

SOV/48-22-8-19/20

Data Concerning Industrial Photoelectronic Multipliers for Scintillation Spectrometers

with a sensitivity better than $20\mu\text{ A lm}^{-1}$, multiplier sensitivity at 2400 V better than 10 A lm^{-1} , toroidal dynodes of AMg K alloy). An FEM with a bismuth-silver-cesium cathode was described in reference 3. These multipliers give a good amplification. The amplitude resolution of 10 specimens of FEM with NaJ-(Tl)-crystal with a diameter of 20 mm and with Cs^{137} was within the limits of 12 - 14%. There are 5 figures, 1 table, and 3 references which are Soviet.

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S/048/59/023/012/008/009
B006/B060

9.8/50 (3002,3203)

AUTHORS: Berkovskiy, A. G., Breydo, I. Ya., Korol'kova, O. S.,
Leyteyzen, L. G.

TITLE: Some Characteristics of New Photoelectronic Multipliers

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959,
Vol. 23, No. 12, pp. 1517 - 1519

TEXT: Two new types of photoelectronic multipliers $\Phi\text{ЭУ}-35$ (FEU-35) and $\Phi\text{ЭУ}-29$ (FEU-29), as applied to scintillation spectrometers, were worked out by the authors. Full particulars are given of FEU-35, less of FEU-29. The cathode diameter of FEU-35 is 25 and 34 mm for 108 mm length. To improve electron-optical properties of the input a focusing cylinder (cf. Fig.1) is applied. This cylinder permits better combination between the axial-symmetric inlet of the multiplier and the inevitably asymmetrical first cascade of the multiplier system. The new inlet system secures a good energy resolution. As much as 600 FEU-35 devices were checked for amplitude resolution (Fig.2) and for the amount of the energetic noise equivalent (Fig.3). Fig.4 illustrates the average

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Some Characteristics of New Photoelectronic Multipliers

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amplification and the sensitivity of the multiplier as well as the dependence of the dark current on the supply voltage. The linear dependence of the output signal amplitude on the γ -quantum energy is secured up to amplitudes of the magnitude 10 v for 50 k Ω and 10 pF. The sensitivity threshold is about $(6-8) \cdot 10^{-12}$ lm for a resonance amplifier band width of 20 cycles and for a resonance frequency of 80 cycles. The second multiplier (FEU-29) suitable for γ -spectrometry has a cathode with the dimensions 38.48.190 mm. Its amplitude resolution is given with 7.5 - 10%. It exhibits an especially low noise level (1 - 2 kev) in the 50 imp/sec level. To test the stability of the photoelectronic multipliers under work conditions a special device was constructed, permitting measurement of the change with time of the Cs¹³⁷ photopeak level by means of a NaJ(Tl)-crystal. This device consisting mainly of a one-channel analyzer is described. Fig. 5 presents the photo of one part of the record chart of the photopeak amplitude stability of Cs¹³⁷ for 4 FEU-29 multipliers. The horizontal multiplying factor was 0.4% of the pulse amplitude, the vertical one was 30 minutes. Displacement with

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S/109/60/005/010/017/031
E033/E415

AUTHORS: Breydo, I.Ya., Glagolev, V.P., Glukhovskoy, B.M.,
Korol'kova, O.S. and Leyteyzen, L.G.

TITLE: Investigation of the Stability of Multi-Stage Photo-
Electron Multipliers

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol.5, No.10,
pp.1698-1702

TEXT: This paper was presented at the 9th All-Union Conference on
Cathode Electronics, Moscow, October 1959.

The stability of the output signal from a photo-electron multiplier depends on a number of factors: the voltage, the current, the time of operation and so on. The purpose of this article is to clarify the effects of these factors on multipliers with emitters of different materials. Since multipliers are widely used as scintillation counters, the multipliers were tested in a special set-up which approximated to operational conditions with crystals of NaJ(Tl) irradiated by Cs¹³⁷ on the cathodes of the multipliers. Block diagrams of the test apparatus are given and the apparatus is described. The output current, which depends not only on the amplitude but also on the frequency of the Card 1/4

Investigation of the Stability ...

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pulses, i.e. on the intensity of irradiation of the crystal by γ -rays, was also monitored. The results show that there are two types of instability: 1) smooth change in the average value of the amplitude of the pulses over a period of time and 2) oscillation of the amplitude about a mean value, which shows as a scatter of the recorded points for a given curve. The deviation of the points is approximately 0.3 to 1% of the value of the output pulse. Early tests showed that the stability depended to a great extent on the previous history of the multiplier. The "settling-down" time is different for different specimens and for the same specimen the settling-down time on the first day can be very much longer than on following days. This "training effect" made investigation of individual specimens impossible and statistical tests on a number of multipliers were necessary. The results on 80 multipliers of the $\Phi 3Y-35$ (FEU-35) type with Sb-Cs cathodes and emitters are presented graphically by histograms of percentage change in pulse amplitude against numbers of multipliers for output currents of 0.1 to 2.5 microamps, 0.3 to 0.5 microamps and 0.55 to 6.0 microamps. The maxima of these distributions show

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greater percentage change for larger currents. The results for 60 antimony-cesium cathode and emitter multipliers were similar. It is concluded that during the first hours of operation the stability is directly related to the output current and reduction in the current density improves the stability. The absolute maxima of the changes in the output current of the multipliers did not exceed published figures for multipliers with Al-Mg, silver-magnesium and antimony-cesium emitters. The settling-down time was found to be proportional to the output current. Tests on multipliers ~~3Y~~-24 (FEU-24) with aluminium-magnesium alloy emitters showed that they also have appreciable settling-down time, but the output current has little effect on it, except that it is reduced with high currents. For example, a batch of multipliers with Al-Mg emitters and bismuth-silver-cesium cathodes had an average settling-down time of 10 to 20 min, after a rest-period of 12 hours with output currents of 20 to 30 microamps. To clarify the effect of activation by cesium on the stability of alloy emitters, a multiplier with a thermo-cathode was prepared. The stability of the emitter was checked directly in a vacuum with continuous pumping before and after cesiation. The relative
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changes in the secondary emission coefficient for thermo-activation and for cesiation for one stage of a copper-beryllium alloy with 100 V and 0.3 mA output current are shown graphically. It is seen that the presence of cesium leads to an increase in both the settling-down time and also in the magnitude of the change in the secondary emission coefficient. There are 7 figures and 2 references: 1 Soviet and 1 non-Soviet.

SUBMITTED: December 21, 1959

Card 4/4

KOROL'KOVA, S

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712.2
.E3

TEKHNOLOGIYA I PRIMENENIYE VITAMINA I KAROTINA (TECHNOLOGY AND USE OF
VITAMINS AND CAROTENE) MOSKVA, PISHECHEPROMISLAT, 1956.

136 P. ILLUS., DIAGRS., GRAPHS, TABLES.

AT HEAD OF TITLE: MOSCOW. VSESOUZNIY NAUCHNO-ISSLEDOVATELSKIY VITAMINNYI INSTITUT.

BIBLIOGRAPHIC FOOTNOTES.

KOROL'KOVA, T. A.

23596.

O BYSTRYKh KOLEBANIYaKh I ELEKTROENTs EFALOGRAMMAKh I NEKOTORYKh. USLOVIYaKh, IKh
USILIVAYuShchIKh BESEDY (PO EKSPERIM. BIOLOGII). T. I. TBILISI, 1949, c. 301-11--
BIBLIOGR: c. 307.

s: LETOPIS' NO. 31, 1949

LIVANOV, M.N.; KOROL'KOVA, T.A.

Effect of inadequate stimulation of the skin with inducing current on bioelectric cutaneous rhythms and on conditioned reflex activity. Zh. vysshei nerv. deiat. Pavlova 1 no.3:332-346 May-June 1951. (CINL 23:2)

1. Moscow.

LIVANOV, M.H.; KOROL'KOVA, T.A.; FRENKEL', G.M.

Electrophysiological examination of the higher nervous function.
Zh. vysshei nerv. deiat. Pavlova 1 no.4:521-538 July-Aug 1951.
(GLML 23:2)

LIVANOV, M.M.; KOROL'KOVA, T.A.

Electrophysiological study on disorders of the higher nervous function
in rabbits. Tr. Vsesoiuz. obsh. fiziol. no. 1:31-36 1952. (CLML 24:1)

1. Delivered 27 September 1950, Moscow.

KOROL'KOVA, T. A.

KOROL'KOVA, T. A.: "The effect on the cerebral cortex of rabbits of rhythmic irritations of varying frequency". Moscow, 1955. Inst of Higher Nervous Activity, Acad Sci USSR. (Dissertations for the Degree of Candidate of Biological Science)

SO: Knizhnaya letopis', No. 52, 24 December, 1955. Moscow.

KOROL'KOVA, T.A.

Effect of drug-induced sleep on one of the pathological forms of electrical activity in the cerebrum of rabbits. Trudy Inst.vys. nerv.delat. Ser.fiziol. 1:308-319 '55. (MLRA 9:8)

1. Iz laboratorii elektrofiziologii uslovykh refleksov, zaveduyushchiy M.N.Livanov.

(CEREBRAL CORTEX) (ELECTROPHYSIOLOGY)
(SLEEP—THERAPEUTIC USE)

KOROL'KOVA, T.A.

Studying the physiological mechanisms of the vormation of rhythms reflecting the respiration rate in the cerebral bicelectrical currents. Trudy Inst.vys.nerv.deiat. Ser.fiziol. 2:181-182 '56.
(MLRA 10:1)

1. Iz laboratorii elektrofiziologii uslovnnykh relfeksov, zav. -
M.N.Livanov,

(ELECTROPHYSIOLOGY) (RESPIRATION)

KOROL'KOVA, T.A.

Electrophysiological study of the effect of ionizing radiation on the functional state of the cerebral cortex under normal and pathological conditions. Trudy Inst.vys. nerv. deiat. Ser. fiziol. 3: 121-135 '59. (MIRA 12:3)

1. Iz laboratorii elektrofiziologii uslovykh refleksov, zav. - M.N. Livanov.

(RADIATION--PHYSIOLOGICAL EFFECT)
(CEREBRAL CORTEX)

KOROL'KOVA, T.A.

Investigation of the significance of rhythmic processes in the cerebral cortex of rabbits following the extinction of conditioned reflexes. Trudy Inst. vys. nerv. deiat. Ser. fiziol. 5:21-32 '60.
(MIRA 13:10)

1. Iz Laboratorii elektrofiziologii uslovnykh reflektsov, (zav. - M.N. Livanov) instituta vyshey nervnoy deyatel'nosti.
(CEREBRAL CORTEX) (CONDITIONED RESPONSE)

GLIVENKO, Ye.V.; KOROL'KOVA, T.A.; KUZNETSOVA, G.D.

Integral picture of the correlative relationships between
biopotentials of the rabbit cerebral cortex. Fiziol. zhur.
48 no.4:384-388 Ap '62. (MIRA 15:6)

1. From the Institute of Higher Nervous Activity and
Neurophysiology, U.S.S.R. Academy of Sciences, and the Institute
of Controlling Electronic Machines, Moscow.
(CEREBRAL CORTEX)
(ELECTROENCEPHALOGRAPHY)

KOROL'KOVA, T.A.

Standards of physiotherapeutic service for the urban population at the existing level of the general incidence of disease and hospitalization. Zdrav. Ros. Feder. 7 no.10:12-17 0'63 (MIRA 16:11)

1. Iz otdela organizatsii zdravookhraneniya (rukovoditel' doktor med. nauk V.D. Bogatyrev) Moskovskogo nauchno-issledovatel'skogo instituta gigiyeny imeni F.F. Erismana (dir.: A.P.Shitskova).

*

GLIVENKO, Ye.V.; KOROL'KOVA, T.A.; KUZNETSOVA, G.D.; LUCHKOVA, T.I.;
TRUBNIKOVA, R.S.

Physiological evaluation of the averaging method for the derivation
of biopotentials. Fiziol. zhur. 51 no.8:943-951 Ag '65. (MIRA 18:7)

1. Institut vysshey ~~neurofiziologii~~ 'nosti i neyrofiziologii AN SSSR i
Institut elektronnykh upravlyayushchikh mashin, Moskva.

VASIL'KOV, Igor' Afanas'yevich; KOROL'KOVA, T.Ye., red.; GORINA,
V.A., tekhn. red.

[With a motion-picture camera in the world of insects; scenario]
S kinoapparatom v mire nasekomykh; stsensarii. Moskva, Iskusstvo,
1962. 133 p. (MIRA 15:12)
(Motion pictures in science) (Insects)

KOROL'KOVA, V.A.; KAYUSHEVA, I.V.

Pulseless disease. Klin. med. 38 no. 2:141-142 F '60.

(MIRA 14:1)

(ARTERIES—DISEASES)

S/271/63/000/003/021/049
A060/A126

AUTHORS: Keropyan, K.K., Korol'kova, V.A.

TITLE: On a method of electrical simulation of plane movable frames

PERIODICAL: Referativnyy zhurnal, Avtomatika, telemekhanika i vychislitel'naya tekhnika, no. 3, 1963, 6, abstract 3B32 (Tr. Rostovsk. inzh.-stroit. in-ta, 1961, no. 23, 49 - 70)

TEXT: A new method is proposed for solving problems of electrical simulation of movable frames. The method is based on the application of well-known in their mechanics approximate methods of analysis for the preliminary determination of the displacement of the frame nodes with the subsequent introduction of these nodes into the electrical simulation circuit in the form of emf imitating the angles of intersection of the struts. The proposed method is illustrated by examples of analysis of single-level plane multi-span frames with varied strut attachment; by the simulation of monotonic symmetrical multi-level, multi-span frames bearing a wind load, and by the simulation of plane movable multi-level frames. Expressions are cited for estimating the errors in the values of the

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On a method of electrical simulation of plane

S/271/63/000/003/021/049
A060/A126

moments acting at the ends of the struts on account of errors in the determination of angles. The experimental results are presented of a verification of the described method in the analysis of several plane movable frames taking horizontal loads, using the simulator ЭМСС-5 (EMSS-5). There are 9 figures and 6 tables.

I. V.

[Abstracter's note: Complete translation]

Card 2/2

KOROL'KOVA, V. I.

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1951

Elektrobezopasnost' na promyshlennykh predpriyatiyakh (Safety measures with electricity in industrial enterprises) Izd. 2. Moskva, Oborongiz, 1951.

315 p. illus., diags., tables.

AB520556.

1. KOROL'KOVAIA; V.I.
2. USSR (600)
4. Electric Engineering - Safety Measures
7. Remarks to V.I. Korol'kovaia's book "Safety measures for electricity in industrial enterprises.", Eng. M.A. Savin. Prom.energ. 10 no. 4, 1953.

9. Monthly List of Russian Accessions, Library of Congress, APRIL 1953, Uncl.

KOROL'KOVA, V.I.; TIMOFEYEV, T.G., spetsredaktor; VESELKINA, A., re-
daktor; SIMKINA, Ye., tekhnicheskiy redaktor.

[Practical manual for technical inspectors from trade-union central
committees] Pcsobie po prakticheskoi rabote tekhnicheskikh inspekto-
rov TsK Profsoiuzov. Vol. 3. [Safety measures in the realm of
electricity] Elektrobezopasnost'. [Moskva] Izd-vo VTsSPS profizdat,
1954. 179 p. (MLRA 8:1)
(Electricity, Injuries from) (Electricity--Safety measures)

KOROL'KOVA, V.I.
KOROL'KOVA, V.I.

[Safety engineering in electric installations; instructional placards] Tekhnika bezopasnosti v elektroustanovkakh; uchebnye tablitsy. Moskva, Gos.energ.isd-vo, 1956. 27 plates (MIRA 10:9)
(Electric power distribution--Safety measures)

RAKITIN, G.A.; VLASOV, A.F.; GLAGOLEVA, T.A., kandidat tekhnicheskikh nauk;
KOROL'KOVA, V.I., kandidat tekhnicheskikh nauk; KUZNETSOV, Ye.I.;
KUCHERUK, V.V., kandidat tekhnicheskikh nauk; PROTOPOPOV, A.P.; KHO-
TSYANOV, L.K., professor; DUBOVA, A.B., redaktor; KIRSANOVA, N.A.,
tekhnicheskii redaktor.

[Labor protection] Okhrana truda. Izd. 2-oe, 1sr. Moskva Izd-vo
VTsSPS Profizdat, 1956. 278 p. (MLRA 9:5)

1.Moscow. Moskovskaya vysshaya shkola profdvizheniya. 2.Chlen-kor-
respondent Akademii meditsinskikh nauk (for Khotseyanov).
(INDUSTRIAL HYGIENE) (INDUSTRIAL SAFETY)

KOROL'KOVA, Vera Ivanovna, kandidat tekhnicheskikh nauk; PAZHITNOV, D.P.,
inzhener, retsenzent; SAVEL'YEV, V.M., inzhener, retsenzent;
KONSTANTINOV, N.A., redaktor; FUBYANSKAYA, F.G., izdatel'skiy
redaktor; GLADKIKH, N.N., tekhnicheskii redaktor

[Safety measures in industrial enterprises] Elektro-bezopasnost'
na promyshlennykh predpriatiakh. Izd. 3-e, dop. Moskva, Gos.
izd-vo obor. promyshl., 1956. 447 p. (MIRA 9:10)
(Industrial safety)
(Electric engineering--Safety measures)

KOROLKOVA V.I.
SYROMYATNIKOV, I.A.; GRUDINSKIY, P.G.; PETROV, I.I.; KOROLKOVA, V.I.;
SERBINOVSKIY, G.V.; BOL'SHAM, Ya.M.; LIVSHITS, D.A.; FAYERMAN, A.L.
NAYFELD, M.P.; ZHIVOV, M.S.; ONKIN, A.K. (Moskva)

Candidate of engineering L. P. Podol'skii. Elektrichestvo no.1:96
Ja '58. (MIRA 11:2)

(Podol'skii, Lev Petrovich, 1887)

8(2)

SOV/105-59-10-22/25

AUTHOR:

Korol'kova, V. I., Candidate of Technical Sciences

TITLE:

Medical-technical Conference on Protection From Electricity

PERIODICAL:

Elektrichestvo, 1959, Nr 10, p 87 (USSR)

ABSTRACT:

A medical-technical conference will be held this year. It will be attended by representatives from medicine and technology. The conference will deal with problems of protection from electricity and prophylaxis of electrotraumatism, and present a scientific foundation for the standards of protection from electricity. The study and generalization of experience collected in electrotherapeutics may be of special importance. Tests on monkeys must play the decisive role. Investigations of these problems are to be made at the Sukhumskaya mediko-biologicheskaya stantsiya AMN SSSR (Sukhumi Medical-biological Station of the AMS of the USSR) together with the collaborators of the Academy who are greatly experienced in tests on monkeys.

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GRIGORYAN, Grigoriy Makarovich, prof., doktor tekhn. nauk; YEGOROV, Valerian Nikolayevich, dots., kand. tekhn.nauk;
KALASHNIKOV, Konstantin Artamonovich, inzh.-polk.;
KOROL'KOVA, Vera Ivanovna, kand. tekhn. nauk; POLOZKOV, Vladimir Tikhonovich, dots., kand. tekhn. nauk;
SARKIS'YANTS, Gayk Arkad'yevich, prof. Primal uchastiye;
SMIRNOV, V.M., inzh.-podpolk.; KUSHELEV, Vladimir Pavlovich, red.; ROYTMAN, Miron Yakovlevich, red.; YEFREMOVA, T.D., ved. red.; KLEYMENOVA, K.F., ved. red.; VOROB'YEVA, L.V., tekhn.red.

[Fundamentals of safety engineering and fire prevention in the petroleum and gas industries] Osnovy tekhniki bezopasnosti i protivopozharnoi tekhniki v neftianoi i gazovoi promyshlennosti. [By] G.M.Grigoriant i dr. Moskva, Gos. nauchno-tekhn. izd-vo neft. i gorno-toplivnoi lit-ry, 1962. 222 p.

(MIRA 15:2)

(Gas industry--Fires and fire prevention)
(Petroleum industry--Fires and fire prevention)
(Industrial hygiene)

KOROL'KOVA, Vera Ivanovna, kand. tekhn. nauk; KNYAZEVSKIY, B.A.,
kand. tekhn. nauk, dots., retsenzent; TUEYANSKAYA, F.G.,
red. izd-va; ORESHKINA, V.I., tekhn. red.

[Safety measures in using electrical equipment in industrial
enterprises] Elektrobezopasnost' na promyshlennykh pred-
priyatiyakh. 4., dop. izd. Moskva, Oborongiz, 1962. 527 p.
(MIRA 15:7)

(Electric engineering--Safety measures)

BY: PERKIN, V. G.; STACHUKA, I. I.; KARSENKOV, V. I.

Neuroendocrine reactions after morphine and caffeine
administration and fertilization. *Endokrinologiya* 3 no. 5: 16-17,
1963. (1963)

1. Institute of Endocrinology, Ministry of Health, Leningrad.

IVASHKOVA, V.K., kand.tekhn.nauk; Primalni uchastiye: KOROL'KOVA, Ye.A.,
starshiy inzh.; LEBEDEV, V.M., laborant; VILKOV, G.N., red:izd-va;
EL'KINA, E.M., tekhn.red.

[Using electric models to study the Thermal properties of the
enclosing elements of buildings] Issledovanie teplotekhnicheskikh
svoistv ograzhdaiushchikh konstruksii zdaniy metodom
elektromodelirovaniya. Moskva, Gos.izd-vo lit-ry po stroit.,
arkhit.i stroit. materialam, 1960. 135 p. (Akademiya stroitel'stva
i arkhitektury SSSR. Institut stroitel'noi fiziki i
ograzhdaiushchikh konstruksii. Nauchnoe soobshchenie, no.1)
(MIRA 15:1)

(Walls--Electromechanical analogies)

L 61215-65 EWT(1)/ECC G7

ACCESSION NR: AT5017499

UR/3116/65/273/000/0026/0033

AUTHOR: Korol'kova, Ye. D.

TITLE: Climatic seasons in the Arctic

SOURCE: Leningrad, Arkticheskiy i antarkticheskiy nauchno-issledovatel'skiy institut. Trudy, v. 273, 1965. Klimatologiya i radiatsionnyy rezhim Arktiki: sbornik statay (Climatology and radiation conditions of the Arctic), 26-33

TOPIC TAGS: climatology, Arctic meteorology, climatic season

ABSTRACT: The annual variation of different meteorological elements has been used to determine the limits of the climatic seasons in the Arctic. Precise dates of transition from one season to the next are not given; the accuracy of the dating is 10 or 15 days. The limits were determined by constructing curves of annual variation on the basis of long-term data on: mean monthly air temperature, mean minimum air temperature, mean monthly air pressure, frequency of an overcast sky, and other factors. Curves were constructed for 23 Soviet and foreign polar stations. Winter is characterized by small changes of mean monthly air temperature from month to month, sometimes differing by only tenths of a degree. In spring there is a rapid increase of air temperature from day to day and from month to month; during the two or three spring months the temperature changes by

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25-28C. The arctic summer has a smooth temperature variation which changes only by tenths of a degree during the warmest months. In autumn there is a rapid decrease of air temperature from month to month, 20-25C in two or three months. The entire Arctic is divided into five regions in which the beginning and end of the climatic seasons differs in time: Atlantic, Siberian, Pacific, Canadian-Greenland, and central Arctic basin. The specific character of the climatic seasons for each of these regions is described. The climatic seasons were defined as follows: Western Atlantic: winter - mid-November to March; spring - April-May; summer - June-late August; autumn - September-mid-November. Western part of Atlantic region: winter - early December-March; spring - April-late May; summer - June-mid September; autumn - mid-September-early December. Siberian region: winter - late November-March; spring - April-May; summer - June-September; autumn - October-late November. Pacific Ocean region: winter - early December-March; spring - April-mid-June; summer - mid-June-mid-September; autumn - mid-September-early December. Central Arctic, western sector: winter - mid-November-March; spring - April-May; summer - June-August; autumn - September-mid-November. Central Arctic, eastern sector: winter - December-March; spring - April-May; summer - June-August; autumn - September-November. Orig. art. has: 6 figures and 1 table.

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L 61815-65

ACCESSION NR: AT5017499

ASSOCIATION: Arkticheskiy i antarkticheskiy nauchno-issledovatel'skiy institut, Leningrad
(Arctic and Antarctic Scientific Research Institute)

SUBMITTED: 00

ENCL: 00

SUB CODE: ES

NO REF SOV: 008

OTHER: 000

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Card 3/3

SKOTNIKOVA, K.K.; KOROL'KOVA, Ye.M., master

Experience in achieving waste reduction. Tekst.prom. 19 no.4:
76-77 Ap '59. (MIRA 12:6)

1. Smenny inzhener Sosnevskoy otdelochnoy fabriki imeni Samoylova
(for Skotnikova). Otdel tekhnicheskogo kontrolya Sosnevskoy otdelochnoy
fabriki imeni Samoylova (for Korol'kova).
(Textile fabrics) (Clothing industry)

SOV/54-58-3-8/19

AUTHORS: Marinin, V. A., Polyakova, L. V., Korol'kova, Z. S.

TITLE: Electric Double Refraction of Polystyrene Solutions
(Elektricheskoye dvoynoye lucheprelomleniye rastvorov polistirola)

PERIODICAL: Vestnik Leningradskogo universiteta. Seriya fiziki i khimii, 1958, Nr 3, pp 73-77 (USSR)

ABSTRACT: In the present paper experimental data on the electric double refraction in polystyrene solutions are given. The solutions of 7 polystyrene fractions were investigated. Carbon tetrachloride served as solvent. As the experiments showed the dependence $\Delta = f(E^2)$ remains linear in the domain of the concentrations used. The Kerr constant was computed for all measured polystyrene fractions according to the diagram Δ versus E^2 (Table 1). For reasons of comparison the Kerr constant of styrene (Table 2) was ascertained too. The Kerr constant of the solutions of various polystyrene fractions (molecular weight $4 \cdot 10^5 - 5 \cdot 10^6$) is, evidently, within the errors of observation, of similar magnitude as the Kerr

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Electric Double Refraction of Polystyrene Solutions SOV/54-58-3-8/19

constant of styrene. The behavior of the polystyrene solutions in a constant electric field is analogous to their behavior in a magnetic field (Refs 2, 3). As a comparison the molecular Kerr constant of benzene was examined. Measuring results of this constant in carbon tetrachloride at various concentrations are given in table 2. The quantities K_2 for styrene and benzene were determined from the diagram plotting K_{12} versus C_2 . The coefficient of the angular dependence $K_{12} = f(C_2)$ permits to determine the quantity K_2 for infinite dissolution. The computation showed that the molecular Kerr constant of styrenes is by about two times higher than that of benzene. It was found that the Kerr constant of the polystyrene is independent of the molecular weight. Its sign is positive and in its magnitude it resembles the Kerr constant of styrene. These facts prove the conclusions made by the authors (Refs 2, 3, 7). The authors express their gratitude to V. N. Tsvetkov for his interest. There are 2 figures, 2 tables, and 7 references, 4 of which are Soviet.

Card 2/3

KOROLOEV, V.V.

Welding tip for welding plastics. Khim. i neft. mashinostr.
no. 5839-40 N 64 (MIRA 18:2)

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(CHEST—SURGERY) (SUTURES)

SHIRMAN, G. L., DUBOVIK, A. S., KEVLISHVILI, P. V., GRANIGG, A. B. KOPLOV, I. A. ⁴

"The High Speed No Dead-Time Framing Camera *7CAB-1*"

report presented at the 6th Intl. Cong. of High-Speed Photography, The Hague,
17-22 Sep '62

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Vitamin B₁ as a drug inducing labor and increasing labor pains. Przegł.
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M. D.) of the Hospital imienia G. Narutowicz, Krakow.

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(KL-DV, 11-61, 225).

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Vyazkosty nekotorykh metallov i splavov v svyazi s ikh
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Moscow _ 30 JUN 1959

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Korolyuk, A. F. "Neuropsychological disturbance in intoxication by tetraethyl lead,"
Trudy Kuybyshevsk. gos. med. in-ta, Vol. I, 1949, P. 95-104

SO: U-2283, Letovis Zhurnal'nykh Statey, No. 1, 1949.

AUTHORS: Galkin, A. A.; ~~Korolyuk, A. P.~~ 56-34-4-49/60

TITLE: The Dispersion of Sound Velocity in Metals in a Magnetic Field
(Dispersiya skorosti zvuka v metallakh v magnitnom pole)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,
Vol. 34, Nr 4, pp. 1025 - 1026 (USSR)

ABSTRACT: The dispersion of sound velocity in hard metals predicted by R. A. Alpher and R. I. Rubin (Ref 1) has hitherto not been observed, apparently because of the smallness of the effect. The present report describes experiments connected with the discovery of this phenomenon. An apparatus was developed and built for the investigation of slight variations of the sound vibrations which, in the case of favorable conditions, makes it possible to measure relative deviations of about 10^{-6} from sound velocity. The principle of the measurements is based on the comparison and the measuring of the phase difference of the vibrations passing through the sample to be investigated. The block scheme of the measuring apparatus is shown by a diagram. The high frequency voltage originating from a generator (stabilized by means of quartz)

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56-34-4-49/60

The Dispersion of Sound Velocity in Metals in a Magnetic Field

is transferred to the radiating quartz which on one side was stuck on to the cylindrical sample. The receiving quartz is then stuck on to the second front face of the sample, and the voltage produced by it is then transferred to a phase-meter. At the same time a voltage is directly transferred to the phasemeter from the radiating crystal. For the investigation of the ultrasonic vibrations quartz plates (x-section) of a diameter of 10 mm were used. Cylindrical rods of a length of 20 cm and a thickness of 1.4 cm served as samples. A diagram shows the results of these experiments, which were carried out at room temperature in a field vertical to the axis of the sample. The experimental points fit well on the theoretically calculated straight lines. Sound velocity thus increases proportionally to H^2 in the magnetic field and the intensity of the effect corresponds to the predictions of theory. It is interesting to learn that in bismuth no dispersion of the sound velocity was observed at room temperature. Finally, the authors thanked Professor A. I. Akhiezer and S. V. Peletminskiy, who had directed their attention to the discussed phenomenon. There are 2 figures and 2 references, 1 of which is Soviet.

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56-34-4-49/60

The Dispersion of Sound Velocity in Metals in a Magnetic Field

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainy SSR
(Institute of Radiophysics and Electronics AS Ukrainian SSR)

SUBMITTED: January 14, 1958

1. Sound--Refraction
2. Metals--Acoustic properties

Card 3/3

24(1), 24(3)

AUTHORS:

Galkin, A. A., Korolyuk, A. P.

SOV/56-36-4-52/70

TITLE:

Anisotropy of the Absorption of Ultrasonics in Metals in the Magnetic Field (Anizotropiya pogloshcheniya ul'trazvuka v metallakh v magnitnom pole)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1307-1309 (USSR)

ABSTRACT:

It has already been shown that for longitudinal sound the absorption coefficient in tin depends on the magnetic field - in such a manner, that if the latter is vertical to the wave vector, a weakly marked maximum of absorption occurs in certain fields; a similar phenomenon is observed in polycrystalline copper and in indium. In the present "Letter to the Editor" experiments are discussed in which the influence exercised by the magnetic field on the absorption of ultrasonics at low temperatures in polycrystalline samples of very pure metals was investigated. Tin with a residual resistance

$1.6 \cdot 10^{-5}$ and zinc with $R_{4.2}/R_{300} = 2 \cdot 10^{-4}$ was investigated.

The samples had a diameter of 12 and a length of 12 and 15 mm respectively. The absorption coefficients were determined by

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SOV/56-36-4-52/70

means of the well-known pulse method at frequencies of 17.3, 23.3, 51, and 70 megacycles. Figure 1 shows the results obtained by measurements carried out at 4.2° K with a magnetic field that was vertical to the wave vector. The curves plotted at higher frequencies show already two maxima. Thus, zinc at 70 megacycles showed a minimum at about 500 Oe, the first maximum at about 800, and a second flat maximum at about 2,000 Oe. If the magnetic field rotates in a plane that is vertical to the sample axis, the curves are found to vary essentially: The absorption of the maxima and their amount varies, in the case of certain directions these maxima vanish, and in certain cases the maxima exist only within range of the angles of 15-20°. Figures 2 and 3 show such diagrams at 70 megacycles. Here the absorption coefficient for ultrasonics shows a tendency of assuming a saturation value at 5,000-6,000 Oe. This limiting value depends on the orientation of the sample in the field. The diagrams for the limiting value in the case of strong fields describe the anisotropy of electric conductivity in the magnetic field. There are 3 figures and 6 references, 1 of which is Soviet.

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Anisotropy of the Absorption of Ultrasonics in
Metals in the Magnetic Field

SOV/56-36-3-52/70

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy
SSR (Institute for Radiophysics and Electronics of the Academy
of Sciences, Ukrainskaya SSR). Fiziko-tekhnicheskiy institut
Akademii nauk Ukrainskoy SSR (Physico-technical Institute of
the Academy of Sciences, Ukrainskaya SSR)

SUBMITTED: December 12, 1958

Card 3/3

24 (1)

AUTHORS:

Bezuglyy, P. A., Galkin, A. A.
Korolyuk, A. P.

SOV/56-36-6-61/66

TITLE:

The Anisotropy of the Absorption Coefficients of Ultrasonics in Superconductors (Anizotropiya koeffitsiyentov pogloshcheniya ul'trazvuka v sverkhprovodnikakh)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959
Vol 36, Nr 6, pp 1951 - 1952 (USSR)

ABSTRACT:

By the investigation of the absorption of ultrasonics in superconductors it is possible to determine the size of the energy slit at $T = 0$ as well as the dependence of the slit width (ξ_0) on temperature. The experiments carried out in this connection are in agreement with theory. By means of experiments also the influence exercised by the isotope composition and the homogeneous lattice deformation upon T_k and on the width of the slit was investigated. It may be imagined that lattice anisotropy leads to more visible results than isotopic composition. In the present "Letter to the Editor" experimental results concerning the absorption of ultrasonics (frequency 70 kilocycles) in superconductive and normal media are published. (Determina-

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The Anisotropy of the Absorption Coefficients of
Ultrasonics in Superconductors

SOV/56-36-6-61/66

tion of the absorption coefficient in the C_2 - and C_4 -axis of a spherical tin sample). The results, which were dealt with by the method developed by Bardeen, Cooper and Schrieffer (Ref 4) are shown in a table. It was found that the temperature dependence of the ratio of the absorption coefficient α_s/α_n is different in the two directions. The case of sound propagation along the C_4 -axis agrees better with the isotropic theory of superconductivity. There are 1 table and 4 references, 1 of which is Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR
(Physico-technical Institute of the Academy of Sciences,
Ukrainskaya SSR)

SUBMITTED: April 7, 1959

Card 2/2

24 (1)

AUTHORS:

Galkin, A. A., Korolyuk, A. P.

SOV/56-37-1-53/64

TITLE:

Oscillation of the Sound Absorption Coefficient in Lead at Low Temperatures (Otsillyyatsii koeffitsiyenta pogloshcheniya zvuka v olove pri nizkikh temperaturakh)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 1, pp 310 - 312 (USSR)

ABSTRACT:

It has already been shown (Refs 1-3) that the absorption coefficient of ultrasonics in metal does not change monotonely with the magnetic field, but that it has a special anisotropy. The authors of the present "Letter to the Editor" investigate the latter at an ultrasonic frequency of 70 megacycles and give a report on the results obtained. Investigations were carried out in a spherical monocrystalline lead sample of 15 mm diameter. Planes were cut off from the sphere, to which the ultrasonic sources were applied. The perpendicular lines of these planes were parallel to the axes of 2. and 4. order. Absorption was investigated for longitudinal sound, the wave vector \vec{k} of which was parallel to the axis of 2. or 4. order. The sample was rotated in the magnetic field \vec{H} , with the \vec{k} -vector remaining per-

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Oscillation of the Sound Absorption Coefficient in Lead at Low Temperatures SOV/56-37-1-53/64

pendicular to \vec{H} . Figure 1 shows the course of the amplitude in dependence on the field strength (45 - 1000 Oe) at $T = 4.2^\circ\text{K}$, for sound propagation along the axis of second order; \vec{H} was parallel to the axis of 4. order. The curve has a manifold of marked maxima and minima (of V. Gurevich, Ref 4). From the oscillation periods the magnitude of the limiting momentum of the electron was estimated at $p = 5 \cdot 10^{-20}$ g.cm/sec. Figure 2 shows the dependence of the projection of the limiting momentum of the electrons on to the plane (001) as a function of the angle between the axes of 2. and 4. order, developed according to oscillation periods. Figure 3 shows several results of measurements of the absorption coefficient in dependence on the magnetic field voltage and the angle of rotation φ in the (001)-plane. Figure 4 shows the angular dependence of the absorption coefficient at $H = 7 \cdot 10^3$ Oe and with rotation of the field in the (001)-plane. The investigation of sound absorption in a field $\vec{H} \parallel \vec{k}$ shows that the curve $\alpha(H)$ has singular points. According to the theory by V. Gurevich, the magnetic field in

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Oscillation of the Sound Absorption Coefficient in Lead at Low Temperatures SOV/56-37-1-53/64

these points satisfies the condition $H_1 = \text{const}/n$, where n is an integer number. There are 4 figures and 4 references, 2 of which are Soviet.

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainской SSR
(Institute of Radiophysics and Electronics of the Academy of Sciences, Ukrainskaya SSR)

SUBMITTED: March 25, 1959

Card 3/3

86749

S/120/60/000/006/025/045
E041/E521

6.8000 (3201, 1099, 1162)

AUTHORS: Galkin, A.A. and Korolyuk, A.P.

TITLE: Instrument for Studying Ultrasonic Absorption by Metals at Low Temperatures

PERIODICAL: Prihory i tekhnika eksperimenta, 1960, No.6, pp.99-103

TEXT: The greatest interest lies in the absorption by magnetic materials under conditions where the mean free path of a conduction electron is significantly greater than the wavelength of the sound in the material, while the Larmor radius of the electron is comparable with the latter. The absorption coefficient varies periodically with magnetic field strength and the period is a measure of the electron impulse at the Fermi surface. The present article describes a method of recording automatically the propagated signal strength as a function of magnetic field in a series of monocrystals. Fig.1 shows the block diagram of the experimental arrangement. A pulse generator 26M (26I) drives simultaneously a modulator and a delay circuit. The modulator switches a high-frequency generator connected by coaxial cable to the transmitting crystal a. The crystal can be matched to the generator by varying

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the cable length. The receiving crystal b is similarly joined to the receiver whose output is gated in the pulse selector drive by another generator 26I from the delay circuit. The selector output is peak detected, the selection of the appropriate pulse being made by varying the delay. The detected output goes to a recorder ЭПН-09 (EPP-09) which is a two-dimensional self-balancing potentiometer plotter. The field strength is measured by a germanium Hall-effect pick-off. Fig.2 is the circuit of the modulator and high-frequency generator. The latter oscillates between 50 and 250 Mc/s. The receiver is in two parts. The high-frequency part is an ordinary television receiver front-end working over the bands 50-100 and 160-230 Mc/s. Other frequencies are covered by heterodyning. The intermediate frequency amplifier circuit is in Fig.4. The centre frequency is 32 Mc/s, the bandwidth 3 Mc/s, amplification 10^5 , sensitivity between 5 and 10 microvolts. Fig.4 is the delay circuit providing delays between 0 and 250 microsecs. Fig.5 is the pulse-selecting gate. Fig.6 is a cross-section through the

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crystal. Fig.7 shows how the sample is mounted. The sample may be rotated in the field. The magnet current is controlled from 0 to 8 amperes by the circuit of Fig.8. Fig.9 is an example of a record taken on a monocrystal of tin. The sound frequency was 220 Mc/s, parallel to the (101) axis. The H-vector lay in a perpendicular plane and made an angle of about 36° to the (100) axis. The two curves each took 3-4 minutes in recording. Manual methods would have taken 15-20 times as long. The overall error in measuring either coordinate does not exceed a few percent. There are 9 figures and 8 references: 4 Soviet and 4 non-Soviet.

ASSOCIATION: Institut radiofiziki i elektroniki AN UkrSSR
(Institute of Radiophysics and Electronics, AS, UkrSSR)

SUBMITTED: October 13, 1959

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85675

S/056/60/038/006/017/049/XX
B006/B070

6.8000 (3201, 1099, 2404)
24.1800

AUTHORS: Galkin, A. A., Korolyuk, A. P.

TITLE: Absorption of Ultrasonics in Zinc at Low Temperatures

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki,
1960, Vol. 38, No. 6, pp. 1688 - 1694

TEXT: The oscillation of the ultrasonic absorption coefficient α with a change in the magnetic field has been studied several times in the past; the theory of this effect is due to V. L. Gurevich. Also two of the earlier papers of the present authors (Refs. 1, 2) were concerned with problems of the same nature. Now, the behavior of α in a strong magnetic field is studied for the case when $l \gg \lambda \gg r$ (l - mean free path of the electrons; $r = cp/eH$ is the Larmor radius; λ - ultrasonic wavelength). The behavior of α is essentially related to the asymptotic behavior of the electrical conductivity tensor. A theoretical study of this was made by Gurevich and E. A. Kaner (Refs. 9, 8) who showed that data on the topology of the Fermi surface

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85675

Absorption of Ultrasonics in Zinc
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can be obtained by studying the anisotropy of α in a magnetic field. The experiments described here were carried out on single crystals of zinc by the method of Obreimov-Shubnikov. The metal was 99.9998% pure, and had a resistivity ratio $R_{4.2}/R_{300} = 2 \cdot 10^{-4}$. The techniques of preparing the specimens, of producing the ultrasonic waves (60, 100, 180, and 220 Mc/sec), and of the measurement are described in the introduction. The periods of oscillation of α were measured for different orientations of \vec{H} which could be rotated in a plane perpendicular to \vec{k} . Fig. 1 shows one of these oscillation curves at 220 Mc/sec. Fig. 2 shows the number of oscillations as a function of $1/H$ for different directions of \vec{H} in the $(10\bar{1}0)$ plane. In Fig. 3, a, b, and c show the angular dependence of the extreme diameters of the Fermi surface (perpendicular to \vec{H}) on rotation of \vec{H} and the planes $(11\bar{2}0)$, (0001) , and $(10\bar{1}0)$, respectively. Fig. 4 shows the dependence of the difference of α -values with and without a field (7000 oe) on the direction of \vec{H} . a: $k \parallel [0001]$; b: $k \parallel [10\bar{1}0]$; c: $k \parallel [11\bar{2}0]$. $T=4.2^\circ K$; $\nu = 60$ Mc/sec. According to the theory (Ref. 6), a change in the diameter of the electron orbit in relation to λ corresponds to each oscillation of α

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B006/B070

in the magnetic field. The relation $l = r\lambda (n+1)$ holds for the mean free path of electrons in a weak field. Another possibility of determining l is to measure the component of the electron momentum perpendicular to \vec{k} and \vec{H} (p_{\perp}), and the minimum field in which oscillations appear ($p_{\perp}/r_{\max} = eH_{\min}/c$). The following path lengths were determined by these methods:

\vec{k} direction	Path length [mm] according to the number of oscillations	according to p_{\perp}	Temperature [°K]
[0001]	0.5	0.6	1.65
[1010]	0.22	0.2	4.2
[1120]	0.27	0.24	1.65

Thus, the electron path length also shows anisotropy. The results are discussed in the conclusion. The values obtained for the extreme diameters of the Fermi surface show that the law of dispersion of

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Absorption of Ultrasonics in Zinc
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B006/B070

electron energy deviates largely from the quadratic form. It is concluded from the anisotropy of α in a strong field that the Fermi surface of zinc is an open surface of the sixth order in the direction of the symmetry axis. E. A. Kaner and M. I. Kaganov are thanked for discussions, and V. I. Bogatov for supplying liquid helium. There are 4 figures, 1 table, and 11 references: 7 Soviet, 3 US, and 1 British.

J

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk
Ukrainskoy SSR
(Institute of Radiophysics and Electronics of the
Academy of Sciences Ukrainskaya SSR)

SUBMITTED: January 10, 1960

Card 4/5

Korolyuk, A.P.

82594

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S/056/60/039/01/01/029
B006/B070

AUTHORS: Bezuglyy, P. A., Galkin, A. A., Korolyuk, A. P.

TITLE: Investigation of the Anisotropy of the Energy Gap in Superconducting Tin

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 1 (7), pp. 7-12

TEXT: The authors investigated the temperature dependence of the ultrasonic absorption coefficient in different directions of single crystals of superconducting tin. They describe the methods of investigation and present the results. The method of energy gap investigation is based on the determination of the difference between the curves $\alpha_s/\alpha_n = f(T)$ when the ultrasonics is propagated along a binary (C_2) and a tetragonal crystal axis. From this difference the anisotropy of the energy gap may be determined. α_s and α_n are the electronic ultrasonic absorption coefficients in the superconducting and the normal state respectively. They are related to the width $2\epsilon_0$ of the energy gap by

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the relation $\alpha_s/\alpha_n = 2/(e^{\epsilon_0/kT} + 1)$. To investigate the influence of the lattice anisotropy on the energy spectrum of electrons in a semiconductor, the temperature dependence and absorption coefficients of longitudinal superphonons was investigated by means of an apparatus described here in detail. Fig. 1 shows a block diagram of the measuring device. The generator works at 70 Mc/sec, the quartz emitter receives 2500-3000 pulses per second for a duration of $(1 \div 1.5) \cdot 10^{-6}$ sec. A small sphere of single crystals of tin was used as a sample. It had a diameter of 13-15 mm, and on it, cut surfaces of 5-6 mm diameter perpendicular to the crystallographic axes were produced by electrocorrosion. Onto these surfaces quartz emitters and receivers were cemented in vacuum and on them small plates of brass of 5-6 mm diameter and a thickness of 0.2-0.3 mm. For very pure crystals of tin the condition that the mean free path of the electrons be large in comparison to the ultrasonic wavelength was very well fulfilled at helium temperature. The temperature dependence of ultrasonic absorption coefficients was measured simultaneously in two different directions at temperatures down to 1°K. Fig. 2 shows the Dewar for helium in which the measurements were carried out. ✓

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The temperature of the sample was determined from the saturation vapor pressure of helium. The results are shown in diagrams. Fig. 3 shows α_s/α_n between 1° and 4°K taken along two mutually perpendicular C_2 axes. The measured values (full and empty circles) all lie on one line which shows that the physical properties are the same in the two directions. Fig. 4 shows the same for C_2 and C_4 axes. Here the anisotropy of the energy gap is clearly seen. Measurements made on two samples gave uniform results. For the absolute value of the electronic part of the ultrasonic absorption coefficients in the normal state in the neighborhood of T_c , the following results are obtained: $\alpha_n = (47.6 \pm 0.2)$ decibel/cm - (C_2), and $\alpha_n = (21.4 \pm 0.2)$ decibel/cm - (C_4). Fig. 5 shows $\log(\alpha_s/\alpha_n) = f(T_c/T)$. From the slope of the straight line portion of the curve, the energy gap width at absolute zero may be determined to be $(3.5 \pm 0.2)kT_c$ for the C_2 -axis and $(3.1 \pm 0.1)kT_c$ for the C_4 -axis. Besides the anisotropy in the temperature dependence of the absorption coefficients, an anisotropy

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Investigation of the Anisotropy of the Energy
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of the transition temperature T_c is also established. For the C_2 -axis T_c lies about $0.004^\circ K$ higher than for the C_4 -axis. The authors thank A. I. Berdovskiy and E. I. Ponomarenko for cooperation in the measurements and V. L. Karpachevskiy and B. N. Aleksandrov for help in the preparation of the sample. There are 5 figures and 13 references: 5 Soviet, 6 American, 1 British, and 1 Dutch. ✓

ASSOCIATION: Fiziko-tehnicheskij institut Akademii nauk Ukrainской SSR
(Physicotechnical Institute of the Academy of Sciences of
the Ukrainskaya SSR)

SUBMITTED: January 12, 1960

Card 4/4

88423

S/056/60/039/006/007/063
B006/B056

24.7700 (1043, 1143, 1559)

AUTHORS: Galkin, A. A., Kaner, E. A., Korolyuk, A. P.

TITLE: Investigation of Ultrasonic Absorption by Metals in a
Magnetic Field

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 39, No. 6(12), pp. 1517-1528

TEXT: The characteristics of ultrasonic absorption in metals at low temperatures under conditions at which the mean free path l of the electrons is very large with respect to the acoustic wavelength λ have already repeatedly been investigated both theoretically and experimentally, above all the periodic change in the ultrasonic absorption coefficient α as a function of H^{-1} . The first theoretical calculations are by Fermi and V. L. Gurevich. In the present paper, the theoretical and experimental results are given, and compared for tin and indium. First, the magnetoacoustic resonance and the oscillation of α are investigated for a strong magnetic field, as well as the conditions $\vec{k} \perp \vec{H}$ (\vec{k} - wave vector) and $\lambda \ll 2\pi \ll l$.

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Investigation of Ultrasonic Absorption by
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B006/B056

For tin- and indium crystals typical oscillation diagrams are shown and discussed. Two different types of oscillations are said to occur in tin: Anharmonic resonance oscillations and sinusoidal oscillations. Those of the first kind are ascribed to the existence of an open Fermi surface; the period of the open surface, calculated on the basis of oscillation periods, is in agreement with crystallographic data. A study was made of the anisotropy of ultrasonic absorption in a strong magnetic field and when the condition $r \ll \lambda \ll l$ is satisfied (r is the characteristic parameter of the electron orbit), and theoretical and experimental results were intercompared. The anisotropy of the oscillation periods along the various crystallographic directions was analyzed, and the anisotropy and frequency dependence of α saturation was examined. An analysis of periods, amplitudes, oscillation-phases and the shapes of absorption curves for tin are in agreement with a Fermi surface model, which is a plane network of "corrugated" cylinders directed along the $[110]$ and $[\bar{1}\bar{1}0]$ crystallographic axes. The causes for some quantitative discrepancies between theory and experiment are discussed. A. I. Akhiezer, N. Ye. Alekseyevskiy, Yu. P. Gaydukov, B. N. Aleksandrov, and B. I. Verkin are mentioned. There are 8 figures and 25 references: 16 Soviet, 7 US, 1 Japanese, and

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Investigation of Ultrasonic Absorption by
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B006/B056

1 Canadian.

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy
SSR
(Institute of Radiophysics and Electronics of the Academy
of Sciences Ukrainskaya SSR)

SUBMITTED: June 22, 1960

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Card 3/3

1147
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9.2585

83555
S/020/60/134/001/006/021
B019/B060

AUTHORS: Galkin, A. A., Kaner, E. A., Korolyuk, A. P.

TITLE: A New Kind of Oscillations of the Ultrasonic Absorption Coefficient in Metals in a Magnetic Field

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 1, pp. 74-76

TEXT: The authors show in this article that under certain conditions the variation of the ultrasonic absorption coefficient in metals has a resonance character in the presence of a magnetic field. Fig. 1 shows the ultrasonic absorption coefficient in tin as a function of the magnetic field. The diagram was drawn with $\vec{H} \perp \vec{k}$ in the (110) plane, and \vec{k} was in the direction of the [101] axis. The marked maxima are due to relation

(1): $\bar{\beta} = \frac{\bar{k}\bar{v}}{2\pi} T \neq 0$, where $\bar{\beta}$ and \bar{v} are the shift and velocity of the electron averaged over the period. The existence of resonance oscillations in certain angular intervals was revealed by examinations of

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A New Kind of Oscillations of the Ultrasonic Absorption Coefficient in Metals in a Magnetic Field

S/O20/60/134/001/006/021
B019/B060

tin single crystals at a frequency of 220 megacycles. Fig. 3 shows the stereographic projections of the wave vectors \vec{k} and the magnetic field \vec{H} , where oscillations of this kind were observed. At $\vec{k} \perp \vec{H}$, resonance oscillations are observed in connection with open trajectories. The authors conclude from an analysis of these stereographic projections that the direction of the open periodic trajectory coincides with the $[110]$ axis; this is in accordance with the results obtained from a galvanomagnetic investigation (Ref. 5). The calculation by a formula developed by Galkin et al. (Ref. 2) led to a period of $15 \cdot 10^{-20}$ g.cm/sec along an open trajectory. This value agrees with the one determined by Chambers (Ref. 6) for the Brillouin zone. There are 3 figures and 6 references: 4 Soviet, 1 US, and 1 Canadian. X

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk USSR
(Institute of Radiophysics and Electronics of the
Academy of Sciences UkrSSR)

Card 2/3

KOROLYUK, A. P.

Cand Phys-Math Sci - (diss) "Study of absorption of ultrasonics by metals in a magnetic field at low temperatures." Khar'kov, 1961. 10 pp; (Ministry of Higher and Secondary Specialist Education Ukrainian SSR, Khar'kov Order of Labor Red Banner State Univ imeni A. A. Gor'kiy); 200 copies; free; bibliography at end of text (18 entries); (KL, 6-61 sup, 193)

KOROLYUK, A.P.; PRUSHCHAK, T.A.

New type of quantum oscillations of the absorption coefficient
of ultrasound in zinc. Zhur. eksp. i teor. fiz. 41 no.5:1689-1691
N '61. (MIRA 14:12)

1. Institut radiofiziki i elektroniki AN Ukrainskoy SSR.
(Quantum theory)
(Adsorption of sound)

KOROLYUK, A.P.

"Gigantic" quantum oscillations of the coefficient of sound
absorption in bismuth. Fiz. tver. tela 5 no.11:3323-3324 N '63.
(MIRA 16:12)

1. Institut radiofiziki i elektroniki AN UkrSSR, Khar'kov.

L 1125-66 EWT(1)/EPF(c) IJP(c) WW/GG
ACCESSION NR: AP5021146

UR/0386/65/002/001/0030/0034

AUTHOR: Korolyuk, A. P.; Matsakov, L. Ya. 47.55 49.55

TITLE: New acoustic resonance in an oblique magnetic field

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 2, no. 1, 1965, 30-34

TOPIC TAGS: antimony, sound absorption, absorption coefficient, magnetic field, magnetic resonance, resonance absorption

ABSTRACT: Since earlier observations by one of the authors (Korolyuk, with A. A. Galkin and E. A. Kaner, DAN SSSR v. 134, 74, 1960) of resonant oscillations of the absorption coefficient were limited to magnetic fields perpendicular to the wave vector, and since the earlier theoretical analysis shows that resonance depends on the angle between the electron orbits on the Fermi surface and the magnetic field, the authors have measured this effect in antimony single crystals in an experimental set-up wherein the magnetic field vector could be rotated in the plane of the binary and trigonal axes. The samples for the measurements were grown in the form of disks approximately 1 mm thick with the normal along the binary axis, which coincided with the direction of the wave vector. Plots of the derivative of the absorption coefficient with respect to the magnetic field are shown in Fig. 1 of the

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ACCESSION NR: AP5021146

Enclosure for two frequencies and for one of the orientations of the field. The results show that in weak fields the lines are sinusoidal, but with increasing field intensity they become narrower and assume a somewhat asymmetrical Lorentz shape. The oscillations have the same period in the reciprocal magnetic field. A change in the sound frequency shifts the corresponding resonance lines in proportion to the frequency. Variation of the magnetic field orientation discloses a pronounced anisotropy of the period, and new oscillating components, similar to beats, appear at certain field directions. The number of oscillations also changes with the field direction as a function of the reciprocal field. "We are grateful to E. A. Kaner for useful discussions and to N. D. Belousov for help with the measurements." Orig. art. has: 3 figures and 3 formulas. [02]

9

55

44,55

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk UkrSSR (Institute of Radiophysics and Electronics, Academy of Sciences, UkrSSR)

SUBMITTED: 27Apr65

NO REF SOV: 005

ENCL: 01

OTHER: 002

SUB CODE: SS, NP

ATD PRESS: 4099

Card 2/3

L 1425-66

ACCESSION NR: AP5021146

ENCLOSURE: 01

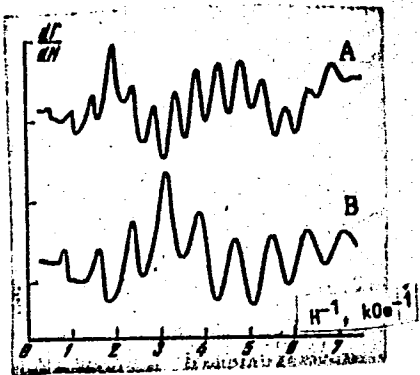


Fig. 1. Plot of the derivative of the longitudinal-sound absorption coefficient $d\gamma/dH$ vs the reciprocal magnetic field. The angle between k and H is 25° , k is along the binary axis, H is in the plane of the binary and trigonal axes.

A - $\omega/2\pi = 5 \times 10^8$ cps;
B - $\omega/2\pi = 3 \times 10^8$ cps.

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DP

~~I 8616-66~~

ACC NRI AP5027038

SOURCE CODE: UR/0120/65/000/005/0217/0219

AUTHOR: Korolyuk, A. P.; Matsakov, L. Ya.

53
52

ORG: Institute of Radiophysics and Electronics, AN UkrSSR, Khar'kov (Institut radio-fiziki i elektroniki AN UkrSSR)

B

TITLE: The stabilization and unfolding of magnetic fields by means of "driftless" amplifiers

SOURCE: Pribory i tekhnika eksperimenta, no. 5, 1965, 217-219

TOPIC TAGS: DC amplifier, magnetic field, magnetic field intensity, servosystem, voltage stabilizer, circuit design

ABSTRACT: The existing DC amplifiers used for the stabilization and unfolding of magnetic fields are often not sufficiently accurate because of their inherent drift of the zero and comparatively low amplification. In addition, they require large voltage drops across reference resistances. The article describes a new servo-system stabilizing the electromagnetic field with respect to a certain reference voltage with a relatively high degree of accuracy ($\sim 10^5$). The control voltage may originate from Hall sensors or from voltage drops across reference resistors. The device is also applicable to the unfolding of magnetic fields according to a certain given law (e.g., hyperbolic). Such requirements arise whenever the oscillations of various physical quantities have the same period in the reversed magnetic field. The author gives the block diagram of the device, the circuit diagram of the stabilization and unfolding device, the block for field unfolding, and the circuit for hyper-

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UDC: 621.317.4

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8616-66
ACC NR: AP5027038

During a 3 hour recording session the drift did not exceed the half-width of the line (~ 0.05 Oe). Orig. art. has: 3 formulas and 5 figures.

SUB CODE: IE,EC,EM / SUBM DATE: 02Ju164 / ORIG REF: 002

jrn

Card 3/3

L 11962-66 EWT(m)/T/EWP(t)/EWP(b)/EWA(s) IJP(c) JD

ACC NR: AP5026586

SOURCE CODE: UR/0056/65/049/004/1009/1018

42
38
B

AUTHOR: Korolyuk, A. P.

ORG: Institute of Radiophysics and Electronics, Academy of Sciences, Ukrainian SSR
(institut radiofiziki i elektroniki Akademii nauk Ukrainiskoy SSR)

TITLE: Investigation of the oscillations of the absorption coefficient of sound in bismuth. I. Geometrical resonance

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 4, 1965, 1009-1018

TOPIC TAGS: bismuth, sound absorption, single crystal, acoustic resonance

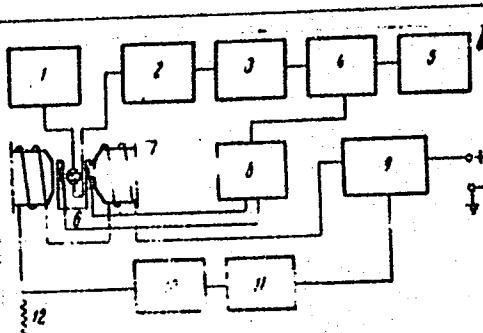
ABSTRACT: Detailed investigations were made of the oscillations of the coefficient of absorption of sound in bismuth single crystals at a longitudinal vibration frequency of 500 Mc and at 1.4K. Inasmuch as earlier experiments on the quantum oscillations of various physical quantities have yielded data only on the areas of the cross section of the Fermi surface, the authors used the geometrical resonance method for a direct determination of the extremal diameters of the bismuth Fermi surface. The measurements were made with an ultrasonic continuously-operating spectrometer, using apparatus similar to that used by D. H. Reneker (Phys. Rev. v. 115, 303, 1959), and a cryostat described by the author earlier (PTE No. 6, 99, 1960). X-cut quartz plates with natural frequency of approximately 100 Mc were used as transducers to convert the electromagnetic oscillations into ultrasound (at the 5th harmonic)(Fig.1.)

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ACC NR: AP5026586

Fig. 1. Block diagram of apparatus. 1--Oscillator, 2--superheterodyne receiver, 3--low-frequency amplifier, 4--phase-sensitive detector, 5--automatic recorder, 6--sample, 7--electromagnet, 8--magnetic-field modulator, 9--electronic rheostat, 10--control voltage unit, 11--dc amplifier, 12--standard resistor.



The samples were discs about 2.5 mm thick and 8--10 mm in diameter, cut from larger bismuth crystals. The extremal dimension of the Fermi surface was determined from the measured period of the oscillations by a formula derived by V. L. Gurevich (ZhETF v. 37, 71, 1959). The measurements were made for three orientations of the crystal with respect to the acoustic wave vector K and the magnetic field, and the three principal crystallographic planes were investigated. The minimum value of the electron momentum was found to be $(5.5 \pm 0.2) \times 10^{-22}$, $(7.6 \pm 0.3) \times 10^{-22}$, and $(13.8 \pm 0.5) \times 10^{-22}$ along the binary axis, in the plane of the bisectrix and the trigonal axis, and along the bisectrix axis, respectively. The maximum electron momentum is $(76 \pm 3) \times 10^{-22}$ in a direction which makes an angle $6 \pm 1^\circ$ with the bisectrix axis, in the plane of the bisectrix and the trigonal axis. The results are discussed in light of several models of the Fermi surface of bismuth. Author thanks E. A. Kaner,

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L 11962-66

ACC NR: AP5026586

3

M. S. Khaykin, and L. E. Fal'kovskiy for valuable discussions, and O. G. Shevchenko for purifying the bismuth and measuring its resistance. Orig. art. has: 6 figures, 7 formulas, and 2 tables.

SUB CODE: 20/ SUBM DATE: 25Mar65/ ORIG REF: 009/ OTH REF: 011

Ch
Card 3/3

L 21576-66 EWI(1)/EPF(n)-2/ETC(m)-6 IJP(c) WW

ACC NR: AP6011495

SOURCE CODE: UR/0386/66/003/007/0291/0295

AUTHOR: Korolyuk, A. P.; Matsakov, L. Ya.

ORG: Institute of Radiophysics and Electronics, Academy of Sciences, UkrSSR
(Institut radiofiziki i elektroniki Akademii nauk Ukrainiskoy SSR)

TITLE: Doppler splitting of acoustic cyclotron resonance lines in an oblique magnetic field in antimony

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 7, 1966, 291-295

TOPIC TAGS: acoustic resonance, cyclotron resonance, line splitting, Doppler effect, antimony, sound absorption, *single crystal, magnetic field*

ABSTRACT: This is a continuation of an earlier investigation of the sound absorption coefficient in antimony at helium temperatures and with the sound-wave and magnetic-field vectors not mutually perpendicular (Pis'ma ZhETF v. 2, 30, 1965), in which several new phenomena, and in particular oscillations on the extremal electron trajectories, were reported. It is shown in this article that a similar effect occurs at relatively low sound frequencies. To observe the effect the authors have grown single crystals of antimony, subjected to supplementary 20-fold zone recrystallization. Owing to the purification and to the lowering of the tem-

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L 21576-66

ACC NR: AP6011495

perature to 1.4K, the electron mean free path time increased to such an extent, that even at a sound frequency 5.0×10^8 cps it was already possible to reach the region of acoustic cyclotron resonance (ACR). Measurements of the periods and of the splitting of the ACR lines in a magnetic field make it possible, in contrast to the case described earlier, to measure separately the cyclotron mass and the velocity of the electron on the extremal section. For the case of quadratic energy dispersion, a general expression is obtained for the angular dependence of the ACR periods on the extremal trajectories. Preliminary measurements were made of the angular dependence of the periods and the splitting of the ACR lines in the plane of the binary axes of antimony at 5.0×10^8 cps. Since it is not clear at present how good the quadratic approximation is for antimony, and whether the spectral constants used are reliable, the qualitative agreement between the calculated and measured quantities can be regarded as fully satisfactory. The obtained effective mass of the carriers $m^* = 0.15 m_0$ is in sufficiently good agreement with the mass $m^* = 0.14 m_0$ measured by the method of ordinary cyclotron resonance. The authors thank E. A. Kaner for fruitful discussions. Orig. art. has: 2 figures and 3 formulas.

SUB CODE: 20/ SUBM DATE: 10Feb66/ ORIG REF: 002/ OTH REF: 003

Card 2/2 *ULR*

L 04108-67 EWP(k)/EWT(d)/EWT(l)/EWT(m)/T/EWP(t)/ETI IJP(c) WW/JD

ACC NR: AP6032464

SOURCE CODE: UR/0056/66/051/003/0697/0706

49
48
B

AUTHOR: Korolyuk, A. P.

ORG: Institute of Radio Physics and Electronics, Academy of Sciences Ukrainian SSR (Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy SSR)

TITLE: Investigation of the sound absorption coefficient in bismuth. II. Gigantic oscillations

SOURCE: Zhurnal eksperimental'noy i teoricheskoy fiziki, v. 51, no. 3, 697-706

TOPIC TAGS: low temperature physics, low temperature effect, bismuth single crystal, ultrasound absorption, ultrasound absorption coefficient

ABSTRACT: Gigantic oscillations of the longitudinal ultrasound absorption coefficient in bismuth single crystals were studied at a temperature of 1.4K. The oscillation periods were measured at frequencies of 220 and 300 Mc/sec in the three main crystallographic planes. The shapes and amplitudes of the absorption lines were in accordance with theoretical predictions. The experimental results were compared with data obtained by other methods. The author expressed his gratitude for participation in discussion of the subject to E. A. Kaner, V. G. Skobor, and V. L. Gure-

Card 1/2

L 04108-67
ACC NR: AP6032464

vich, and for assistance in computations to L. Ya. Matsakov. Orig. art. has:
11 figures, 1 table, and 8 formulas. [Based on author's abstract]

SUB CODE: 20/ SUBM DATE: 09Jul65/ ORIG REF: 013/ OTH REF: 006/

kh

Card 2/2

ACC NR: AR6037010 (A, N) SOURCE CODE: UR/0181/66/008/011/3418/3420

AUTHOR: Kazanskiy, V. B.; Korolyuk, A. P.

ORG: Institute of Radiophysics and Electronics, AN UkrSSR, Kharkov (Institut radiofiziki i elektroniki AN UkrSSR)

TITLE: Giant quantum oscillations of the absorption coefficient of ultrasound in antimony

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3418-3420

TOPIC TAGS: ultrasound absorption, antimony, quantum oscillation, electron interaction, phonon interaction

ABSTRACT: In view of the increased interest in the characteristics and the Fermi surface of semimetals, the authors measured the amplitudes and periods of giant quantum oscillations in antimony using 350-MHz ultrasound at 1.8K, in magnetic fields up to 110 kOe. The magnetic field was produced by discharging a capacitor bank through a liquid-hydrogen cooled solenoid. The duration of the magnetic field pulse from maximum to 50 kOe was 0.25 sec. The oscillations were recorded with an oscilloscope. The sample was cut from a single crystal in the form of a disc 7 mm in diameter and 2.5 mm thick. The wave vector of the sound was perpendicular to the surface of the sample and parallel to the binary axis. The experimental values of the periods of the giant quantum oscillations were found to be in agreement with a theoretical formula derived by one of the authors earlier (Korolyuk, ZhETF v. 51, 697, 1966). The measured amplitudes are used to calculate the energy of the electron-

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ACC NR: AP6037010

phonon interaction, which is found to decrease from 7.2 to 6.0 ev at 0 and 30° respectively, and then increase to 6.3 ev at 36°. The anisotropy of the electron-phonon interaction energy is found to be small in the plane of the binary axis. The absolute value of the energy of the electron-phonon interaction in antimony is thus found to be close to its value in good metals, in spite of the low carrier density. Orig. art. has: 2 figures, 2 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 02Jun66/ ORIG REF: 003/ OTH REF: 003

Card 2/2

KOROLYUK, A. Ye. (Cand. Med. Sci.)

Analiz Kliniko-anatomicheskikh Danykh o Bol'nykh Shizofrennykh Chlenakh v
Kuybyshevskoy Psikhonevrologicheskoy Bol'nitse b 1949-1955gg. p. 377

Gistopatologicheskiye Izmeneniya Mozga Bol'nykh Shizofrennykh Chlenakh vo Vremya
Insulinovogo Shoka. p. 382

V sb Aktual'nyye Problemy Nevropatologii i Psikhologii. Kuybyshev, 1957.

Iz Kafedry Psikhologii Kuybyshevskogo Gosudarstvennogo Meditsinskogo Instituta

24(2), 24(6), 18(6) SOV/126-7-2-26/39
AUTHORS: Kushta, G. P., Mikhaylyuk, I. P. and Korolyuk, G. F.
TITLE: Influence of Alloy Element Additions on the Interatomic
Bond Forces of the Aluminium Lattice (Vliyaniye
legiruyushchikh primesey na sily mezhatomnoy svyazi
v reshetke alyuminiya) 1. Influence of Copper
(1. Vliyaniye medi)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 7, Nr 2,
pp 299-301 (USSR)

ABSTRACT: The study of the mechanism by which the characteristic temperature of solid solutions changes as a function of their composition, is one of the most important means for the determination of the nature of reactions between atoms of solid solutions. In a paper by Kushta (Ref 7), one of the authors has shown that the great strength of the duralumin type of alloys is not associated with formation of stronger bond forces between the atoms in the lattice of these alloys. Duralumin, however, contains a number of alloy elements (Cu, Mg, Si, Mn and others), each of which may exert a different influence, as the nature and extent to which bond forces change in solid solutions depend on the properties of each alloy element

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SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

and its concentration in the solid solution (see Refs 3,8 and 9). It appears appropriate that the influence of each of the alloy constituents on the bond forces in the solid solution should be studied. Technically pure aluminium of specification AI and electrolytic pure copper were used as materials for making alloys. Specimens were made in porcelain crucibles by thermodiffusion of copper in molten aluminium at 800°C. Melting was carried out under a layer of flux. The characteristic temperature of the specimens was determined by the change of the heat factor of the X-ray interference line intensity. The specimens for X-ray exposure were made from powder produced by filing, which was annealed for 10 hours in vacuum at 500°C, and had a cylindrical shape^{*}, the diameter being 0.8 mm (^{*} The practically instantaneously cooled powder specimens were X-rayed at once after cooling. This permits the assumption that the copper concentration in the solid solution was practically identical with the one given.) X-raying was carried out in an open camera of the type RKD in the rays of a copper

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SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

anticathode at two temperatures - room temperature and liquid air temperature. In the last case, the specimen was sprayed with a stream of liquid air by means of a special siphon device (Ref 1). In order to obtain the line (333) for aluminium in X-ray pictures, a special (non-standard) collimator was used. X-ray photographs, taken at room temperature and at a low temperature, were developed under identical conditions and were then photometered in a visual microphotometer of type MF-2. For the determination of the characteristic temperature from the X-ray results a method was used which had been worked out by Il'ina et al. and Kurdyumov et al. (Refs 10 and 3 respectively). The relative intensities of the lines (111), (222), (422) and (333) were experimentally measured. The results of the measurements were neutralised along two directions of the X-ray picture for 2-5 X-ray photographs. The intensity of the lines was calculated as an area, bounded by the photometric curve and the base line. The intensity of the line (333) was calculated as the sum of the areas of two

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Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

lines of the $K\alpha_{1,2}$ doublet. In Fig 1 the results of the measurements are shown in the form of a logarithmic dependence of the intensity ratio

$$\frac{(i_{h_2 k_2 l_2} / i_{h_1 k_1 l_1})_{20^\circ}}{(i_{h_2 k_2 l_2} / i_{h_1 k_1 l_1})_{-183^\circ}} = \frac{\alpha_1}{\alpha_2}$$

on the difference of the sums of the index squares of corresponding pairs of lines for pure aluminium and its alloys with 2, 3 and 4 wt.% copper. From the figure it can be seen that the change of the heat intensity factor on introducing copper into the solid solution changes in the direction of decrease of the mean square of displacement of the atoms during oscillations, and of increase in the temperature of the solid solution, i.e. in the direction of increase of the bond forces of

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SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

the lattice. From the tangent of inclination of the straight line in Fig 1, using the formula

$$\ln \frac{\alpha_1}{\alpha_2} = A\varphi(\theta) \left(\sum h_2^2 - \sum h_1^2 \right),$$

where $A = \frac{3h^2}{a^2mk\theta}$, $\varphi(\theta) = \left[\frac{\Phi(\theta|T_1)}{\theta|T_1} - \frac{\Phi(\theta|T_2)}{\theta|T_2} \right]$

Φ - Debye's function, the values of $\Delta \bar{v}_2^2$ and of the characteristic temperature θ_2 were determined. The calculated values of θ and \bar{v}_a^2 , which are characteristic of the strength of the interatomic bond of the solid solution lattice, are shown in the Table. The accuracy with which the characteristic temperature can be determined is within ± 8 to 10^0 . The observed increase in bond force with increase in copper content in the solid solution coincides with a decrease in the lattice parameter of aluminium on introducing copper. As the

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SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

interatomic bond forces in the lattice of duralumin are practically identical with those of pure aluminium (Ref 7), it can be assumed on the basis of the results obtained in this investigation, that the influence of other additions appears to be of opposite sign. It is understood that these assumptions require further confirmation. Thus, the most important alloy element addition in duralumin, copper, increases the bond forces in the lattice in the solid solution, and only the joint influence of all additions leaves the bond strength in the lattice practically unaltered; the strengthening of the alloy observed is due to other strengthening factors (Ref 7) which bring about a more effective employment of the bond forces existing in the lattice.

There are 1 figure, 1 table and 10 references, all of which are Soviet.

(Note: This is a slightly abridged translation except for the figure and table captions)

ASSOCIATION: Chernovitskiy gosudarstvennyy universitet
(Chernovtsy State University)

SUBMITTED: October 13, 1957
Card 6/6

KOROLYUK, I.K.; STRAKHOV, N.M.; GEKKER, R.F., redaktor; SPRYGINA, L.I., redaktor;
SHEVCHENKO, G.N., tekhnicheskij redaktor.

[Limestone hills and conditions of their formation in Podolia] Podol'skie toltry i usloviia ikh obrazovaniia. Moskva, Izd-vo Akad.nauk SSSR, 1952
138 p. (Akademiia nauk SSSR. Institut geologicheskikh nauk. Trudy, no.110).
(MIRA 9:7)

1.Chlen-korrespondent AN SSSR (for Strakhov).
(Podolia--Physical geography) (Podolia--Cerals, Fossil)