian Plain is covered by wind blown sand. In the exposures of the sand dunes a thin fossil soil layer has been separating wind blown sand strata (formations). From seven different localities 17 charcoal samples were collected and the measured  $^{14}\text{C}$  ages range from 11.000 to 12.900 BP. These radiocarbon dates indicate directly that in the Late Glacial there were two phases of blown sand movements (in the Older Dryas and Younger Dryas periods), and the fossil soil evolved in the Bölling resp. Alleröd periods.

The wind blown sand underlying the fossil soil had developed in the Upper Pleniglacial, which was the main period of the sand movements in Hungary

## TIME SPAN OF MAIN AND LATE ALPINE MOLASSES IN CARPATHIANS

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\*Geologicky Ustav Dionyza Stura, Bratislava

Submitted to Zeitschrift für Geol. , Berlin, DDR

THE POLLUTANT EFFECTS OF AERIAL NUCLEAR WEAPON-TEST

E. Hertelendi and E. Csongor

The arms race and the nuclear war, (ed.: M. Neményi, Budapest, 1985. 77-94  
(In Hungarian)

RECENT RESULTS IN THE RADIOCARBON DATING OF WINDBLOWN SAND  
MOVEMENT IN THE TISZA-BODROG INTERFLUVE

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Acta Geographica Debrecina 22 (1983) 1

COMPARATIVE INVESTIGATIONS ABOUT THE WATER AND GAS CONTENT OF  
CRUST AND MANTLE ROCKS

S. Szalay

Talk, Meeting of the Hungarian Geological Society, Budapest,  
November 13. 1985. (In Hungarian)

SURVIVAL AND THE GEOMETRY OF ENERGY DEPOSITION

L. Végh

Talk, 13th Meeting of the Hungarian Biophysical Society,  
Debrecen, July 3-5, 1985.  
(In Hungarian)

INVESTIGATION OF AIR POLLUTANTS IN DEBRECEN USING ESCA METHOD

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Talk, Working session of Debrecen Committee of the Hungarian  
Academy of Sciences, Szolnok, December 2, 1985. (In Hungarian)



INTEGRAL ALPHA AND GAMMA RADIATION MEASUREMENTS IN  
DMELLING HOUSES

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3rd Int. Conf. on Indoor Air Quality and Climate, Stockholm,  
August 20-24, 1985. (Eds.: B. Berglund, T. Lindvall,  
J. Sundell), Sivedish Council for Building Research, Stockholm,  
2 (1984) 113-118

TIME-INTEGRATED ALPHA AND GAMMA RADIATION MEASUREMENTS IN  
DMELLINGS

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Lecture, 10th Training Course on Radiations Protection  
Balatonkenese, april 24-26, 1985 (In Hungarian)

TIME-INTEGRATED RADON MEASUREMENTS IN SPRING AND WELL WATERS  
BY TRACK TECHNIQUE

G. Somogyi and L. Lénárt\*

\*Technical University for Heavy Industry, Miskolc, Hungary

Talk, 13th Int. Conf. on Solid State Track Detectors, Rome  
September 23-27, 1985. Submitted to Nuclear Tracks

GEOCHEMICAL FACIER ANALYSIS WITH SIMULTANEOUS THERMOANALYTICAL  
TECHNIQUE

Gy. Szöőr\*, É. Balázs\* and S. Bohátka

\*Kossuth University, Debrecen, Hungary

Submitted to Földtani Közlöny. (In Hungarian)

DEVELOPMENT OF METHODS AND INSTRUMENTS

OPERATION AND DEVELOPMENT OF THE 5 MV VAN DE GRAAFF  
ACCELERATOR IN 1985

L. Bartha, Á. Z. Kiss, E. Koltay, I. Papp, Gy. Szabó

The research in experimental nuclear physics laid the most claim to the use of the accelerator this year, as it is shown in Table 1. The beam time used for this subject amounted to the double of such value in the preceding year. The high percentage of the use of  ${}^4\text{He}^+$  ions appearing in Table 2 was due to extensive (alpha, gamma) work on the accelerator.

A study on the presence of neutral particles in the direct accelerated beam called our attention to the effect of distributed stripping on the secondary electron loading of the acceleration tube. Measured intensity and energy of the neutral particles yielded information on the most probable places of origin of the neutral component and on the characteristic features of the process [1].

Table 1.

Field	Hours	%
Nuclear Physics	1090	55.0
Analytical Studies	610	30.8
Other experiments	195	9.8
Machine tests	84	4.4
<b>T o t a l :</b>	<b>1979</b>	<b>100.0</b>

Table 2.

Ion Species	Hours	%
$\text{H}^+$	746	37.7
${}^3\text{He}^+$	73	3.7
${}^4\text{He}^+$	1125	56.8
$\text{N}^+$	35	1.8

[1] L. Bartha, Á. Z. Kiss, E. Koltay, Gy. Szabó and L. Zolnai:  
Nucl. Instr. Meth. in Phys. Rev. A244 (1986) 166.

STATUS REPORT ON THE CYCLOTRON PROJECT OF ATOMKI

A. Valek and G. Bibók

Talk, 22nd European Cyclotron Progress Meeting, Milano, Italy  
7-8 November 1985.

CYCLOTRON PROJECT AT ATOMKI

I. Mahunka

Talk, International Atomic Energy Agency (IAEA) Nuclear Data  
Section (Vienna), November 28, 1985

TPA (LSI) CAMAC DATA ACQUISITION SYSTEM AT THE ATOMKI  
CYCLOTRON LABORATORY, DEBRECEN

A. Paál, K. Sepsy and A. Vass

Talk, 12th International Symposium on Nuclear Electronics  
Dubna, July 2-6, 1985

EXPERIENCES AND RESEARCH ON ACCELERATOR PHYSICS IN THE  
ELECTROSTATIC ACCELERATOR DEPARTMENT OF ATOMKI

E. Koltay

Seminar lecture at the Institute of Atomic Energy, Beijing,  
15 May 1985

NEW CYCLOTRON LABORATORY IN ATOMKI, DEBRECEN

T. Fényes

Talk, Session of the Low Energy Physics Scientific Council  
of JINR (Dubna), November 26-28, 1985

STATUS REPORT OF THE CYCLOTRON LABORATORY OF THE INSTITUTE OF  
NUCLEAR RESEARCH OF THE HUNGARIAN ACADEMY OF SCIENCES, DEBRECEN

A. Valek and G. Bibók

Int. Conf. of Cyclotrons and Their Applications Behyňa,  
Czechoslovakia, 25-28 June, 1985.

A DISTORTED FIELD CYLINDRICAL MIRROR ELECTRON SPECTROMETER  
I. CALCULATION OF THE ANALYZER

D. Varga, Á. Kövér, L. Kövér and L. Redler\*

\*Central Research Institute of Silicate Industry,  
Budapest, Hungary

Nuclear Instruments and Methods A238 (1985) 393-395

A new "box" type cylindrical mirror electrostatic analyzer (CMA) with second order focusing properties is presented. The effect of the fringing field was taken into consideration in the design, resulting in some advantage (e.g. better dispersion) compared to the classical CMA.

DEVELOPMENT OF AN IN-BEAM CONVERSION-ELECTRON SPECTROMETER  
WITH SUPERCONDUCTING-MAGNET ELECTRON-TRANSPORTER THE  
CRYOGENICAL DESIGNING

D. Novák, F. Tárkányi, K. Füle and T. Fényes

ATOMKI Közlemények, 27 (1985) 498-506

ANALYSIS OF BETA SPECTROGRAMS, EVALUATION OF COMPLEX  
INTERNAL CONVERSION ELECTRON SPECTRA

J. Gulyás, V.B. Zakazov\*, G.A. Kononenko\*, V.V. Kuznetsov\*,  
M.I. Fominykh\* and V.M. Tsupko-Sitnikov\*

\*JINR, Dubna

JINR Report, Dubna, P6-85-717, 1985

BREMSSTRAHLUNG MEASUREMENTS WITH COLLIMATED THERMOLUMINESCENT  
DOSIMETERS AROUND A TANDEM ACCELERATOR

M. Friedrich\*, R. Günzel\*, A.Z. Kiss, E. Koltay and  
J. Félserfalvi\*\*

\*Central Institute of Nuclear Research, Rossendorf, DDR

\*\*Institute for Applied Physics, Kossuth Lajos University,  
Debrecen, Hungary

Nuclear Instruments and Methods A234 (1985) 1-5

THE EFFECT OF PARTICLE FLUENCE ON TRACK DIAMETER AND RESPONSE  
OF ELECTROCHEMICALLY ETCHED SSNTDs

K. Turek\* and G. Dajkó

\*Institute of Radiation Dosimetry of the Czechoslovakia  
UDS, Praga

Nuclear Tracks, 9 (1984) 209-213

COMPUTER PROGRAM FOR THE CONSTRUCTION OF THE LEVEL SCHEME ON  
THE BASIS OF ENERGY BALANCE OF GAMMA TRANSITIONS

F. Ditrói and I. Mahunka

Nuclear Instruments and Methods in Physics Research, A236  
(1985) 375-379

FGM- A FLEXIBLE GAMMA-SPECTRUM ANALYSIS PROGRAM FOR A SMALL  
COMPUTER

G. Székely

Computer Physics Communications, 34 (1985) 313-324

SOFTWARE SYSTEM FOR PROCESSING THE RAW EXPERIMENTAL DATA AT  
THE ELECTRON SPECTROMETER ESA-21

J. Végh and I. Kádár

Lecture 2nd Workshop on High-Energy Ion-Atom Collision  
Processes Debrecen, Hungary, Aug. 27-28. 1984. Invited  
lectures and contributed papers. (Eds: D. Berényi, G. Hock),  
Akadémiai Kiadó, Budapest, 1985., 179-181

INSTRUMENTS FOR MATERIAL ANALYSIS IN ATOMKI

D. Berényi and G. Máthé

ATOMKI Közlemények, 27 (1985) 117-121 (In Hungarian)

FAST NEUTRON SPECTROMETER BASED ON CR-39 PROTON SENSITIVE TRACK DETECTOR

G. Dajkó

Talk, Computer Aided Methods in Radiation Dosimetry  
Budapest, Hungary, 22-25 October 1985

DESIGN AND IMPLEMENTATION OF A CONTROL SYSTEM TO A QUADRUPOLE MASS SPECTROMETER

Z. Diós, K. Sepsy, I. Szabó and G. Székely

Talk, Sixth Summer School (17-26 September 1985) Software Engineering, Methods and Tools in Computational Physics. Contributed papers, Nove Mesto na Morave, Czechoslovakia, 17-26 september 1985, p.69-72

ACCURATE DETERMINATION OF BORON ISOTOPE ABUNDANCES WITH A MODIFIED MI-1309 TYPE MASS SPECTROMETER

É. Svingor and Á. Kovách

Talk, 28th Hungarian Meeting on Spectroscopy, Eger, 25-28 June 1985, p.57-60

SQUID APPLICATIONS IN ATOMKI: PICOVOLTMETER FOR RRR MEASUREMENTS; BIOMAGNETIC MEASURING SYSTEM

S. Mészáros, K. Vad and D. Novák

Proceedings, Workshop on Low Temperature Physics, Debrecen 17. April 1985. ATOMKI Report E/7 (1985) 492-497

FAST NEUTRON SPECTROMETRY WITH PROTON SENSITIVE SOLID STATE TRACK DETECTORS

G. Dajkó and G. Somogyi

Talk, 10th Training Course on Radiation Protection, Balatonkenese, April 24-26, 1985, p.56

VACUUM PROCEDURES IN MODERN MEASUREMENT TECHNIQUES AND THEIR APPLICATIONS

I. Berecz

Fizikai Szemle, 45 (1985) 21-24 (In Hungarian)

HARDWARE DEVELOPMENTS FOR MICROCOMPUTER CONTROLLED DATA ACQUISITION AND DATA PROCESSING SYSTEMS

J. Molnár

Ph. D. thesis, ATOMKI, 1985 Kossuth University, Debrecen, (In Hungarian)

DEVELOPMENT OF A COMPUTER CONTROL UNIT FOR QUADRUPOLE MASS SPECTROMETERS

Z. Diós

Ph. D. thesis (supervisor: G. Székely), 1985. Kossuth University, Debrecen. (In Hungarian)

NX-28 COLLIMATOR CONTROL AND DRIVER INSTRUMENT

L. Záborszky

ATOMKI Report E/6 (1985) 289-295

DEVELOPMENT OF ELECTRONIC INSTRUMENTS IN THE ATOMKI

G. Máthé

Fizikai Szemle 35 (1985) 27-28 (In Hungarian)



ADVANTAGES OF A QUADRUPOLE-DERIVATOGRAPH THERMOANALYTICAL INSTRUMENT

S. Bohátka, G. Szöőr\*

\*L. Kossuth Univ., Inst. of Mineralogy and Geology,  
H-4010 Debrecen, Hungary

Talk, Hungarian - Austrian - Yugoslavian Third Joint Vacuum Conference, 7-9 October, 1985, Debrecen, Hungary  
Program and Abstracts, p.33

DIFFUSION PUMP CONSTRUCTION IN ATOMKI

I. Berecz, S. Bohátka, G. Langer, J. Mosolygó, A. Nagy and G. Tarr

Talk, Hungarian - Austrian - Yugoslavian Third Joint Vacuum Conference, 7-9 October, 1985, Debrecen, Hungary  
Program and Abstracts, p.37

QUADRUPOLE MASS SPECTROMETRIC ANALYSIS OF FERMENTATION GASES

S. Bohátka

Talk, Seminar of the Institute of Biochemistry and Physiology of Microorganisms, USSR, Pushchino, April, 1985

A MICROPROCESSOR CONTROLLED QUADRUPOLE MASS SPECTROMETER GAS ANALYSER SYSTEM

I. Berecz, S. Bohátka, Z. Diós, I. Gál, J. Gál, L. Kiss, R.M. Kovács, G. Langer, J. Molnár, K. Sepsy, I. Szabó and G. Székely

Talk, Hungarian - Austrian - Yugoslavian Third Joint Vacuum Conference, 7-9 October, 1985, Debrecen, Hungary  
Program and Abstracts, p.39

ION COUNTING DEVICE WITH DEAD TIME CORRECTION

I. Berecz, S. Bohátka, Z. Diós, J. Gál, G. Langer and J. Molnár

Talk, Hungarian - Austrian - Yugoslavian Third Joint Vacuum Conference, 7-9 October, 1985, Debrecen, Hungary  
Program and Abstracts, p.33

## QUADRUPOLE MASS SPECTROMETRY IN THE MONITORING AND CONTROL OF FERMENTATIONS

D. Lloyd\*, S. Bohátka and J. Szilágyi\*\*

\*Department of Microbiology, University College, Newport Road, Cardiff, CF21TA, Wales

\*\*BIOGAL Pharmaceutical Works, H-4042, (Hungary)

Biosensors, 1 (1985) 179-212

The application of quadrupole mass spectrometry to the monitoring of fermentation processes allows continuous and simultaneous non-invasive measurement of gases and volatile substrates, intermediates or products. Components are directly and continuously sampled through a silicone rubber membrane either from solution in the culture medium and/or in the influent or effluent gas streams. Gases measured include  $H_2$ ,  $CH_4$ ,  $O_2$ ,  $CO_2$ ,  $H_2S$ ,  $N_2$ ,  $N_2O$  and (as calibration standard) Ar: vapours include methanol, ethanol, propanol, acetone, n-butanol, acetic acid and butyric acid. This versatility of detection is enhanced by off-line determinations of non-volatiles after pH adjustment (e.g. total  $CO_3^{2-}$  or  $NH_4^+$ ) or derivatization (e.g. some carboxylic or keto acids). Appropriate automation allows multicomponent analysis at many sampling points (i.e. simultaneously in many different fermentors).

Applications are described for aerobic processes (antibiotic production, yeast fermentation, growth on methanol) and anaerobic processes (acetone-butanol fermentation, anaerobic digestion of farm and domestic wastes, and fermentation in the rumen). Future developments include exploitation of the high sensitivity, long-term stability and high specificity of mass spectrometric measurements to process control and optimization.

## THE DEVELOPMENT OF A BIOMAGNETIC MEASURING INSTRUMENT BASED ON A SQUID

S. Mészáros, K. Vad

Diploma thesis (supervisor: S. Mészáros, K. Vad), ATOMKI, Debrecen, 1985. (In Hungarian)

APPLICATION OF SUPERCONDUCTING QUANTUM INTERFERENCE DEVICES  
IN BIOMAGNETIC RESEARCHES

K. Vad, S. Mészáros

Kórház- és Orvostechnika, 23 (1985) 88-93 (In Hungarian)

SIMPLIFIED BALANCING OF A 3<sup>d</sup> ORDER TYPE SUPERCONDUCTING  
GRADIOMETER

K. Vad, S. Mészáros, G. Halász and A. Domonyi

Talk, 17th International Symposium on Low Temperature  
Physics and Cryoelectronics, Georgenthal/Thür., GDR  
November 4-8, 1985

APPLICATION OF A SIMPLE DIRECTIONAL COUPLER FOR RF SQUIDS

S. Mészáros and K. Vad

Talk, 16th Int. Symposium on Low Temperature Physics and  
Cryoelectronics /Bad Blankenburg, 3-7 Dec.1984/ Friedrich-  
Schiller University, Jena, DDR, (1984) 145-149

While in the conventional arrangement of a RF SQUID system the impedance of a tank circuit is measured directly, in the VHF-UHF frequency range the reflective mode has some definite advantages. In the reflective mode the impedance of the tank circuit is measured with a directional coupler. The construction of directional couplers for the frequency range from 1 MHz to 1 GHz is well established and these devices are available commercially. A new method of the construction is described here.

SQUID PICOVOLTMETER SYSTEM FOR RESIDUAL RESISTIVITY MEASUREMENTS

S. Mészáros, K. Vad, D. Novák

Talk, 16th Int. Symposium on Low-Temperature Physics and  
Cryoelectronics /Bad Blankenburg, 3-7 Dec.1984/ Friedrich-  
Schiller University, Jena, DDR, 1984. 122-129

DETERMINATION OF GAMMA DOSE IN NEUTRON BACKGROUND BY LiF-s

I. Uray

International Atomic Energy Agency Vienna, Austria,  
Annual Report, Vienna, Austria, 33 (1985)

NEUTRON SENSITIVITY OF LiF DETECTORS

I. Uray

IAEA - Health Physics Research Abstracts, International Atomic  
Energy Agency, Annual Report, Vienna, Austria, 34 (1985)

DETERMINATION OF NEUTRON RESPONSE OF LiF-s IN GAMMA  
BACKGROUND

I. Uray

IAEA - Health Physics Research Abstracts, International Atomic  
Energy Agency, Annual Report, Vienna, Austria, 34 (1985)

NEUTRON DOSE MEASUREMENT BY USING LiF DETECTORS

I. Uray

IAEA - Health Physics Research Abstracts, International Atomic  
Energy Agency, Annual Report, Vienna, Austria, 35 (1985)

THERMOLUMINESCENCE DOSIMETRY

I. Uray

Talk, Seminar Åbo Akademi, Turku, Finland, September 19, 1985

EXPERIENCES OF GLOW CURVE ANALYSIS OF LiF DETECTORS

I. Uray, E. Rose\*, M. Hintzen\*, and H.J. Probst\*\*

\*Kernforschungsanlage Jülich GmbH, ASS

\*\*Kernforschungsanlage Jülich GmbH, IKP

Talk, Computer Aided Methods in Radiation Protection,  
Budapest, Hungary, 22-25 october, 1985

MEASURING EQUIPMENT ELGA FOR INVESTIGATION OF THE DECAY OF  
SHORT-LIVED NUCLEI

Z. Árvay, J. Gulyás, T. Kibédi, T. Fényes, V.V. Kuznetsov\*,  
V.I. Fominykh\*, R. Lushchinski\*, V.A. Utkin\*, B.A. Alikov\*\*,  
IS. Makhmudov\*\*\*, T.M. Muminov\*\*

\*JINR, Dubna

\*\*University of Tashkent

\*\*\*University of Samarkand

Talk, Seminar JINR, Laboratory of Nuclear Problems, October  
15, 1985. (In Russian)

MEASURING APPARATUS ELGA FOR INVESTIGATION OF THE DECAY OF  
SHORT-LIVED NUCLEI

Z. Árvay, J. Gulyás, T. Kibédi, T. Fényes, V.V. Kuznetsov\*,  
V.I. Fominykh\*, R. Lushchinski\*, V.A. Utkin\*, B.A. Alikov\*\*,  
I.T. Makhmudov\*\*\* and T.M. Muminov\*\*

\*JINR, Dubna

\*\*University of Tashkent

\*\*\*University of Samarkand

Submitted to Pribory i Tekhnika Eksperimenta

A description of the measuring equipment ELGA for on-line investigations of the decay characteristics of nuclei far from the stability line is given. The equipment consists of semiconductor detectors and mini-orange spectrometer for studying  $\alpha, \gamma, e^-, \beta^+$ -radiations and  $e\gamma$ - and  $\gamma\gamma$ -coincidences, tape moving system to transport radioactivity to the detectors. Electronics used for nuclear spectroscopy and a microprocessor based control unit of the system make possible to investigate radioactive isotopes with half-life of  $T_{1/2} \gtrsim 0.1$  s.

TRACE ELEMENT ANALYSIS BY USING THE DIRECT CPAA METHOD

S. Takács, F. Ditró and I. Mahunka

Nuclear Instruments and Methods B10/11 (1985) 1051-1053

Multielemental trace analysis was performed at Turku Cyclotron Laboratory on purified industrial aluminium samples and Ultra-High-Purity aluminium standards, produced by VAW (FRG), by using the direct CPAA (Charged Particle Activation Analysis) method. Both types of Al were expected to contain less than 10 ppm trace element contamination. 8 to 10 MeV proton beams were used for irradiation. The absolute trace quantities were determined for some ten elements by using the cross section curves and calculating the ranges of the bombarding particles in the samples, and measuring the absolute beam current and the intensities of the characteristic gamma-lines of the activated isotopes. The investigated elements are: Ca, Ti, V, Cr, Fe, Ni, Cu, Zn, Ga, Br and Zr. The obtained results were in good agreement with the guaranteed (VAW) data.

MEASUREMENT OF EXHALATION AND DIFFUSION PARAMETERS OF RADON  
IN SOLIDS BY PLASTIC TRACK DETECTORS

G. Somogyi, Abdel-Fattah Hafez\*, I. Hunyadi and M. Tóth-Szilágyi

\*On leave from Alexandria University, Faculty of Science,  
Department of Physics, Egypt

Talk, 13th Int. Conf. on Nuclear Track Detectors, Rome,  
September 23-27, 1985. Submitted to Nuclear Tracks

DETERMINATION OF RADON AND THORON PERMEABILITY THROUGH SOME  
PLASTICS BY TRACK TECHNIQUE

Abdel-Fattah Hafez\* and G. Somogyi

\*On leave from Alexandria University, Faculty of Science,  
Department of Physics, Egypt

Talk, 13th Int. Conf. on Nuclear Track Detectors, Rome,  
September 23-27, 1985. Submitted to Nuclear Tracks

NEUTRON RADIOGRAPHIC CHARACTERISTICS OF MA-ND TYPE (ALLYL-  
-DIGLYCOL-CARBONATE) NUCLEAR TRACK DETECTORS

R. Ilic\*, J. Rant\*, M. Humar\*, G. Somogyi and I. Hunyadi

\*J. Stefan Institute, E. Kardelj University of Ljubljana,  
Yugoslavia

Talk, 13th Int. Conf. on Nuclear Track Detectors, Rome,  
September 23-27, 1985. Submitted to Nuclear Tracks

NUCLEAR TRACK DETECTOR KIT FOR USE IN TEACHING

L. Medveczky, M. Nagy\* and G. Somogyi

\*Reformed Grammar School, Debrecen, Hungary

Talk, 13th Int. Conf. on Nuclear Track Detectors, Rome,  
September 23-27, 1985. Submitted to Nuclear Tracks

EFFECT OF CERTAIN PRODUCTION PARAMETERS AND POST-PRODUCTION TREATMENTS ON THE ETCHING CHARACTERISTICS OF CR-39 SHEETS

G. Somogyi, M. Tóth-Szilágyi, I. Hunyadi and Abdel-Fattah Hafez\*

\*On leave from Alexandria University, Faculty of Science, Department of Physics, Egypt

Talk, 13th Int. Conf. on Nuclear Track Detectors, Rome, September 23-27, 1985. Submitted to Nuclear Tracks

IDENTIFICATION OF LIGHT NUCLEI WITH MA-ND TYPE TRACK DETECTOR

G. Somogyi

Talk, Scientific meeting of the Medicobiological aspects of the Intercosmos Committee Budapest, March 28, 1985. (In Hungarian)

AUTORADIOGRAPHY WITH PLASTIC TRACK DETECTORS (INVITED LECTURE)

G. Somogyi

Invited lecture, 14th Int. Symp. on Autoradiography Reinhardtsbrunn, NDK, (ed.: H.C. Treutler), ZfI-Mitteilungen, Nov. 19-23, 1985

The present state of art in the use of plastic nuclear track detectors in autoradiography is surveyed. The methods of track revelations available at present for this purpose (chemical and electrochemical etching, mixed techniques, track dyeing, multi-track technique) is considered. The main parameters of the typical detector materials used in autoradiographic works and the elements which can be successfully mapped by the present track methods are summarized. At the end, special emphasis is laid on the discussion of track registration characteristics of LR-115 films and CR-39 detectors used in alpha-radiography.

USE OF NUCLEAR TRACK DETECTORS IN RADIOBIOLOGY

G. Somogyi

Talk, 18th Workshop of the Intercosmos Programme on Cosmic Biology and Medicine, Gagra (SU), 27 May, 1 June 1985 (In Russian)

APPLICATION OF CRYOTECHNICS AND SUPERCONDUCTIVITY FOR INVESTIGATIONS IN NUCLEAR PHYSICS AND MATERIAL SCIENCE

D. Novák

Thesis for the Candidate of Physical Sciences Degree, ATOMKI Debrecen, 1985, Submitted to the Hungarian Academy of Sciences (In Hungarian)

QUADRUPOLE MASS SPECTROMETERS; MEASURING SYSTEMS AND METHODS

S. Bohátka

Thesis for the Candidate of Physical Sciences Degree, ATOMKI, Debrecen, 1985, Submitted to the Hungarian Academy of Sciences (In Hungarian)

AN EFFECTIVE METHOD FOR SPECTRA STORAGE

L. Zolnai and S. Szilágyi

Submitted to Nucl. Instr. and Meth.

The efficiency of some commonly used methods for spectrum storage are compared. A new encoding method is proposed, by which a considerable amount of storage can be gaved.

INVESTIGATION OF ELECTRONIC NOISES OF Si(Li) X-RAY DETECTORS

G. Kalinka

Talk, Workshop meeting on semiconductor nuclear radiation detectors, Dubna, 24-26 September, 1985. (In Russian)

NUCLEAR TRACK DETECTORS

G. Somogyi

Lecture Series, Interregional Training Course on Solid State Nuclear Track Detectors and their Applications, organised by IAEA, Kiel (NSZK) September 2-20, 1985



STUDY OF NEUTRON RADIOGRAPHIC CHARACTERISTICS OF MA-ND TYPE  
(ALLYL-DIGLYCOL-CARBONATE) NUCLEAR TRACK DETECTORS

R. Flic\*, J. Rant\*, M. Humar\*, G. Somogyi and I. Hunyadi

\*J. Stefan Institute, E. Kardely University of Ljubljana,  
P.O.Box. 100, Ljubljana, Yugoslavia

Invited lecture, 14th Int. Symp. on Autoradiography,  
Reinhardtsbrunn (NDK), (ed.: H.C. Treutler), nov. 19-23, 1984.  
ZfI-Mitteilungen, Leipzig, 103 (1985) 118 —

HEBDOMADAL SEMINARS IN ATOMKI

10 January  
Actual problems of ATOMKI  
D. Berényi

24 January  
Starting of X-ray emission analitic investigations  
in Lusaka  
(Zambia) under auspices of IAEA  
J. Bacsó

31 January  
The role of the lowest target-nucleus  $2^+$  and  $4^+$  states in the  
identification, structure and decay of  $g_{9/2}$  IAR fragments in  
the case of  $^{51}\text{Mn}$   
J. Sziklai  
Central Institute of Physical Research, Budapest

7 February  
Our possibilities and tasks in ultravacuum technique  
I. Berecz

14 February  
Activation analysis with charged particle beams  
S. Takács

21 February  
Experiences of a trip to Vietnam  
G. Somogyi

28 February  
Isotope production in Jülich and Debrecen  
Z. Kovács

7 March  
Gamow states  
B. Gyarmati

14 March  
Measurement of nuclear lifetimes with recoil distance method  
M. Józsa

21 March  
Present status of the ATOMKI cyclotron project  
A. Valek

28 March

Radiation protection problems of cyclotrons

I. Uray

11 April

CRYRING - a proposed acceleration / storage system for atomic and nuclear physics experiments at Stockholm

T. Lindblad

Research Institute of Physics, Stockholm

19 April

Potential electron emission from solid surfaces due to multiply charged ions

P. Varga

Technical University, Vienna

2 May

Visit to the Groningen University of Natural Sciences, to the IAEA (Vienna) and Jülich Nuclear Research Centre

E. Hertelendi

9 May

Channel coupling phenomena in alpha-transfer reactions

G. Pál

Central Institute of Physical Research, Budapest

23 May

Results of calculations on target  $Z_{\text{eff}}$  in ion-atom collisions

G. Hock

5 June

Application of cryogenic and superconducting techniques for nuclear and material sciences

D. Novák

6 June

Determination of radon and radon decay products in living rooms with solid state track detectors

B. Paripás

Borsod-Abauj-Zemplén county KÖJAL, Miskolc

13 June

Results, present trends and perspectives of the research in physics at UNAM

A. Mandragon

Instituto de Fisica, Universidad Nacional Autonoma de México, UNAM

20 June

Description of resonances of rotating and charged systems

Z. Papp

27 June

Quadrupole mass-spectrometers, measuring equipments and methods

S. Bohátka

27 August

Scientific activity at the Nuclear Structure Facility tandem  
Van de Graaff

P. Twin

NSF at Daresbury Laboratory, United Kingdom

9 September

Use of small electrostatic accelerators for material research

M.K. Mehta

IAEA, Nuclear Data Section, Vienna

12 September

Heavy-ion collision experiments

J. Pálinkás

19 September

Spectroscopy of electrons originating from light ion-atom collisions

Á. Kövér

23 September

New results and possibilities in nuclear medicine  
(cyclotron produced isotopes and labelled compounds)

A.P. Wolf

Brookhaven National Laboratory, USA

25 September

Electrospectroscopy for chemical analysis

K. Siegbahn

Uppsala University, Institute of Physics, Sweden

30 September

Physics and chemistry of the early Earth

G. Arrhenius

University of California, San Diego

3 October  
Study of the  $^{116}\text{Sn}$  nucleus at the University of Kentucky  
Z. Gácsi

10 October  
On "DIGITRACK"  
S. Szilágyi

14 October  
Production of cyclotron isotopes from molted targets  
I. Mahunka

11 October  
PIXE study of aerosol long range transport  
K.O. Groeneveld  
Frankfurt/Main University

17 October  
Radioactivity still remained in the fallout from H-bomb tests  
S. Shimizu  
Kyoto University, Japan

21 October  
Overview on the activity of the Nuclear Research Centre Jülich  
H. Jacobs  
KFA Jülich

24 October  
Alpha clustering in heavy nuclei  
H.J. Daley  
Daresbury Laboratory, United Kingdom

1 November  
The data collecting and processing system of the ATOMKI  
cyclotron  
A. Paál, K. Sepsy

4 November  
A quantum mechanical approximative method based on the  
separable expansion of potential and its application  
B. Gyarmati

14 November  
Medical Project of Hammersmith based on the cyclotron  
D.J. Silvester  
Chemistry Section, Hammersmith Hospital, London

21 November

Effective proton-neutron interaction in transitional nuclei  
Zs. Dombrádi

28 November

Study of ion-atom collisions with heavy-ion beams  
D. Varga

5 December

Proton capture at subbarrier energies  
T. Matulewicz  
Warsaw University, Poland

12 December

Research at the Bucharest tandem and booster  
V. Zoran  
Bucharest

19 December

Report on the IAEA solid state track detector school (Kiel)  
and the 13th International conference on solid state track  
detectors (Rome)  
G. Somogyi

AUTHOR INDEX



Abdel Hady, M. M.	18,25
Alikov, B.	83
Afanasjev, V. P.	17
Anttila, A.	16,44
Áskai, P.	65,66
Arrhenius, G.	91
Árva-Sós, E.	57,58,61,62,63,64
Árvay, Z.	20,37,83
Bacelar, J..	16
Bacsó, J.	44,45,46,47,49,89
Balázs, É.	71
Baldo, M.	10,22
Balogh, K.	53,56,57,58,60,61,62,63,64,65,66,67,68,69
Barci, V.	24
Bartha, L.	73
Barna, P. B.	68
Beck, R.	6,7,21,23
Bengtson, T.	24
Berecz, I.	78,79,89
Berényi, D.	31,32,33,34,36,37,38,49,76,89
Bibók, Gy.	74
Blessing, G.	16,17
Blinnikov, Yu. S.	17
Bohátka, S.	50,54,71,79,80,86,91
Borbély, F.	51
Borbély, T.	34
Borcos, M.	63
Bornemisza, P.	51,52
Borsi, Z.	62,68,70
Botos, K.	54
Burkhard, M.	33,34,36,38
Church, D. A.	28,29
Civitarese, O.	10
Csatlós, M.	51,52
Cseh, J.	8,15,18,21,23,38
Cserny, I.	33,34,50,53,54
Csongor, É.	67,69,70,60
Cziczó, T.	47
Dajkó, G.	76,77
Daley, H. J.	92
Dávid, L.	48,50
Decowski, P.	15
Dezső, B.	46
Dickmann, F.	6,7,21,23
Diós, Z.	77,79,79
Ditrói, F.	44,76,83
Doern, F. E.	47

Dombrádi, Zs.	14,19,93,
Domonyi, A.	81
Egri, K.	51
Elfström, S.	24
Fazekas, Z.	51
Fekete, Z.	15
Félszerfalvi, J.	75
Fényes, T.	12,18,19,21,23,74,75,83
Ferreira, L. S.	10,22
Flick, R.	87
Fodor, I.	8
Földvári, M.	67
Fominikh, V. I.	75,83
Forsyth, P. D.	16
Freyer, K.	49,53
Friedrich, M.	75
Frischkorn, H. J.	36
Fulton, C. A.	28
Füle, K.	75
Fülöp, E. R.	48
Gácsi, Z.	20,24,92
Gál, I.	79
Gál, J.	79
Ganbaatar, N.	11,17,28
Garrett, J. D.	16
Gelencsér, J.	52
Gizon, J.	24
Gődény, S.	41
Grecula, P.	59
Groeneveld, K.-O.	33,34,36,38,92
Gulyás, J.	75,83
Gulyás, L.	33,34,38
Günzel, R.	75
Gyarmati, B.	8,9,18,20,22,24,31,89,92
Gyarmati, P.	61,63,66,68
Hafez, A. F.	84,85
Hagemann, G. B.	16
Halász, G.	81
Halmi, J.	63,65
Hantala, M.	18
Hámor, G.	63
Hintsen, M.	82
Heil, O.	36
Helus, F.	24
Herbák, J.	34,37
Herskind, B.	16
Hertelendi, E.	69,70,90,
Herzog, M. W.	10,11,20

Hildingsson, L.	24
Hock, G.	31, 32, 33, 34, 35, 90
Hofmann, D.	33, 36, 38
Holm, A.	16
Howe, D.	16
Humar, M.	84, 86
Hunyadi, I.	49, 53, 84, 85, 86
Ilic, R.	84
Jakobs, H.	92
Jámbor, Á.	61, 62, 64, 67
Jerrestam, D.	24
Józsa, M.	20, 40, 89
Kádár, I.	31, 32, 33, 34, 44, 76
Kalinka, G.	86
Kalinnikov, V. G.	11, 17
Katz, S. A.	46
Keinonen, J.	20
Kemmler, J.	36
Kenefick, R. A.	28, 29
Kertész, M.	47
Kibédi, T.	12, 14, 19, 83
Kicinska-Habior, M.	15
Kiss, Á. Z.	16, 18, 20, 25, 40, 44, 73, 75
Kiss, I.	40, 41, 42, 54, 68
Kiss, K.	31
Kis-Varga, M.	41, 45, 47
Klamra, W.	24
Koltay, E.	16, 18, 20, 25, 34, 40, 41, 42, 44, 47, 54, 73, 74, 75
Kononenko, G. A.	75
Kormicki, J.	17
Koschar, P.	36
Kossakowski, R.	24
Kovács, Á.	58, 59, 65, 66, 77
Kovács, P.	41, 47
Kovács, R. M.	79
Kovács, Z.	16, 17, 52, 89
Kövér, Á.	33, 34, 36, 38, 53, 75, 91
Kövér, L.	38, 47, 48, 50, 53, 54, 68, 70, 75
Kozák, M.	62
Krasznahorkay, A.	14, 19
Kruppa, A. T.	8, 9, 18, 21, 22, 23, 31
Kuznetsov, V. V.	75, 83
Langer, G.	52, 54, 79, 96
Latz, R.	36
Lazányi, I.	51
László, S.	40, 41
Leander, G. A.	24

Lénárt, L. 71  
 Lindblad, Th. 24,90  
 Liotta, R. J. 10,11,20  
 Lloyd, D. 80  
 Lovas, R. G. 6,7,21,23  
 Lóki, J. 70  
 Luontama, M. 12  
 Lushchinski, R. 83  
 Lusztig, G. 46

McIntyre, N. S. 47  
 Mahunka, I. 24,74,76,83,92  
 Maier-Borst, W. 24  
 Makhmudov, I. T. 83  
 Mandragon, A. 90  
 Marten, D. 48  
 Maurer, R. J. 30  
 Máté, Z. 15  
 Máthé, G. 76,78  
 Mátulewicz, T. 15,93  
 Medve, F. 47,50,68,70  
 Medveczky, L. 84  
 Mehta, M. K. 91  
 Mezilev, K. A. 11,17,28  
 Mészáros, S. 54,77,80,81  
 Mikecz, P. 52  
 Molnár, J. 78,79  
 Mosolygó, J. 79  
 Mózsik, L. 52  
 Muminov, T. H. 83

Nagarajan, N. M. 7  
 Nagy, A. 79  
 Nagy, M. 84  
 Nikl, I. 71  
 Novák, D. 54,75,77,81,86,80  
 Novikov, Yu. N. 11,17  
 Nurmukhamedov, A. M. 11,17  
 Nusszer, A. 61,62,64  
 Nyakó, B. 16,18,20,25,40,44  
 Nyulászi, L. 38

Osipenko, V. P. 11,17

Paál, A. (András) 74,92  
 Paál, A. (Antal) 46  
 Paál, Z. 48,53  
 Paar, V. 12  
 Pálinkás, J. 28,29,30,31,81  
 Pál, K. F. 7,8  
 Pálla, G. 80

Pakontai, M.	54
Pankotai, M.	42
Pantelejev, V. N.	17
Pap, S.	61
Papp, I.	73
Papp, T.	30, 31, 35
Papp, Z.	8, 9, 22, 23, 91
Paripás, B.	49, 71, 90
Partényi, Z.	61, 62, 64
Passoja, A.	12
Pásztor, K.	51
Pedrazzini, G. J.	28, 29
Peltz, S.	61
Pécskay, Z.	56, 57, 61, 62, 63, 64, 66, 68
Poljakov, A. G.	17
Potempa, A.	11, 17
Pozsgai, I.	68
Probst, H. J.	82
Qaim, S. M.	16, 17
Raisanen, J.	16
Rant, J.	84, 87
Ratkos, M.	51
Ravasz-Baranyai, L.	57, 58, 62, 64
Ravasz, Cs.	58, 62, 64
Räisänen, J.	44
Redler, L.	75
Repcok, I.	63, 64
Ricz, S.	31, 32, 33, 34
Riley, M. A.	16
Róder, M.	50, 54
Rose, E.	82
Sa. J.	24
Sági, F.	52
Sántha, Gy.	54
Sarkadi, L.	27, 30
Schader, J.	36
Schág, J. B.	50, 68, 70
Schlenk, B.	31, 51, 52
Shi, X.	20, 24
Schüssler, G.	36
Seif El-Nasr, S.	40
Sepsy, K.	74, 77, 79, 92
Seres, J.	37
Sharma, V. K.	7
Sharpey-Schafer, J.F.	16
Shchegolev, V. A.	31
Shimizu, S.	92
Shyam, R.	7
Sibanda, L. S.	10
Siegbahn, K.	91

Sikora, B.	15
Silvester, D. J.	92
Simpson, J.	16
Solti, G.	61,64
Somogyi, G.	48,52, 53,71,77,84,85,86,87,89,93
Somorjai, E.	15,16,20,40,
Somosi, I.	54
Stöcklin, G.	16,17
Streit, L.	10,22
Suhonen, J.	11
Sulik, B.	31,32,33,34,35
Svingor, É.	58,59,65,66,77
Szabó, Gy.	33,34,36,38,40,41,42,54,73
Szabó, I. (Ilona)	70
Szabó, I. (István)	77,79
Szalay, A.	70
Szederkényi, T.	58,65,66
Székely, G.	76,77,79
Széky-Fux, V.	56,61,62,63,64,66,68
Szigeti, I.	46
Sziklai, J.	89
Szilágyi, J.	54,80
Szilágyi, S.	86,92
Szmola, E.	34
Szőőr, Gy.	50,71,79

Takács, S. Sándor; (Debrecen)	40,83,89
Takács, S. Sándor; (Miskolc)	44,71
Tarr, G.	79
Tárkányi, F.	11,17,44,52,75
Timár, J.	12
Tjøm, P. O.	16
Tóth, J.	48,50,53,54,68
Tóth-Szilágyi, M.	84,85
Töke, J.	15
Treutler, H. Ch.	49,53
Trzaska, W.	12
Tsupko - Sitnikov, V.M.	75
Turek, K.	76
Twin, P. J.	91

Uray, I.	82,90
Utkin, V. A.	83
Uzonyi, I.	46,47

Vad, K.	77,80,81
Vajdae, E.	61,63
Valek, A.	74,89
Varga, D.	31,32,33,34,36,37,75,93
Varga, P.	90
Varga, Zs.	48,53

Varró, T.	52
Vass, A.	74
Vass, D.	63, 65, 69
Végh, J.	31, 32, 33, 34, 76
Végh, L.	18, 22, 25, 35, 58, 59, 70
Veress, Z.	15
Vertse, T.	10, 11, 20, 22, 24
Veszprémi, T.	38, 53
Wang, D. W.	28
Watson, R. L.	28, 29, 30
Weil, J. L.	20, 24
Wolber, G.	24
Wolf, A. P.	91

Zakazov, V. B.	75
Záborszky, L.	78
Zeleznačov, V.	17
Zhou, Z.	20, 24
Zolnai, L.	40, 41, 42, 43, 45, 54, 86
Zoran, V.	93
Zsombok, Gy.	38, 53
Yurkovski, J.	11, 17

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