

LOMONOSOV, I.I.; NEMILOV, Yu.A.; PISAREVSKIY, A.N.; TETERIN, Ye.D.

Photomultipliers designed for scintillation spectroscopy. Trudy
Radiov.inst.AN SSSR 9:164-180 '59. (MIRA 14:6)
(Photoelectric multipliers)

NEMILOV, Yu.A.; PISAREVSKIY, A.N.; TETERIN, Ye.D.

Scintillation γ -spectrometers. Trudy Radiofiz. Inst. AN SSSR 9:181-
191 '59. (MIRA 14:6)

(Spectrometer)

21(3)

AUTHORS:

Nemilov, Yu. A., Lomonosov, I. I.,
Soshin, L. D., Teterin, Ye. D.

SOV/48-23-2-19/20
Pisarevskiy, A. N.,

TITLE:

Some Problems on the Linearity of the Scintillation Spectrometer
(Nekotoryye voprosy lineynosti pri stsintillyatsionnoy
spektrometrii)

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959,
Vol 23, Nr 2, pp 257-262 (USSR)

ABSTRACT:

In a more accurate investigation of the scintillation reaction of NaJ(Tl) in the case of γ excitation the authors found deviations from the reaction linearity up to 20% within the range of $E_\gamma < 100-150$ kev (Ref 6). This problem was investigated according to a method already applied in previous papers. The measurements were carried out by means of crystals produced at the Institut kristallografii AN SSSR (Crystallographical Institute of the AS USSR) and in the Khar'kov Works. The crystals were bred according to methods devised by Kiropulos and Stokbarger. The measurement results of various crystals NaJ(Tl), CsJ(Tl), KJ(Tl) on deviation of the scintillation reaction from linearity within the range 10-1500 kev are

Card 1/3

SOV/48-23-2-19/20

Some Problems on the Linearity of the Scintillation Spectrometer

listed in a table. Perceptible deviations were found within the range 50-100 keV. It represented a minimum which attained different values in the individual crystals (Fig 1); the least value was found with KJ(Tl). Besides, the dependence of resolving power on the energy of the measured radiation and the effectiveness of conversion of the crystals were investigated. In the case of ideal crystals there is a linear dependence of the square half width of spectrometer lines Δ_c^2 on E_γ^{-1} . In the case of small E_γ values this dependence is expressed by $\Delta_c = \sqrt{\Delta_K^2 + \Delta_\phi^2} \gamma$, where Δ_K denotes crystal resolution and Δ_ϕ that of FEU. In the case of high energies the effectiveness of conversion κ is to be determined according to formula (6) (Ref 14). For a number of E_γ values the corresponding κ values are given in %. A duplication of lines of the total energy by NaJ(Tl) crystals was found, the presence of which possibly may be attributed to crystal water. There are 4 figures, 1 table, and 15 references, 4 of which are Soviet.

Card 2/3

SO7/48-23-2-19/20

Some Problems on the Linearity of the Scintillation Spectrometer

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR
(Radium Institute imeni V. G. Khlopin of the Academy of
Sciences, USSR)

Card 3/3

82876
S/120/60/000/02/007/052
EO32/E414

24.6810

AUTHORS: Nemilov, Yu.A. and Litvin, V.F.

TITLE: Multispectrograph - A New Magnetic Analyser for
Charged Products of Nuclear Reactions /9

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, Nr 2,
pp 32-34 (USSR)

ABSTRACT: A detailed analysis was carried out by the present authors of the focusing properties of the boundary of a uniform magnetic field when the source of particles is located in the field. This analysis led to the development of the multispectrograph which is illustrated in Fig 1. In this figure 1 is the target, 2 is the boundary of the pole pieces, 3 are slits, 4 are nuclear emulsions and 5 the trajectories of charged reaction products. Sections of linear boundaries of the uniform magnetic field which pass (by extension) through the target were thus chosen as the focusing elements. The reaction products leaving the target pass through slits 3 (Fig 1) located at the mid-points of the linear sections of the field boundary and are focused on the focal surface which is shown by the

Card 1/2

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E032/E414

Multispectrograph - A New Magnetic Analyser for Charged Products of Nuclear Reactions

arcs 4 in Fig 1. A high vacuum is maintained over the path of the charged particles. The instrument can be used to obtain simultaneously nine energy spectra of reaction products at nine values of the exit angle θ of the reaction products, measured from the direction of the bombarding beam and in the angular range between 0 and 90°. Each such spectrum includes particles differing in energy by a factor of 10. The solid angle subtended by each channel is 5×10^{-5} sterad. The resolving power achieved experimentally was 1.2%. The magnetic field was produced by permanent magnets which, in addition to the high stability of the field, ensured small dimensions and weight. The total weight of the multispectrograph was about 600 kg. There are 2 figures and 4 references, 3 of which are English and 1 Soviet.

ASSOCIATION: Radiyevyy institut AN SSSR (Radium Institute, AS USSR)

SUBMITTED: May 15, 1959

Card 2/2

81652
S/181/60/002/06/42/050
B006/B056

24.2600

AUTHORS: Nemilov, Yu. A., Privalova, V. Ye.

TITLE: The Influence of Alkali Metals on the Properties of Antimony Photocathodes 21

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 6, pp. 1308 - 1315

TEXT: The present paper deals with the investigations carried out in continuation of earlier papers (Refs. 1,2), in which antimony-lithium photocathodes have already been investigated. Fig. 1 shows spectral characteristics of the photocurrent of such cathodes with a sensitivity of more than 20 $\mu\text{A/lumen}$; Fig. 1 also shows the spectral photocurrent characteristics of antimony-potassium- and antimony-sodium-, and SbKNa-photocathodes. A selective maximum of the antimony-lithium photocathode was found within the range of 380 $\text{m}\mu$, and also the SbK-photocathode has a maximum within this range. Within the range of 300 $\text{m}\mu$ are the maxima of the SbKNa- and SbNa-photocathodes. For the quantitative antimony analysis in the photocathodes, a colorimetric method was used (the analysis was carried out by Ye. I. Plotkina and

Card 1/4

81652

The Influence of Alkali Metals on the Properties of Antimony Photocathodes S/131/60/002/06/42/050
B006/B056

Ye. L. Chumicheva). The results obtained and the sensitivity of the method (for individual elements) are given in Table 1. Table 2 shows the ratios of sodium and potassium, which characterize the four cathode types investigated. A comparison between Table 2 and Fig. 1 shows that photocathodes mainly containing sodium have a selective maximum in the 300 m μ -range, while those mainly containing potassium have one in the 380 m μ -range. Fig. 2 shows the characteristics of four SbK-photocathodes, in which the quantity of sodium varies with respect to the potassium content (curve 1 - lowest, curve 4 - highest sodium content). Fig. 3 shows typical characteristics for two groups of SbLi-photocathodes (No. 1 - more Na than K, No. 2 - more K than Na). The two characteristics differ essentially from each other. Table 3 contains data concerning the connection between the integral sensitivity of the lithium photocathodes and the potassium - sodium ratio. The sensitivity of the SbLi-photocathodes increases with decreasing Na - K ratio. These ratios of the cathodes investigated were about 1:0.80 and 1:1.15. The results obtained by other authors with 2:1 ratios are briefly discussed. The ratio antimony: alkali metal in the case of the cathodes investigated was between 1:3.5 and 1:4. No linear connection could be found to exist

Card 2/4

81652

The Influence of Alkali Metals on the Properties of Antimony Photocathodes

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between the integral sensitivity and the change in this ratio. Finally, problems of the connection between resistivity and sign of the current carriers and the antimony activation by alkali metals of SbLi- and SbK-photocathodes were discussed, and several results were compared with those obtained by other authors. An analysis of alkali metals and antimony activated to various stages showed that in the various stages the Sb-alkali-ratios do not differ. Several stages differ by the Na-K-ratio (cf. Table 4). Finally, the spectral characteristics of the photocurrent of photocathodes activated up to various stages were investigated. Fig. 4 shows $I_{\text{photo}} = f(\lambda)$ for lithium photocathodes with equal Na-K-ratio, the one activated up to the violet stage (2), the other up to the yellow stage (1). Within the region of the selective maximum the characteristics are similar. The photolayer of the yellow light is merely a considerably higher quantum yield. Summarizingly, it may therefore be said that the activation stages of antimony by alkali metals differ also by the color of light and by the quantum yield. The sensitivity within an activation stage depends considerably on the Na-K-ratio. For SbLi-cathodes a predominance of K over Na, and for SbKNa-cathodes a predominance of Na

Card 3/4

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The Influence of Alkali Metals on the Properties of Antimony Photocathodes S/181/60/002/06/42/050
B006/B056

over K is optimal. There are 4 figures, 4 tables, and 9 references:
6 Soviet and 1 American.

SUBMITTED: August 3, 1959

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Card 4/4

Nemilov, Yu. A.

82 535

S/187/60/002/007/010/042
B006/B070

24.7700

AUTHORS: Didenko, A. A., Nemilov, Yu. A., Fomina, V. I.

TITLE: Investigation of Induced Conductivity in Thin Films of Zinc Sulfide

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 7, pp. 1434-1440

TEXT. The authors investigated the induced conductivity in ZnS films by the electron contact method which is described in the Introduction. The films were obtained by sputtering in vacuum. The experimental arrangement is shown in Fig. 1, and also described. The results of experiments on 0.3 : 1 μ thick films are represented in diagrams, Fig. 2 shows the potential dependence of dark current for a film thickness of 0.35 μ . The curve may be represented by the function $I = aV^n$, where n increases from 1 (for $E < 10^5$ v/cm) to 8 ($E > 10^5$ v/cm). The absolute magnitude of the current for positive field directions is 10 to 15 times larger than that for negative directions, the corresponding resistivities being $\rho_+ = (3 \div 4) \cdot 10^{12}$ ohm.cm and $\rho_- = (4 \div 5) \cdot 10^{13}$ ohm.cm. Fig. 3 shows the

Card 1/3

Investigation of Induced Conductivity in
Thin Films of Zinc Sulfide

82535

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B006/B070

dependence of the induced current on the potential at the film for three samples with thicknesses of 0.35, 0.63, and 1 μ . The first sample showed exponential increase of ΔI_{ind} with potential (in the range of 20-60 v) and the other two linear increase. The dependence of the induced current on the electron energy is given by the function $g = f(V_p)$. Fig. 4 shows these curves for a sample 0.35 μ thick for different magnitudes and polarities of voltage, g denoting the amplification factor. All curves have a distinct maximum at about $V_p = 11$ kv. For other semiconductors, these curves show similar trends. The maximum value of the amplification factor is obtained at an exciting current density of $i_p = 6 \cdot 10^{-10} \text{ a/cm}^2$. $V_p = V_{pmax}$; and does not exceed 280-320. Fig. 5 shows $\Delta I_{ind} = f(I_p)$; and Fig. 6 shows the dependence of multiplicity on the potential at the film for samples 0.35, 0.5, and 1 μ thick. The curve for the first sample lies considerably above the other two, and shows a maximum at about 50 v. The results are discussed and summarized as follows. 1) The dark and induced currents do not depend linearly on the applied potential. The degree of nonlinearity for the induced current is essentially smaller.

Card 2/3

Investigation of Induced Conductivity in
Thin Films of Zinc Sulfide

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2) For an electron energy of a few hundred electron volts, the dark current shows a considerable asymmetry. For the dark current the rectification factor is 10-15. 3) The induced current also shows an asymmetry. The rectification factor for it is not greater than 2. 4) The amplification factor has a maximum value of 320. The authors thank A. A. Mostovskiy for advice and discussions. There are 6 figures and 9 references: 1 Soviet, 3 US, 2 British, and 1 Swiss.

SUBMITTED: June 15, 1959

Card 3/3

Nemilov, Yu. A.

82554

S/181/60/002/007/037/042
B006/B060

24.3500

AUTHORS: Lomonosov, I. I., Nemilov, Yu. A.

TITLE: The Effect of an Electric Field on the Scintillation Process
in CsI(Tl)

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 7, pp. 1629-1631 ✓

TEXT: The problem of the mechanism of the energy transfer to the luminescence centers is still in the discussion stage. For the phosphorescence of alkali halide crystal, two migration mechanisms are regarded as possible: the exciton- and the electron-hole mechanism. If the latter is correct the luminescence intensity must be susceptible to influence an outer electric field. In order to study this, the authors conducted investigations on a CsI(Tl) crystal (diameter 20 mm, thickness 150 μ) with a setup shown schematically in Fig. 1. The crystal was placed between a transparent electrode (SnO₂ film on glass) and a 5 μ thick aluminum foil, in the case of an excitation by a particle, and a semitransparent platinum layer on a quartz disk in the case of a photoexcitation. The sources of the exciting radiation were Y⁹¹(β), Pu²³⁹(α), and a spectrophotometer of the type

Card 1/2

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The Effect of an Electric Field on the Scintillation Process in CsI(Tl)

S/181/6C/002/007/037/042
B006/B060

CS₂-11 (SF-11); the crystal emission was recorded with a photomultiplier. ✓
The pulse height spectrum was taken with a 128-channel analyzer of the type
AMA-3C (AMA-3S). The investigations yielded the following results: 1) The
total radiation of the phosphor (fluorescence + phosphorescence), excited
by fast electrons, decreases with growing field strength, as can be seen
from Fig. 2. 2) A study of the pulse height spectrum showed that, within
the limits of statistic error, no influence of the field can be observed.
3) On the excitation of phosphor by ultraviolet light, the emission intensi-
ty does not depend on the field applied in the whole range of waves between
200 - 330 mμ. 4) On the excitation of phosphor by alpha particles neither
the total radiation nor the pulse amplitude depend on the field applied.
These results support the exciton mechanism. There are 2 figures and
6 references: 4 Soviet and 1 Swiss.

SUBMITTED: November 28, 1959

Card 2/2

85348

9.4130 (2301, 2801, 3001)
26.2421

S/120/60/000/005/018/051
E032/E514

AUTHORS: Nemilov, Yu.A., Belozerskiy, G.N. and Soshin, L.D.

TITLE: On the Stability of Photomultipliers

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No.5, pp.81-85

TEXT: A study is reported of the stability of photomultipliers with Cs-Sb and composite dynodes under various conditions. The overall sensitivity of the photomultipliers was measured both under constant and pulsed illumination of the photocathode. In the case of the pulsed illumination the measurements were carried out under conditions analogous to those employed with the scintillation spectrometer, or by measuring the average current at the output of the photomultiplier. Both methods are adequate provided the mean current is much greater than the dark current. When this is not true, average-current measurements can lead to false conclusions. The multi-channel kicksorter AMA-3c (AMA-3s) (Ref.4) was employed in the case of the pulsed measurements. Special steps were taken to keep the temperature at a constant and known value. Experiments showed that the role of the photocathode in introducing the observed changes in the overall sensitivity is quite negligible. It follows

Card 1/2

85348

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E032/E514

On the Stability of Photomultipliers

that the observed variations are associated with the dynode system.

No explanation is offered for these variations. Apparently they are associated with the removal of cesium from the Cs-Sb surfaces and a variation in the coefficient of secondary emission under the action of electron bombardment. All the photomultipliers are of Soviet manufacture and recommendations are given for the optimum conditions under which they should be used. There are 8 figures and 11 references: 6 Soviet and 5 English.

ASSOCIATION: Radiyevyy institut AN SSSR (Radium Institute, AS USSR)

SUBMITTED: July 15, 1959

Card 2/2

69277

S/051/60/008/04/022/032
E201/E691AUTHORS: Nemilov, Yu.A., Belozerskiy, G.N. and Pisarevskiy, A.N.24.3506
TITLE: On the α/β Ratio of a Liquid Scintillator¹⁹

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 4, pp 554-555 (USSR)

ABSTRACT: The α/β ratio is the ratio of the scintillation yields of α - and β -particles. The present paper deals with the effect of an additional solvent on the α/β ratio of 2,5-diphenyloxazole (PPO) in toluene. The additional solvent was naphthalene and the α - and β -sources were Pu²³⁹ and Cs¹³⁷ respectively. The scintillations were recorded and analysed by means of a photoelectric multiplier FEU-13 and an analyser AMA-35.¹⁹ Figs 1-3 show that on addition of a second solvent both the α - and β -particle light yields rise, the ratio α/β becomes greater and the region of the activator (PPO) concentration in which variations of α/β can be observed is extended to 5 g/litre. The authors investigated also the properties of scintillators consisting of PPO and POPOP (4-di-[2-(5-phenyloxazolyl)]-benzene) in toluene, PPO and POPOP in polystyrene gels, and the properties of stilbene crystals. In PPO + POPOP + toluene systems the ratio α/β was 10% smaller (at all concentrations of PPO) than in solutions without POPOP. The same was true of the scintillation yield of PPO + POPOP + toluene: the fall of

Card 1/2

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E202/E691

On the α/β Ratio of a Liquid Scintillator

the scintillation yield on addition of POPOP is either due to large losses on transfer of energy from PPO to POPOP or due to mutual exchange of energy between them. The results obtained in polystyrene gels were identical with those obtained in solutions, i.e. the scintillator viscosity does not affect the ratio α/β , at least up to 10^3 stokes. In the case of stilbene crystals the ratio α/β was equal to the "saturation" value (0.06) of PPO dissolved in toluene. There are 3 figures and 5 references, 3 of which are Soviet and 2 English.

SUBMITTED: July 13, 1959

Card 2/2

S/051/60/009/006/016/018

E201/E191

AUTHORS: Nemilov, Yu.A., Gridnev, K.A., and Pisarevskiy, A.

TITLE: The Intensity of the Slowly Decaying Component of Stilbene Luminescence Excited with α -Particles 19

PERIODICAL: Optika i spektroskopiya, 1960, Vol 9, No 6, p. 792

TEXT: The authors report a study of the slowly-decaying component of luminescence of stilbene excited with α -particles of ≈ 4 MeV energy or with electrons produced by irradiation with 660 keV γ -rays from CS137 (the maximum electron energy was 480 keV). It was found (a table on page 792) that the intensity of the slowly decaying component (relative to the total intensity) was greater in the case of electron excitation than the value reported by Brooks (Ref.4). With increase of dE/dX (this quantity is not defined in the article, cf. Ref.2) of the exciting particles the relative intensity of the slowly-decaying component increased. The results confirmed Brooks' ideas on the nature of the slowly-decaying component. The apparatus used is shown in a figure on p. 792, where

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Card 1/2

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E201/E191

The Intensity of the Slowly Decaying Component of Stilbene
Luminescence Excited with α -Particles

1 is a crystal, 2 is a photomultiplier, 3 is a device used
to separate out the slowly-decaying component, 4 is an
attenuator, 5 is a differential comparison circuit, 6 is a
recorder, γ_1 and γ_2 are amplifiers.
There are 1 figure, 1 table and 4 English references.

SUBMITTED: June 23, 1960

Card 2/2

ALEKSANDROV, Yu.A.; SEMILOV, Yu.A.; NIKITIN, M.K.; PISKORZH, Sh.

Investigating the decay scheme of Eu^{147} . *Izv. AN SSSR. Ser. fiz.*
24 no. 9:1099-1104 S '60. (MIRA 13:9)

1. Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo
gosudarstvennogo universiteta im. A.A. Zhdanova.
(Europium--Decay)

88421

S/056/60/039/006/005/063
B006/B056

24-6600

AUTHORS:

Alekseyev, N. V., Zherebtsova, K. I., Litvin, V. F.,
Nemilov, Yu. A.

TITLE:

Investigation of the Stripping Reactions on C^{12} , O^{16} and Si^{28}

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 39, No. 6 (12), pp. 1508 - 1510

TEXT: A report is given on (d,p) reactions on Si^{28} , O^{16} and C^{12} -nuclei; the 6.25 Mev deuteron beam (from a cyclotron) used was monochromatic with an accuracy of $\sim 1\%$. The energy spectrum of the reaction products was recorded by means of a novel magnetic analyzer, a so-called multispectrograph (described in Refs. 5, 6). Films ~ 1.5 mg/cm² thick were used, viz: Polyethylene film (carbon target), quartz film (O- and Si-target), and Si (in natural isotopic composition) per $\sim 0.1\mu$ silver. Fig. 1 shows the energy spectrum obtained, Fig. 2 the proton angular distribution of various Si^{29} -energy groups, and the Table gives the values of the angular momenta I_n obtained by comparison with the theory (transferred into the final

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Card 1/6

Investigation of the Stripping Reactions on
 C^{12} , O^{16} and Si^{28}

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nucleus by the neutron), spin and parity, as well as the reduced probabilities Λ_n for the "adhesion" of a neutron. From a comparison with the theory it follows, e. g., that the excited 5.946-Mev level of the Si^{29} -nucleus has negative parity and a spin of $3/2$ or $1/2$, etc. (cf. Table). There are 2 figures, 1 table, and 9 references: 5 Soviet, 1 British, 2 US, and 1 Canadian. ✓

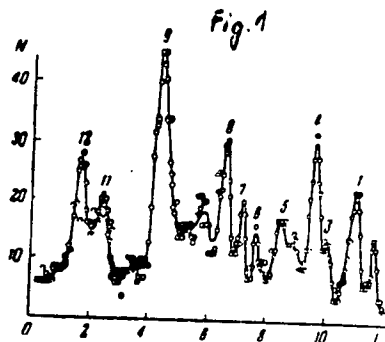
ASSOCIATION: Radiyevyy institut Akademii nauk SSSR (Radium Institute of the Academy of Sciences USSR)

SUBMITTED: June 15, 1960

Card 2/6

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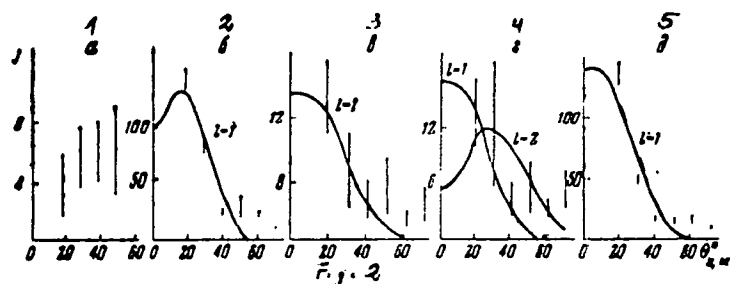
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Card 3/6

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7-17-66



Card 4/6

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B006/3056

№ группы на рис. 1	Энергия уров- ня, MeV	l n	Спин и чет- ность	Λ_n (отн. ед.)
Реакция $Si^{28}(d, p)Si^{29}$				
2	4,078	изотропная	$3/2^-, 1/2^-$	10
4	4,934	1	$3/2^-, 1/2^-$	0,93
6	5,946	1	$3/2^-, 1/2^-$	1,1 (для $l_n=1$)
7	6,105	1(2)	$3/2^-, 1/2^-$	7,2
8	6,380	1	$3/2^-, 1/2^-$	
Реакция $C^{12}(d, p)C^{13}$				
1	0	1	$1/2^-$	1
9	3,090	0	$1/2^+$	1,38
11	3,684	1	$3/2^-$	0,75
12	3,855	2	$3/2^+$	4,34
Реакция $O^{16}(d, p)O^{17}$				
3	0	2	$3/2^+$	3,20
5	0,875	0	$1/2^+$	1

Card 5/6

88421

S/056/60/039/006/005/063
B006/B056

Text to Fig. 1: Energy spectrum of protons recorded under $\theta = 69^\circ$; 4, 5, 7, and 8 proton group from the reaction $\text{Si}^{28}(\text{d}, \text{p})\text{Si}^{29}$; 1, 9, 11, and 12 from $\text{C}^{12}(\text{d}, \text{p})\text{C}^{13}$, 3 and 5 from $\text{O}^{16}(\text{d}, \text{p})\text{O}^{17}$; N - number of proton tracks in the field of vision of the microscope, L - coordinate on the photographic film. Text to the Table: 1) Number of the proton group, as in Fig. 1. 2) Level energy. 3) Spin and parity. 4) Isotropic.

Text to Fig. 2: Angular distributions of the Si proton groups (J - differential reaction cross section in relative units); the experimental values are given by perpendicular lines, whose length corresponds to the statistical error; the curves are calculated according to a formula by Bhatia with $R = 6.4 \cdot 10^{-13}$ cm: 1) Group 2, E = 4.078 Mev; 2) Group 4, E = 4.934 Mev; 3) Group 6, E = 5.946 Mev; 4) Group 7, E = 6.105 Mev; 5) Group 8, E = 6.380 Mev; E - excitation energy of the final nucleus.

Card 6/6

86264

S/053/60/071/101/00/101
R019/R016

24.7200 (1043, 1144, 1385)

AUTHORS: Belozerskiy, G. N. and Nerilov, Yu. F.

TITLE: Resonance Scattering of Gamma Rays in Crystals

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol. 72, No. 3
pp. 433 - 466

TEXT: In the introduction, the authors discuss the part played by the study of the resonance scattering of γ -rays for the investigation of nuclear properties. The study of the scattering of low energy γ -quanta by nuclei built into crystal lattices was only begun in 1958. The theory of the capture of slow neutrons by lattice atoms which was developed by Lamb, is given, and the resonance scattering of γ -quanta in crystals is studied by applying this theory. The resonance absorption cross section of low-energy γ -rays is described. An experimental arrangement used to observe the resonance absorption of γ -rays through a crystal (with recoil) is described. In this arrangement the temperature change of the source and a mechanical motion of the source relative to the absorber are used. Experimental results obtained from Ir^{191} showed that above 100 K

Card 1/4

86264

Resonance Scattering of Gamma Rays in Crystals

S/C53/60/072/005/00/100
BO 9/3055

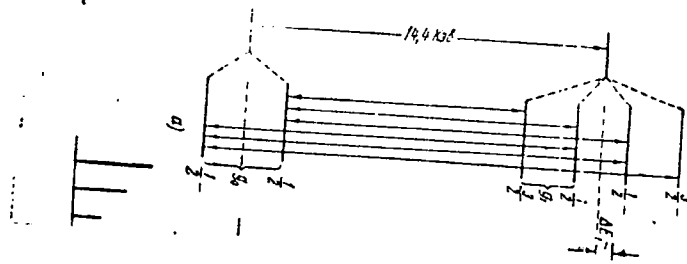
this absorber may be looked upon as "thin" for 129 keV resonance radiation, whereas below 30°K it is considered to be "thick". This result agrees well with theoretical calculations. Furthermore, a level width $(3.94 \pm 0.58) \cdot 10^{-6}$ eV and a lifetime of $1.65 \cdot 10^{-10}$ sec were found for the 129-keV level of Ir^{191} . Hyperfine splitting and the polarization of lines in the resonance scattering of γ rays without recoil are described in detail. Fig. 13 shows a splitting diagram of the ground state and of the first excited state of Fe^{57} (Fig. 13 a) contained in ordinary iron and of Fe^{57} (Fig. 13 b) contained in Fe_2O_3 . Fig. 13 c shows the ratio between the intensities of the components of the 14.4 keV lines for artificially orientated emitting nuclei. The further chapters deal with the use of the resonance absorption of γ rays for the study of solids. In this case the authors base upon Mossbauer. Further, the verification of Einstein's principle of mass energy addition with the Mössbauer effect absorption is discussed. In the experimental system used for this study source and absorber rotated round axes at different rates. The last

Card 2/4

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Resonance Scattering of Gamma Rays in Crystals S/O53/02/000000000000
B.10/8096

two chapters deal with the prospects and the range of application of resonance absorbers of γ -rays. Among other things, an experimental scheme for studying the Rayleigh scattering of γ -rays using the Mössbauer effect is discussed. V. R. Regel', A. A. Krusovskaya, V. N. Kolomyantz, and V. G. Alekseyeva are mentioned. There are 12 figures, 4 tables, and 95 references: 17 Soviet, 61 US, 5 German, 1 Swiss, 1 Canadian, 1 British, 1 Swedish, 1 Italian, and 3 French.



Card 3/4

BELOZERSKIY, G.N.; NEMILOV, Yu.A.

Resonance scattering of γ -rays in crystals. *Usp. fiz. nauk*
77 no.3:433-466 N '60. (MIRA 16:8)

(Gamma rays—Scattering)

S/056/61/041/006/012/054
B113/E104

AUTHORS: Zherebtsova, K. I., Litvin, V. F., Liu Chao-yuen, Nemilov, Yu. A.

TITLE: Levels of the Si³⁰ nucleus from the reaction Si²⁹(d,p) Si³⁰

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v 41, no. 6(12), 1961, 1761-1762

TEXT: New data on the levels of the Si³⁰ nucleus were obtained when measuring the energy and angular distributions of protons in the reaction Si²⁹(d,p) Si³⁰ with a multispectrograph. The bombarding deuterons had an energy of 6.58 Mev. The 0.5 mg·cm⁻² thick target consisted of 34.9% Si²⁸, 63.7% Si²⁹, and 1.4% Si³⁰. A number of levels of the Si³⁰ nucleus found by Browne and Radzynski (Ref. 5: Nucl Phys. 19, 164, 1960) were confirmed. Because of the complexity of the energy spectrum, it was only possible to obtain angular distributions for two Si³⁰ levels (excitation energies 8.149 and 8.571 Mev). The following results are obtained by comparing the experimental and theoretical data (Ref. 5).



Card 1/3

Levels of the Si³⁰ nucleus

S/056/61/041/006/012/054
E113/E104

Final nucleus	Excitation energy, Mev	l_n	possible values of the nuclear spin J, π	configuration according to shell model
Si ²⁹	4.93	1	$3/2^-$	
Si ³⁰	8.149	1	$0^-, 1^-, 2^-$	$2P_{3/2}$ $(2S_{1/2})^1 (2P_{3/2})^1$
Si ³⁰	8.571	1 or 0		or $(2S_{1/2})^1 (2P_{1/2})^1$



On account of the considerable admixture of Si²⁸ nuclei in the target, it was possible to compare the "adhesion" probability of the neutron in the p-state of the Si²⁹ and Si³⁰ nuclei since the corresponding proton groups were obtained in the same experiment. There are 2 figures, 1 table, and 5 references: 3 Soviet and 2 non-Soviet. The two references to English-language publications read as follows. C P Browns, J T Radzynski Nucl. Phys., 19, 164, 1960; A B. Bhatia, Kun Huang, R. Huby, H C News Card 2/3

Levels of the Si³⁰ nucleus

S/056/61/041/006/012/054
B113/E104

Phil. Mag., 43, 485, 1952.

ASSOCIATION: Radiyevyy institut Akademii nauk SSSR (Radium Institute of
the Academy of Sciences USSR)

SUBMITTED: June 30, 1961

✓

Card 3/3

S/089/62/013/001/004/012
B102/E104

AUTHORS: Blinov, V. A., Konstantinov, I. O., Litvin, V. F.,
Nemilov, Yu. A.

TITLE: A polygonal magnetic multispectrograph-analyzer

PERIODICAL: Atomnaya energiya, v. 11, no. 1, 1962, 59-60

TEXT: Details are given of a particle distribution analyzer similar to those already described by S. Hinds and S. Middleton (Proc. Intern. Conf. Nucl. Structure, Kingston, Canada, 1960). It is designed as a multi-spectrograph with a Van-de-Graaff accelerator; the gap field, produced by permanent magnets can be varied within a range of 1.5×10^3 oe. The gap width is 1 cm. Nine sections with diaphragms correspond to nine angle intervals between 5° and 95° , each diaphragm serving to separate a solid angle of $\approx 3 \cdot 10^{-4}$ steradian into its "own" spectrograph. The charged particles coming from the target, which is placed in the uniform part of the magnetic field, pass through the corresponding diaphragm and are focused onto the nuclear emulsion plates arranged along the focal curve. By contrast with the analyzers described by Hinds and Middleton it is possible with this

Card 1/2

A polygonal magnetic...

S/089/62/013/001/004/012
B102/B104

analyzer to raise the upper limit of particle energy by several times on account of the aperture ratio, without having to change the magnetic field strength in the gap. As an example, the energy spectrum of 2.55-Mev protons elastically scattered through 90° by a gold target (ninth section of the analyzer) is given. The energy resolution was 300. There are 2 figures. ✓

SUBMITTED: January 26, 1962

Card 2/2

42556

24770
24.6/30

S/089/62/013/005/008/012
B102/B104

AUTHORS:

Blinov, V. A., Karamyan, S. A., Matveyev, O. A., Nemilov, Yu.A.,
Selitskiy, Yu. A.

TITLE:

On some peculiarities of measuring the energy spectra of
 α -particles and fission products with semiconductor detectors

PERIODICAL:

Atomnaya energiya, v. 13, no. 5, 1962, 476-478

TEXT: Semiconductor detectors of charged particles have various known advantages. Chatham-Strode et al., however, have found that these detectors cause a low-energy tail in the pulse-height spectrum of monochromatic α -particles (IRE Trans. Nucl. Sci., 8, 59, 1961). In the tail region the integral count amounts to about 1% only. This effect being attributed to the presence of certain traps in the pn junction which reduce the pulse heights, the reduction was now studied for α -particles and fission fragments. All measurements were made with semiconductor surface-barrier detectors designed in the Leningradskiy fiziko-tekhnicheskij Institut im. A. F. Ioffe AN SSSR (Leningrad Physicotechnical Institute imeni A. F. Ioffe AS USSR) of 5.5 mm size and having a resistivity of 150 ohm-cm. The voltage
Card 1/2

On some peculiarities of measuring ...

S/089/62/013/005/008/012
3102/B104

applied to the detector was 20v. In various experiments with Am²⁴¹, U²³⁵ and U²³⁵ the causes of the low-energy tails in the energy spectra of α -particles and fission fragments were investigated. It was found that the recording zone of the pn junction does not contain any regions that reduce the pulse heights. Only boundary effects could explain this reduction quantitatively. In special experiments the kinetic energy of fragments from thermal fission of U²³⁵ was determined as a function of the fragment mass ratio. The drop in total kinetic energy of the fragments observed with symmetric fission was in agreement with other papers (e. g. J. Milton, J. Fraser, Phys. Rev. 7, No. 2, 27, 1961). The data obtained from the semiconductor counters were corrected for the low-energy tail. An integral neutron flux of $\sim 5 \cdot 10^{11} \text{ cm}^{-2}$ was found to raise the detector resistivity from 150 ohm·cm to 1000 ohm·cm. There are 3 figures. ✓

SUBMITTED: April 5, 1962

Card 2/2

24.6600

S/056/62/043/001/002/C56
B154/B108

AUTHORS: Zherebtsova, K. I., Litvin, V. F., Nemilov, Yu. A.

TITLE: Investigation of stripping and elastic scattering of
deuterons from the C^{12} nucleus

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
no. 1(7), 1962, 8-10

NOTE: The article bases on previous publications (S. Butler. Yadernyye reaktsii sryva, IIL, 1960. W. Tobocman. Phys. Rev., 115, 98, 1959. D. Robson. Nucl. Phys., 22, 1, 1961). Simultaneous measurements were made of the angular distributions of deuterons elastically scattered from C^{12} and protons produced by the reaction $C^{12}(d,p)C^{13}$ (C^{13} in the ground state and first excited state with an energy of 3.09 Mev). The deuteron beam (8.60 Mev) was extracted from a cyclotron (V. F. Litvin. Tr. RIAN, 5, 141, 1959. Yu. A. Nemilov, V. F. Litvin. PTE, 2, 32, 1960) and shot upon a ~ 2 mg/cm² thick pure carbon target. The angular distributions were measured in a multi-channel magnetic analyzer. Theory and experiment

Card 1/2

Investigation of stripping and ...

S/056/62/043/001/002/056
B154/B108

are in better agreement if strong spin-orbit interaction is taken into account. There are 2 figures.

SUBMITTED: January 24, 1962

Card 2/2

39476

S/056/62/043/002/004/003
B102/B104

24 610

AUTHORS: Nemilov, Yu. A., Pobedonostsev, L. A.

TITLE: Polarization of 3-Mev protons during their elastic scattering from C^{12} nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 13, no. 2(8), 1962, 382-384

TEXT: To clarify the divergence of experimental data in pC^{12} scattering at $E_p > 2.5$ Mev, the authors studied the angular dependence of the proton polarization at $E_p = 3$ Mev in the range of $40-80^\circ$, and conducted a phase shift analysis. The protons came from the cyclotron of the Radiyevyy institut AN SSSR (Radium Institute AS USSR), and had an energy of 3300 ± 50 kev. Fig. 1 shows the experimental arrangement for double-scattering measurements; the two scatterers were spectroscopically pure C^{12} films (2 mg/cm^2) without a backing. The protons were recorded by $50-\mu$ Я-1 (Ya-1) nuclear emulsion plates. The polarization of protons

Card 1/0 2

Polarization of 3-Mev protons ...

S/056/62/043/002/004/053
B1C2/B1C4

after the first scattering (55°) was calculated by the relation
 $P(55^\circ) = \sqrt{\epsilon(55^\circ)}$ from the left-right asymmetry $\epsilon = (N_L - N_R)/(N_L + N_R)$, and
 for the other angles by $P(\theta) = \epsilon(\theta)/P(55^\circ)$. $P(\theta)$ for the phases
 corresponding to the experimental results is shown in Fig. 2. Comparison
 with data given by Reich et al. (Phys. Rev. 104, 143, 1956) shows that
 these phases are well suited for describing the angular distribution of
 elastically scattered 3-Mev protons. As the polarization is very
 sensitive to phase shifts (cf. Fig. 2), it is a good criterion for phase
 shift analyses. There are 3 figures.

SUBMITTED: January 24, 1962

Legend to Fig. 1: (1) Collimator for the primary beam; (2) target for the
 1st scattering; (3) beam catcher; (4) collimator for the scattered beam;
 (5) cylinder; (6) second-scattering target; (7) control photoplate,
 (8) operating photoplate; (9) additional photoplate.

Card 2/0 2

BELOZERSKIY, G.N.; NEMILOV, Yu.A.

Change in the intensity of the Mössbauer effect due to plastic deformation. Fiz. tver. tela 5 no.11:3350-3352 N '63.

(MIRA 16:12)

GUSEVA, M.I., ZHERENTSOVA, K.I., LITVIN, I.P., NEMILOV, Yu.A.

^{31}Si nucleus excitation levels. *Phys. Lett.* 18 no.10:130 '63.
(Silicon isotopes) (Protons) (MIRA 16:8)

ZHEREBTSOVA, K.I.; LITVIN, V.F.; NEMILOV, Yu.A.; CHZHAN TSZYAN' [
[Chang Chien]

Measurements of the absolute differential cross sections of
proton groups from the reaction $Al^{27}(d, p)Al^{28}$. Vest. LGU
18 no.22:63-67 '63. (MIRA 17:1)

BOCHIN, V.P.; ZHEREBTSOVA, K.I.; ZOLOTAREV, V.S.; KOMAROV, V.A.;
KRASNOV, L.V.; LITVIN, V.F.; NEMILOV, Yu.A.; PISKORZH, Sh.

Study of (d, p) stripping reactions and (d, d) elastic
scattering on nuclei of mean atomic weight. Part 1. Vest.
IGU 18 no.22:68-77 '63. (MIRA 17:1)

BOCHIN, V.P.; ZHEREBTSOVA, K.I.; ZOLOTAREV, V.S.; KOMAROV, V.A.;
KRASNOV, L.V.; LITVIN, V.F.; NEMILOV, Yu.A.;
NOVATSKIY, B.G.

Study of (d, p) stripping reactions and (d, d) elastic
scattering on nuclei of mean atomic weight. Part 2. Vest.
LGU 18 no.22:78-84 '63. (MIRA 17:1)

24,6600

S/056/63/044/001/018/067
B108/B180

AUTHORS: Gustova, L. V., Nemilov, Yu. A., Pobedonostsev, L. A.

TITLE: Polarisation of 6.5-Mev deuterons on their elastic scattering from Ti, Fe, and Ni

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 1, 1963, 100 - 102

TEXT: Double scattering experiments were made with 6.5-Mev deuterons. The primary scattering was through an angle of 55° . The secondary target was adjusted after the primary scattering by means of a photographic film; its angle could be varied from 27° - 75° . Both targets were made of the same material (2 mg/cm^2 of Ti, Fe, or Ni). The angular asymmetry of scattering was expressed by the quantities $\epsilon_1 = \frac{I(0^\circ) - I(180^\circ)}{I(90^\circ) + I(270^\circ)}$ and $\epsilon_2 = \frac{I(0^\circ) + I(180^\circ)}{I(90^\circ) + I(270^\circ)} - 1$. The asymmetry of scattering was practically the same for all three elements, from which it is concluded that it is only the average properties of all the nucleons in the nucleus which are important in the polarization phenomena involving 6.5-Mev deuterons.

Card 1/2

Polarisation of 6.5-Mev deuterons ...

There are 3 figures.

SUBMITTED: August 1, 1962

S/056/63/044/001/018/067
B108/B180

f

Card 2/2

24.6500

45365

S/056/63/044/001/025/067
B104/B144

AUTHORS: Babenko, N. P., Bibichev, B. A., Konstantinov, I. O.,
Nemilov, Yu. A.

TITLE: Neutron polarization in the $C^{12}(d,n)N^{13}$ reaction

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44,
no. 1, 1963, 135-136

TEXT: The polarization of neutrons from the reaction $C^{12}(d,n)N^{13}$ corresponding to the formation of an N^{13} nucleus in the ground state was measured for a deuteron energy of 6.5 Mev. The neutrons were selected by a conical paraffin collimator at an angle of 40° with the deuteron beam direction. A helium high-pressure scintillation counter was used as analyzer. The chamber of this counter was 4 cm in diameter and 7 cm high, the pressure (He + 7% Xe) was 70 atm. The neutrons scattered by helium under an angle of 123° were recorded by stilbene crystals. The thickness of the Aquadag target corresponded to a loss in deuteron energy of 600 kev, the current to the target was 5 μ a. Using a

Card 1/2

Neutron polarization in the ...

S/O56/63/044/001/025/067
B104/8144

polarization value of $P_{He4} = 0.94$ for 5.7 Mev neutrons scattered on helium through 123° (B.L.Walter et al., Nucl.Phys., 30, 292, 1962), a value of $P(40^\circ) = (-25.0 \pm 3.0)\%$ was obtained for neutron polarization from the $C^{12}(d,n)N^{13}$ reaction ($E_d = (6.2 \pm 0.3)$ Mev). This value agrees with that obtained in the polarization theory for stripping reactions for this energy range. There are 2 figures.

✓

SUBMITTED: August 10, 1962

Card 2/2

S/056/63/044/002/005/065
B102/B186

AUTHORS: Guseva, M. I., Zherebtsova, K. I., Litvin, V. P., Nemilov, Yu. A., Orlova, T. V.

TITLE: The nature of the 3.79-Mev excited level of the Si^{30} nucleus

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 421-423

TEXT: The energy spectra and angular distributions of the protons from $\text{Si}^{29}(\text{d},\text{p})\text{Si}^{30}$ reactions were investigated with a multi-angle magnetic analyzer. The target, a film consisting of silver plus silicon with $200 \mu\text{g}/\text{cm}^2$ Si and 70% Si^{29} , was bombarded by 6.59-Mev deuterons. The protons emitted in the nuclear reaction were analyzed with respect to energy in the range 5-15 Mev, and with respect to emission direction in the interval $10-90^\circ$. Besides the energy peaks corresponding to the Si^{30} ground state, and the states with 2.24 and (8.09 + 8.149) Mev, the 3.79-Mev level of the Si^{30} nucleus was investigated and its proton angular

Card 1/2

S/056/63/044/002/005/065
B162/B166

The nature of the 3.79-Mev ...

distribution was obtained for the first time. Its characteristics were:
 $I_{\alpha} = 0, J = 0^+, [2^2_2^-] = 1.7 \pm 0.6$, the reduced width (cf. Rev. Mod. Phys. 32, 557, 1960). This level could be considered as a two-quasi-particle level. The respective characteristics of the ground and the (6.09 + 6.14) Mev states are: 0, 0^+ , 1, and 1, ($0^-, 1^-, 2^-$), 5.0 ± 1.5 . There are 2 figures and 1 table.

SUBMITTED: July 27, 1962

Card 2/2

I 10192-63

SP-2/1-4/1-1-AR/AD/SD/JG
Accession No: AP 300032

HR/ST(c)/ITP(n)-2/ST(n)/DSC-ITTC/ASD/AFUL/

S/1056/63/044/005/1445/1449

AUTHOR: Marov, G. I.; Samilov, Yu. A.; Selitskiy, Yu. A.; Eyzant, V. P.

TITLE: Fission of uranium and thorium induced by sub-barrier deuterons

SOURCE: Zhurnal eksper. i teoret. fiziki, v. 44, no. 5, 1963, 1445-1449

TOPIC TAGS: Uranium and thorium fission, sub-barrier neutrons, stripping, fragment distribution

ABSTRACT: The absolute fission cross sections of U-233, U-235, U-238, and Th-232 induced by 5.8--6.6 MeV deuterons were measured with a semiconductor detector, and the mechanism of the sub-barrier interaction resulting in the fission of the given nuclei was ascertained. n-type silicon having a resistivity on the order of 150 ohm-cm was used as the detector material. Angular anisotropy of the fragment distribution was disregarded. Simultaneously with registration of the fission events, pulses were fed to a 128-channel pulse-height analyzer for the determination of the fragment energy spectra. The fissions induced by the background neutrons did not exceed 20%. For 6.6 MeV deuterons, the cross

Card 1/2

L 10199-63

ACCESSION NR: AP3000032

sections were found to be 0.15, 0.16, 0.75, and 1.2 millibarns for Th-232, U-238, U-235, and U-233, respectively, with 10% accuracy. The investigation of the fragment kinetic-energy distributions and the analysis of the fission cross sections indicate that Th-232 and U-238 undergo fission mainly following deuteron capture, but that at least 70% of the U-235 and U-233 fission events are preceded by stripping. The authors are indebted to S. A. Karasyan for assistance." Original article has: 2 figures, 4 formulas, and 1 table.

ASSOCIATION: none

SUBMITTED: 12Nov63

DATE ACQ: 12Jun63

ENCL: 00

SUB CODE: PH

NR REF SOV: 001

OTHER: 007

10/10
Card 2/2

L. 1600-42 RPT(a)-2/RPT(a)/RPT(a)/RPT(a) APTIC/ASD/SSD Fe-4 RDM/JD
 ACCESSION NR: AP3005253 S/0056/63/045/002/0103/0106

AUTHOR: Mamilov, Yu. A.; Pobedonostev, L. A.

74
62

TITLE: Polarization of 6.5-MeV deuterons in elastic scattering

SOURCE: Zhur. eksper. i teoret. fiz., v. 45, no.2, 1963, 103-106

TOPIC TAGS: double elastic scattering, deuteron, polarization, quadrupolization, Be, B, C, Mg, Al, Fe, Se, Sb, Fe-54, Au, Co, Mn

ABSTRACT: In order to check on a relation for the intensity I of a doubly elastically scattered beam of deuterons as a function of the azimuthal angle φ in the form

$$I = I_0(A + B \cos \varphi + C \cos^2 \varphi),$$

the azimuthal asymmetry of doubly elastically scattered 6.5-MeV deuterons was measured for first and second target combinations Fe-Fe, Fe-Co, Fe-Mn, Fe-Ni and Fe-⁵⁴Fe at first and second scattering angles of 55° each. The resultant values for A , B , and C were 1, 0.11, and 0.05, respectively. In addition, the angular dependence of the ratios $B/A = \varepsilon_1$ and $C/A = \varepsilon_2$ were also measured for the nu-

Card 1/2

ACCESSION NR: AR4040817

S/0058/64/000/005/A041/A041

SOURCE: Ref. zh. Fizika, Abs. 5A330

AUTHOR: Nemilov, Yu. A.; Gridnev, K. A.; Pisarevskiy, A. N.

TITLE: Dependence of form of scintillation pulse on the type of exciting particles

CITED SOURCE: Sb. Stsintillyatory* i stsintillyats. materialy*. Khar'kov, Khar'kovsk. un-t, 1963, 123-125

TOPIC TAGS: scintillation pulse/UO-IM oscillograph, Impul's multiplier

TRANSLATION: There was investigated the dependence of the form and duration of scintillation pulses appearing in crystals of CsI(Tl) and stilbene on the type of exciting particles. Research was done with the help of a UO-IM oscillograph and an "Impul's" multiplier. Excitation of scintillations was carried out by alpha-particles of Pu²³⁹ and by electrons (during irradiation of

Card 1/2

ACCESSION NR: AR4040817

of Cs¹³⁷ and Co⁶⁰ with gamma-rays). Results of measurements of basic parameters of scintillation pulses are given in the form of tables. Obtained data are compared with results of other works.

SUB CODE: NP

ENCL: 00

Card 2/2

ACCESSION NR: AP4033141

S/0120/64/000/002/0164/0166

AUTHOR: Babenko, N. P.; Konstantinov, I. O.; Nemilov, Yu. A.

TITLE: High-pressure gas scintillation counter

SOURCE: Pribery* i tekhnika eksperimenta, no. 2, 1964, 164-166

TOPIC TAGS: counter, scintillation counter, gas scintillation counter, high pressure gas scintillation counter, fast neutron polarization, neutron polarimeter.

ABSTRACT: A new-design high-pressure gas scintillation counter intended to measure fast-neutron polarization is described. Design sketches of the counter and of the exhaust and filling valves are presented. A stainless-steel chamber with an internal volume of 70 cm³ is filled at 100 atm with a mixture of 5-7% Xe and 93-95% He⁴. All gaskets are made of teflon. An alpha-source (Po) introduced into the counter serves to measure its time and amplitude characteristics; the halfwidth of the Po line is under 6%. The resolution time of the counter

Card 1/2

ACCESSION NR: AP4033141

is not longer than that of stilbene. The counter has been used both as an analyzer and as a monitor in a neutron polarimeter. Orig. art. has 4 figures.

ASSOCIATION: none

SUBMITTED: 15May63

ATD PRESS: 3066

ENCL: 00

SUB CODE: OP, NP

NO REF SOV: 001

OTHER: 004

Card 2/2

BABENKO, N.P.; KONSTANTINOV, I.O.; NEMILOV, Yu.A.

Angular distribution of the polarization of neutrons from the
 $C^{12}(d, n)N^{13}$ reaction. Zhur. eksp. i teor. fiz. 45 no.5:1389-
1392 N '63. (MIRA 17:1)

1. Radiyevyy institut AN SSSR.

BOCHKIN, V. P.; ZHEREBTSOVA, K. I.; KRASNOV, L. V.; KOMAROV, V. A.; LITVIN, V. F.;
NEMILOV, YU. A.

"Investigations of the Reactions of Type (d,p) on Isotopes of Zn, Ni,
and Fe⁵⁰."

report submitted for All-Union Conf on Nuclear Spectroscopy, Tbilisi, 14-22
Feb 64.

Radiyevyy Institut (Radium Inst)

BABENKO, N.P.; KONSTANTINOV, I.O.; NEMILOV, Yu.A.

High-pressure gas scintillation counter. Prib. i tekhn. eksp.
9 no.2:164-166 Mr-Ap'64. (MIFA 17:5)

ACCESSION NR: AP4031173

S/0056/64/046/004/1473/1474

AUTHOR: Gridnev, K. A.; Denisov, A. Ye.; Nemilov, Yu. A. ; Sadkova
skiy, V. S.; Teterin, Ye. D.

TITLE: The (d, α) reaction on B-11 and O-16 at a deuteron energy
6.6 MeV

SOURCE: Zh. eksper. i teor, fiz.. v. 46, no. 4, 1964, 1473-1474

TOPCI TAGS: deuteron α reaction, boron 11, oxygen 16, α particle
angular distribution, stripping reaction, α cluster stripping, com-
pound nucleus mechanism, backward α particle scattering, ground state
cross section, second excited state

ABSTRACT: The angular distribution of α particles were measured in
the reactions $B^{11}(d, \alpha)Be^9$ and $O^{16}(d, \alpha)N^{14}$ in order to check whether
the compound-nucleus reaction or the stripping of α -particle clusters
is the governing mechanism in the deuteron energy region 5--8 MeV,
which has been the least investigated. The $B^{11}(d, \alpha)Be^9$ measurements
are claimed to be the first of their kind, and have disclosed the

Card 1/3 of 122 Year 1964

ACCESSION NR: AP4031173

presence of all four Be^9 levels, including the hitherto doubtful level near 1.7 MeV. The resultant angular distribution favors the compound nucleus mechanism. The strong increase in the cross sections for the ground and second excited levels near 180° , which judging from other data is characteristic of the (d, α) reaction on

O^{16} , is more likely to be due to stripping of a cluster. Calculations to interpret the experimental data are under way. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED 04Jul63

DATE ACQ: 07May64

ENCL: 01

SUB CODE: PH

NO REF SOV: 000

OTHER: 003

Card

2/3

ACCESSION NR: AP4043656

S/0056/64/047/002/0767/0768

AUTHORS: Babenko, N. P.; Konstantinov, I. O.; Moskalev, A. P.;
Nemilov, Yu. A.

TITLE: Neutron polarization in the reaction $D(d, n)He^3$

SOURCE: Zh. eksper. i teor. fiz., v. 47, no. 2, 1964, 767-768

TOPIC TAGS: neutron polarization, deuteron scattering, deuteron
cross section, deuterium, helium

ABSTRACT: The authors used a previously published (ZhETF v. 45, 1389, 1963) and somewhat improved procedure to measure the polarization of neutrons from the reaction $D(d, n)He^3$ at incident deuteron energies 4.7 and 5.6 MeV, for a reaction angle of 45° in the center-of-mass system. The measurements were made with the extracted beam of the Radium Institute cyclotron at a deuteron energy 6.6 ± 0.1 MeV. The target was gaseous deuterium at a pressure of 4.5 atm in a volume

Card 1/3

ACCESSION NR: AP4043656

bounded by two tantalum foils. The neutrons from the reaction were analyzed with a gas-filled scintillation counter at 135°. As shown in Fig. 1 of the enclosure the dependence of the neutron polarization on the incident-deuteron energy, as obtained by various investigators, tends to cluster about two experimental curves. The present results follow the upper curve of the figure. "The authors thank M. B. Miller for help with the measurements." Orig. art. has: 1 figure.

ASSOCIATION: None

SUBMITTED: 14Feb64

ENCL: 01

SUB CODE: NP

NR REF SOV: 004

OTHER: 006

Card 2/3

ACCESSION NR: AP4043656

ENCLOSURE, 01

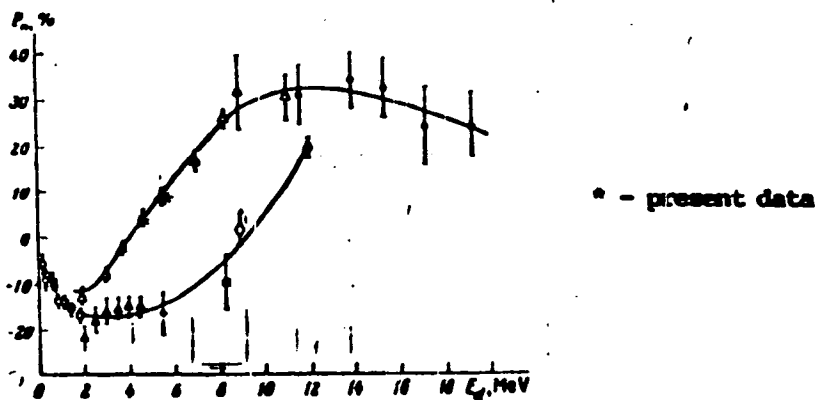


Fig. 1. Dependence of polarization of the neutrons from the reaction $D(d, n)He^3$ on the incident-deuteron energy according to various sources.

Card 3/3

NEMILOV, YU. A.

L 11059-65 ENT(m) DIAAP/SSD/AFWL/ESD(t)
ACCESSION NR: AP4046398

S/0036/64/047/003/0855/0859

AUTHORS: Bochin, V. P.; Zharebtsova, K. I.; Komarov, V. A.;
Krasnov, L. V.; Litvin, V. F.; Nemilov, Yu. A.

TITLE: Elastic scattering of ¹⁹deuterons by separated nickel and zinc isotopes

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 3, 1964, 855-859

TOPIC TAGS: nickel, zinc, isotope, elastic scattering, deuteron scattering, isotopic effect

ABSTRACT: The angular distributions of the elastically scattered deuterons were measured with a 90° magnetic analyzer. The deuteron energy was 6.5 MeV, close to the optimal value for studying the influence of the surface structure on the angular distribution of elastically scattered deuterons. The experimental method was de-

Card 1/3

L 11059-6>

ACCESSION NR: AP4046398

scribed elsewhere (Nemilov and Litvin, PTE, No. 2, 32, 1960). The targets were thin self-supporting foils ($\sim 2 \text{ mg/cm}^2$) of separated isotopes of nickel and zinc, prepared in accordance with a previously described procedure (Bochin et al., Report on (D, p) Reactions at the Paris Congress on Nuclear Physics, 1964). A distinct isotopic effect was observed in the elastic scattering of the deuterons, resulting in a systematic increase in the deviation of the cross section from the Rutherford cross section as pairs of neutrons are added to an even-even nucleus. Computer calculations of the elastic d-d scattering, using the optical model with the Woods-Saxon potential, have shown that the observed isotopic effect can be attributed to a difference in the diffuseness of the nuclear boundaries in the different isotopes. Comparison of theory and experiment yielded the nuclear boundary diffuseness parameter for all the stable isotopes of nickel and zinc. Orig. art. has: 2 figures, 2 formulas, and 1 table.

Card 2/3

L 11059-65

ACCESSION NR: AP4046398

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: 04Apr64

ENCL: 00

SUB CODE: NP

NR REF SOV: 008

OTHER: 009

Card 3/3

BABENKO, N.P.; BIBICHEV, B.A.; KONSTANTINOV, I.O.; MOSKALEV, A.P.; NEMILOV,
Yu.A.

Neutron polarization in (d, n) type stripping reactions with $l_p = 1$.
IAd. fiz. 1 no.3:452-455 Mr '65. (MIRA 18:5)

NEMILOV, Yu.A.; PAVLOV, V.V.; SELITSKIY, Yu.A.; SOLOV'YEV, S.M.
EYSKONT, V.P.

Distribution of the masses and kinetic energies of fragments in the
fission of Th^{232} by 12 Mev. deuterons. IAd. fiz. 1 no.4:633-638 Ap
'65. (MIRA 18:5)

L 13172-66 $\text{INT}(a)/\text{DWA}(b)$

ACC NO: AP0001183 SOURCE CODE: UR/0307/65/002/003/0400/0485

AUTHOR: Nem'lov, Yu. A.; Selitskiy, Yu. A.; Solov'yev, S. M.; Eysenont, V. P.

ORG: None

TITLE: The angular anisotropy of fission ^{14.55} by sub-barrier deuterons 34
B

SOURCE: Yadernaya fizika, v. 2, no. 3, 1965, 460-465

TOPIC TAGS: nuclear fission, fission product, deuteron bombardment, uranium, plutonium, angular distribution

ABSTRACT: This article presents the results of new measurements of the angular distribution of fission products for the fission of heavy nuclei by deuterons of various energies (below the Coulomb barrier). Specific details are given for U^{236} and Pu^{239} , and deuteron energies between 5.7 and 12.1 Mev. It is found that the angular distributions are appreciably anisotropic and that the energy dependence of the anisotropy of the odd-even nuclear targets has certain significant features. For example, for Pu^{239} the anisotropy increases with a decrease in deuteron energy, whereas for U^{236} it decreases and passes into the region of "negative" values $\partial I(0^\circ)/\partial I(90^\circ) < 1$. The significant features indicated are interpreted as the result of the specific feature of the interaction of low-energy deuterons with heavy nuclei. In conclusion, the authors note that, given data more precise than that available at present, the results of the present work may be employed for the calculation of the moments of inertia at the saddle point for nuclei which differ from those studied earlier according to the nucleon composition and excitation energy. Orig. art.

Card 1/2

L 13172-66

ACC NR: AP6001152

has: 4 figures.

SUB CODE: 18/ SUBM DATE: 20Feb65/ ORIG REF: 011/ OTH REF: 009

Card

2/2

DENISOV, A.Ye.; KOLALIS, R.P.; NEMILOV, Yu.A.; SADKOVSKIY, V.S.;
TETERIN, Ye.D.; GRIDNEV, K.A.

Mechanism underlying the reaction $Si^{29} (d, \alpha) Al^{27}$. Izd. fiz.
2 no.4:663-665 0 '65. (MIRA 18:11)

SADKOVSKIY, V.S.; TETERIN, Ye.D.; GRIGNEV, K.A.; DENISOV, A.Ye.; KOLALIS, R.F.
NEMILOV, Yu.A.

Study on the (d, α) -reaction on O^{16} , Al^{27} , and Si^{28} nuclei for
5.5 - 6.7 Mev. deuterons. IAd. fiz., 2 no.5:841-852 N 165.
(MIRA 18:22)

ENT(1)/ENT(m)/ENA(d)/T/EXP(t)/EXP(z)/EXP(b)/ENA(s) LIP(e)

ACCESSION NO. A5010152

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SOURCE: *Physics Letters*, v. 7, no. 4, 1965, 125A-125B

41
40
B

KEY TAGS: Mossbauer effect, indium antimonide, iron impurity, absorption spectrum, iron valence

ABSTRACT: The purpose of the investigation was to study the Mossbauer effect and to investigate the states of impurity atoms of iron in indium antimonide. The attempt was made to observe the absorption spectrum in spite of the fact that the amount of iron that can be introduced in InSb samples of ordinary dimensions is at the limit of sensitivity of the Mossbauer method. The procedure of preparing the sample was described elsewhere (FTT v. 6, 28-9, 1964). The source was Co^{57} , thoroughly purified, introduced into the lattice of indium antimonide. The Mossbauer apparatus consisted of a motor with reduction gear producing a uniform reciprocating motion of the absorber (stainless steel Fe^{57}) relative to the source. The detector was a proportional counter. The effect obtained at room temperature

Card 1/3

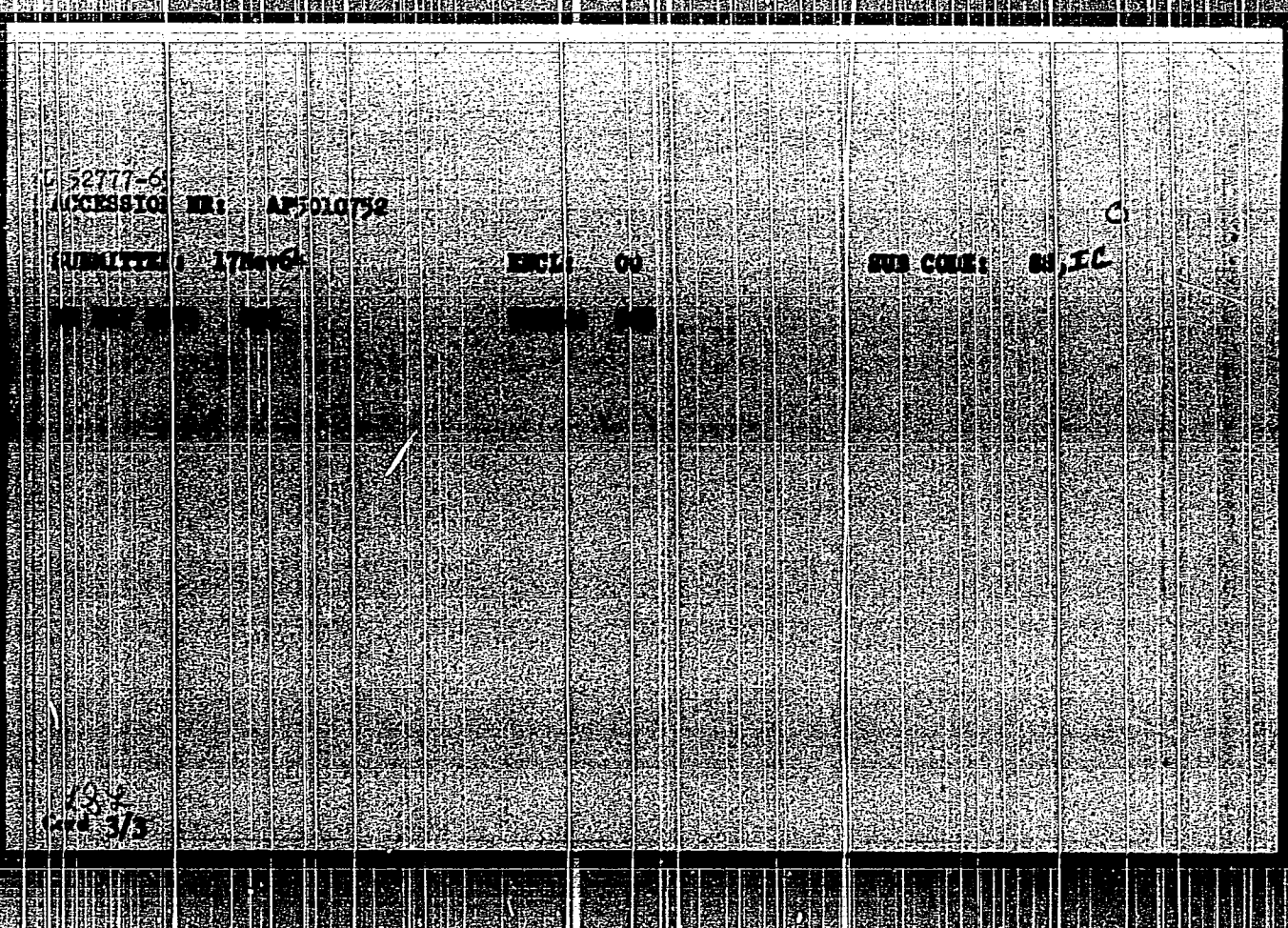
L 52777-6

ACQUISITION NO. APPROXIMATE

are approximately 1%, which was much higher than observed in the same geometry and with the same absorber with sources of stainless steel, chromium, and tungsten. The chemical shift, 0.5 mm/sec, is characteristic of iron in trivalent state. It is pointed out that the Mossbauer spectrum of indium antimonide differs from that of indium arsenide, in spite of the fact that both have the same crystal structure. The temperature dependence of the Mossbauer effect and of the chemical shift was also investigated. Both the effect and the chemical shift increased with decrease in temperature (~20% on going from room temperature to that of liquid nitrogen) and decreased by the same amount on going to 200C. An abrupt change in the Mossbauer spectrum takes place when the sample is heated to 400C, due to the change in the stoichiometric composition of the sample. It is concluded on the basis of the data that iron in indium antimonide has a configuration $3d^5$ and is trivalent. The rather weak dependence of the effect on the temperature indicates that the iron atoms vibrate in the optical modes. A study of the dynamic dependence of the Mossbauer effect on the stoichiometry of the crystal is now under way. "The authors thank S. B. Tolloy for help in preparing the sources." Orig. art. has: 1 figure and 1 table.

ASSOCIATION: None

Card 2/3



B. I. GREGORY, G.M.; NEMKOV, Yu.A.; TANILOW, S.B.; SIVEDCHENKOV, A.V.

Mössbauer effect in InP and GaAs. Fiz. tver. tela 7 no. 13:
3607-3611 D '65 (KIRA 19:1)

L 64368-65 E/C(m)/EPF(n)-2/EAP(t)/EWP(b)/EWA(h) IJP(e) JD/MW/JG/DM
 ACCESSION NR: AP701477A UN/0089/65/018/OC/0456/0419 38
 579.172.13 + 539.17.015 43

AUTHOR: Amilov, Yu. A.; Paylov, V. V.; Selitskiy, Yu. A.; Solov'yev, S. M.; Eysmunt, V. E.

TITLE: Total and differential cross sections for the fission of uranium and thorium by low-energy deuterons

SOURCE: Atomnaya energiya, v. 18, no. 5, 1965, 456-459

TOPIC TAGS: uranium, thorium, fission cross section, subbarrier deuteron, total cross section, differential cross section, fission fragment detection

ABSTRACT: By registering the fission fragments with glass plates, the authors were able to determine the total and differential cross sections for the fission of ^{232}Th , ^{233}U , ^{235}U , and ^{238}U by deuterons of energy much lower than the Coulomb barrier (6.6 MeV and below). Ordinary photographic plates were used, the emulsion serving as a protection for the surface. The targets were made by evaporating fluorides of uranium and thorium on thin silver substrates. The deuterons were accelerated in a cyclotron and their energy was determined accurate to 0.1 MeV. The experimental set-up is illustrated in Fig. 1 of the Enclosure. The results are compared with published data in which the cross sections have been obtained with

Card 1/3

L 643 8-65

ACCESSION NR: AP-014534

semiconductor detectors at larger neutron energies. The differential cross sections of all nuclei varied smoothly within a narrow range at the investigated deuteron energies. The anisotropy of the angular distribution was quite smooth in all cases, except that for U^{235} the angle distribution of the fragments had a maximum not at 0° but at 90° to the beam. Although the results did not differ greatly from those obtained by others, it is indicated that the reactions preceding fission of nuclei having different neutron fission thresholds and bombarded by subbarrier deuterons may differ noticeably from those at higher energies. Orig. a.t. has: 4 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 23 June 65

NR REF SOV: 005

ENCL: 01

SUB CODE: NP

OTHER: 006

Card 2/3

L 64368-65
ACCESSION NR: AP50145 3/4

ENCLOSURE: 01

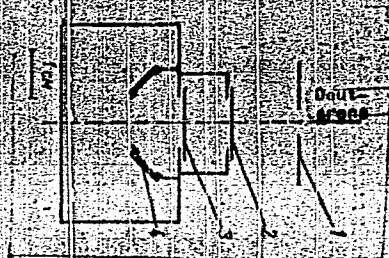


Fig. 1. Setup for the measurement of fission cross sections:

1 - Diaphragm, 2 - foils for the measurement of deuteron energy, 3 - target, 4 - glass plate to register the fission fragments,

llc

Card 3/3

KOLALIS, R.P.; NEMILOV, Yu.A.; SADKOVSKIY, V.S.; TETERIN, Ye.D.; DENISOV, A.Ye.

The $Si^{30}(d\alpha)Al^{28}$ reaction with deuteron energies of 6.5 and 6.7 Mev.
Izv. AN SSSR. Ser. fiz. 29 no.7:1192-1196 J1 '65.

Mechanism underlying the $C^{12}(d\alpha)B^{10}$ reaction. Ibid.:1197-1200

(MIRA 18:7)

BOCHIN, V.P.; ZHEREBTSOVA, K.I.; KOMAROV, V.A.; KRASNOV, L.V.; LITVIN, V.F.;
NEMILOV, Yu.A.

Study of (d,p) stripping reactions on nuclei of medium atomic weight.
Part 3. Vest. LGU 20 no.10:34-51 '65. (MIRA 18:7)

I 9918-66 EWP(t)
ACC NO AF6000862 EWT(l)/EWT(m)/T/EWP(h)/EWA(c)

IJP(c) JD/JG
SOURCE CODE: UR/0181/65/007/012/3607/3611

AUTHOR: Beloserskiy, G. N.; ^{44, 55} Namilov, Yu. A.; ^{44, 55} Tomilov, S. B.; ^{44, 55} Shvadchikov, A. V.

ORG: none
TITLE: ^{21, 44, 55} Mossbauer effect in InP and GaAs

58

SOURCE: Fizika tverdogo tela, v. 7, no. 12, 1965, 3607-3611

TOPIC TAGS: Mossbauer effect, gallium arsenide, indium compound, line width

ABSTRACT: This is a continuation of earlier work (PTT v. 7, 1264, 1965) where the Mossbauer effect was observed in indium antimonide. The present investigation was undertaken for the purpose of obtaining more data on semiconductors of the type A_3B_5 . The InP investigated was polycrystalline and the GaAs was a single crystal cut perpendicular to the (111) axis. The sources were prepared by a standard technique and the spectrum was measured with apparatus described earlier (PTT v. 5, 3370, 1963). The Mossbauer effect was observed at room temperature and at temperature of liquid nitrogen. The chemical shift at room temperature was 0.3-0.37 mm/sec at a line width of 0.39 mm/sec. The probability of recoilless quantum emission was calculated. The absolute measurements were made with an In¹¹³ source and a stainless steel absorber, for which $f_{\text{In}^{113}} = 0.84 \pm 0.06$. For GaAs and InP the value of f was obtained by means of relative measurements at room temperature and found to be 0.84 ± 0.06 and 0.89 ± 0.07 , respectively. The absorbers used were stainless steel foils of thickness 6.7, 7.1, 15.1, 14.2, 20.7, and 27.6 mg/cm². It is concluded from the

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ACC NO: AF6000862

obtained data that the iron in the GdAs and InP is in the form of a trivalent impurity, and that the large magnitude of the effect indicates that the optical branches in the impurity-atom vibrations play an important role. Orig. art. has: 1 figure, 5 formulas, and 1 table. [02]

SUB CORR: 20/ SUBM DATE: 24Apr67/ ORIG REF: 004/ OTH REF: 006
ATD PRESS: 4/66

Card 2/2

L 20200-66 EWT(m)/T/EWP(t) IJP(c) JD
ACC NR: AP6006829

SOURCE CODE: UR/0101/66/008/002/0451/0456

AUTHOR: Belozerskiy, G. N.; Nemilov, Yu. A.; Tolkachev, S. S. (Deceased)

53
49
B

ORG: none

TITLE: Using the Mössbauer effect and x-ray structural analysis to investigate oxidation in InSb

SOURCE: *1.4.8 27 27* *18* Fizika tverdogo tela, v. 8, no. 2, 1966, 451-456

TOPIC TAGS: Mossbauer effect, Mossbauer spectrum, x ray diffraction analysis, indium compound, antimonide, spectrum analysis, oxidation

ABSTRACT: The authors use the Mössbauer effect to study the result of various external processes with respect to changes in the structure of surface layers in a crystal. An indium antimonide crystal was selected and a Co⁵⁷ source was used. It was learned in previous studies that the Fe⁵⁷ Mössbauer spectrum in an annealed InSb specimen at room temperature differs sharply from the spectra of specimens without annealing. This phenomenon is studied in detail in this paper. It is found that heating of specimens at 200°C for 25 hours results in no noticeable change in the form of the Mössbauer spectrum for specimens with or without annealing. Data

Card 1/2

2

L 20200-66

ACC NR: AP6006829

4

from x-ray analysis of specially annealed specimens of InSb are used for interpreting the results of the Mössbauer spectral analysis. It was found that two phases formed in the surface layer of indium antimonide during heating. These phases are the result of oxidation of indium and antimony atoms in In_2O_3 and Sb_2O_4 . There is an initially rapid increase in the In_2O_3 phase with subsequent predominance of the Sb_2O_4 phase. It is found that the Mössbauer spectra may be divided into three lines and that the temperature relationships for the first and third lines are anomalous. A theoretical explanation is given for the temperature behavior of these two states. In conclusion we thank A. M. Murin for interest in the work and I. A. Gusev, A. V. Shvedchikov and I. N. Churumov for assistance with the work. Orig. art. has: 4 figures, 1 table, 2 formulas.

SUB CODE: 20/

SUBM DATE: 15Jul65/

ORIG REF: 003/

OTH REF: 001

Card 2/2

L 23112-66 ENT(m)/ENP(t) LJP(c) JD

ACC NR: AP6006867

SOURCE CODE: UR/0181/66/008/002/0604/0606

AUTHOR: Belozerskiy, G. N.; Nemilov, Yu. A.; Tomilov, S. B.; Shvedchikov, A. V.

ORG: none

TITLE: Mossbauer effect in ZnS and Ge

SOURCE: Fizika tverdogo tela, v. 8, no. 2, 1966, 604-606

TOPIC TAGS: Mossbauer effect, germanium, zinc sulfide, iron, line shift, line width, impurity level, *crystal lattice*

ABSTRACT: The purpose of the investigation was to study the behavior of impurity atoms Fe^{57} in the diatomic crystal lattice of ZnS and to compare this behavior with that of the same atoms introduced in germanium, where the spectra are similar at room temperature. The sources were ZnS single crystals on which several drops of $Co^{57}Cl_2$ solution were placed and allowed to evaporate. The detector was a proportional counter filled with a mixture of argon and methane. The elimination of the background is briefly discussed. The values obtained for the chemical shift, the width, and the effect probability of ZnS at room temperature were $\delta = (0.76 \pm 0.02)$ mm/sec, $\Gamma = (0.710 \pm 0.025)$ mm/sec, and $f = 0.6$ to 0 ± 0.055 . The results are compared with earlier measurements made on germanium with Co^{57} (FIT v. 7, 3617,

Card 1/2

L 23112-66

ACC NR: AF6006867

1965). The results obtained for ZnS point to a strong change in the width of the Mossbauer spectrum when the source is cooled to 78K. This is attributed to the fact that the impurity atoms are situated at different levels, and that the difference between levels disappears with increasing temperature. To observe the temperature dependence of the effect, it is necessary to assume an effective temperature which is much higher than the Debye temperature. The authors thank K. A. Dubenskiy for supplying the ZnS and ZnSe samples. Orig. art. has: 2 figures, 1 formula, and 1 table.

SUB CODE: 20/ SUBM DATE: 15Jul65/ ORIG REF: 001/ OTH REF: 002

Card 2/2 *HW*

L 04801-67 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) GQ/JD

ACC NR: AP6024475

SOURCE CODE: UR/0181/66/008/007/2112/2116

AUTHOR: Belozerskiy, G. N.; Gusev, I. A.; Nemilov, Yu. A.; Shvedchikov, A. V.

ORG: none

TITLE: Investigation of the behavior of impurity atoms in the diatomic InSb and GaSb crystal lattices

SOURCE: Fizika tverdogo tela, v. 8, no. 7, 1966, 2112-2116

TOPIC TAGS: indium compound, gallium compound, antimonide, crystal impurity, gamma spectroscopy, line shift, line width, Mossbauer spectrum

ABSTRACT: The authors introduced Fe^{57} in single-crystal InSb and GaSb and investigated the behavior of the Fe^{57} atoms in these crystals with the aid of nuclear gamma resonance, making use of data of earlier measurements (FIT v. 8, 604, 1966 and v. 7, 3607, 1965). The quantities measured were the absolute values of $f = \exp[-2W(T)]$, where $W(T)$ is the Debye-Waller factor, the chemical shifts, and the line widths at different temperatures. The measurements of f were by comparing the areas under the obtained Mossbauer spectra. The results show that for Fe^{57} in the InSb lattice the interaction forces are harmonic in the entire temperature range. The observed values of f for Fe^{57} in InSb were so large, that they could not be explained even under the assumption that the Fe^{57} oscillate only in the optical branches. It is therefore proposed that the Fe^{57} atoms oscillate at discrete frequencies lying above the optical branches of the ideal lattice. It is shown that, accurate to 6%, the Mossbauer effect for Fe^{57}

Card 1/2

L 04801-67

ACC NR: AP6024475

in the InSb spectrum has no anisotropy. The Mossbauer spectrum of GaAs was found to be very similar to that of InSb. Possible applications of the results for further study are discussed. The authors thank Yu. M. Kagan and Ye. Broverman for valuable discussions. Orig. art. has: 1 figure, 2 formulas, and 1 table. 2

SUB CODE: 20/ SUBM DATE: 15Dec65/ ORIG REF: 008/ OTH REF: 006

Card 2/2 *gd*

HEMILOVA, Aleksandra Vasil'evna

1964

DECEASED

1892-1961

GEOLOGY