"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

S/120/62/000/001/054/061
E032/E314

5.5800

AUTHORS: Kaganov, M.A. and Kaganova, T.I.

TITLE: Direct measurement of the relative humidity of gases

PERIODICAL: Pribory i tekhnika eksperimenta, no. 1, 1962, 199 - 201

TEXT: The authors describe a method of measuring the relative humidity, which is based on the fact that the temperature dependence of the electrical conductivity of thermistors is of the same functional form as the relation between the maximum vapour pressure of water and the temperature. It follows that a simple Wheatstone-bridge arrangement, including two thermistors, may be used to determine the relative humidity. One of the thermistors is used to determine the dew point and the other the temperature of the medium. An accuracy of 2-3% is reported in the range of humidities of 25 - 95% and range of air temperatures of 15 - 70 °C. There is 1 figure.

Card 1/2

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Direct measurement S/120/62/000/001/054/061
E032/E314

ASSOCIATION: Nauchno-issledovatel'skiy institut mekhanizatsii rybnogo khozyaystva (Scientific Research Institute for Mechanization in the Fisheries)

SUBMITTED: April 20, 1961

Card 2/2

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

S/207/62/000/003/014/016
I028/I228

AUTHOR: Kaganov, M. A. and Yu. L. Rozenshtok (Leningrad)

TITLE: On the teperature of bodies in a medium with fluctuating heat transfer and temperature

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1962, 90-92

TEXT: The equations of the temperature fields of bodies under conditions of periodically varying medium temperature and heat ftransfer are solved for the case of cylinderical and spherical bodies by successive approximations. It is assumed that the medium temperature Θ and heat transfer coefficient α are described by the following formulae:

$$\Theta = A \cos \omega t; \quad \alpha = \alpha_0 [1 + \gamma \cos(\omega t - \varphi)] \tag{3}$$

It is found that the thermometer gives a distorted reading of the mean temperature of the medium, the error ΔT depending on the shape of the body and on the phase shift ϕ between Θ and α. There are 2 figures.

SUBMITTED: November 24, 1961

Card 1/1

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

31879
S/170/62/005/001/007/013
B104/B102

26.4100

AUTHORS: Kaganov, M. A., Mushkin, I. G.

TITLE: Semiconductor thermoanemometer with temperature compensation

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 5, no. 1, 1962, 72-78

TEXT: A thermoanemometer with two thermistors as sensitive elements is described. The wind velocity is determined from the difference between the temperatures of the two thermistors connected to a differential bridge. The thermistors are equal in form and temperature coefficient but differ in surface area. They are heated by the differential bridge current. By automatic control of the current heating the thermistors an indication of the wind velocity independent of the ambient temperature is achieved. The decrease of measurement accuracy with increasing wind velocity is one of the most serious defects of the instrument. A functional amplifier and an amplifier with nonlinear amplitude characteristic are recommended for the correction of accuracy. Such corrections make it possible to measure wind velocities between 2 and 40 cm/sec in the 10-30°C range with an error of about 4 %. The error due

Card 1/2

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

DUL'NEV, G.N.; KAGANOV, M.A.; KISNER, I.S.

"Fundamentals of heat transfer by radiation" by A.G.Blokh. Reviewed by G.N.Dul'nev, M.A.Kaganov, I.S.Lisker. Inzh.-fiz. zhur. 5 no.10: 130-131 O '62. (MIRA 15:12)
(Heat—Transmission) (Heat—Radiation and absorption)
(Blokh, A.G.)

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.; MIKHAYLOV, I.; RASHBA, E.

Eighth All-Union Conference on Low Temperature Physics. Usp. fiz. nauk 77 no.2:353-367 Je '62. (MIRA 15:6)
(Low temperature research--Congresses)

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

45022

9,4320

S/103/63/024/001/009/012
D201/D308

AUTHOR: Kaganov, M. A. (Leningrad)

TITLE: A method of compensating differences in temperature characteristics of semiconductor thermo resistances

PERIODICAL: Avtomatika i telemekhanika, v. 24, no. 1, 1963, 97-103

TEXT: The author suggests a method of synthesis of temperature compensating networks based on minimization of measurement errors due to parameter spread. The circuits are two terminal networks having a resistance $R^{(n)}(T)$ and consisting of one temperature sensitive semiconductor resistor with $\rho^{(n)}(T)$ and of two or three constant resistors. The circuits are synthesized so as to result in the best possible approximation, within a given temperature range ΔT, of the temperature dependent $R^{(n)}(T)$ to the function $R^{(o)}(T)$ - the resistance of a dipole with the transducer $\rho^{(o)}(T)$ having nominal values of its parameters. Circuits with two and

Card 1/2

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.A.; LISKER, I.S.

Effect of contact temperature meters on the accuracy of the determination of thermophysical properties. Inzh.-fiz. zhur. 6 no.9:27-34 S '63. (MIRA 16:8)

1. Agrofizicheskiy institut, Leningrad.

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. A.

"Application of thermistors in measuring devices with the transformation of transducer-resistance change into a given functional temperature relation of an output parameter."

report submitted for 2nd All-Union Conf on Heat & Mass Transfer, Minsk, 4-12 May 1964.

Agricultural Physics Sci Res Inst.

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.A.

Precision of differential measuring circuits with semiconductor thermistors. Izm. tekh. no.3:33-36 Mr'64

(MIRA 17:8)

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

L 26818-65 EWT(1)/EPF(n)-2 Pu-4 ASD(h)-5 WW

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

L 24818-65

ACCESSION NR: AP5001966

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

ACCESSION NR: AP4038660

S/0170/64/000/004/0028/0031

AUTHOR: Kaganov, M. A.; Lisker, I. S.

TITLE: Lag of electrical resistance thermometers

SOURCE: Inzhenerno-fizicheskiy zhurnal, 7, no. 4, 1964, 28-31

TOPIC TAGS: Electrical resistance thermometer, resistance thermometer lag, resistance thermometer time constant, heat sensitive element

ABSTRACT: The lag of a thermal system consisting of a heat-sensitive element and wire leads was determined. The dependence of the time constant of electric thermometers on the thermal characteristics of the material constituting the leads, their number and their diameter was obtained. In order to verify experimentally the derived relations characterizing the effect of the leads on the lag of heat-sensitive elements, experiments were carried out in which the thermal lag of substances to which leads of various cross sections were attached was measured. Results are cited for the case of cooling of a series of bismuth spheres 3.2×10^{-3} m in diameter. It was found that the wire leads (constantan, copper, manganin-constantan) had a considerable effect on the time

Card 1/2

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

ACCESSION NR: AP4038660

constant of the sample studied. The results given in the paper may be useful in designing and operating electrical resistance thermometers to be used in recording rapid processes in media of considerable volume. Orig. art. has: 5 formulas.

ASSOCIATION: Agrofizicheskiy nauchno-issledovatel'skiy institut, Leningrad (Scientific Research Institute of Agricultural Physics)

SUBMITTED: 13Feb63 DATE ACQ: 19May64 ENCL: 00

SUB CODE: EE NO REF SOV: 004 OTHER: 000

Card 2/2

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.A. (Leningrad); YANGARBER, V.A. (Leningrad)

Temperature field in a homogeneous medium heated by a current under conditions of spherical symmetry. PMTF no.2:110-113 Mr-Ap '65. (MIRA 18:7)

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

L 2452-66

ACCESSION NR: AP5023178 UR/0320/65/000/008/0129/0131

32
B

AUTHOR: Kaganov, M. A.; Mushkin, I. G.

TITLE: A semiconductor thermoanemometer for agricultural meteorology

SOURCE: Vestnik sel'skokhozyaystvennoy nauki, no. 8, 1965, 129-131

TOPIC TAGS: agriculture, anemometer, electronic measurement, thermistor

ABSTRACT: The authors describe an electronic thermal wind gauge developed at the Scientific Research Institute of Agricultural Physics. Temperature error is eliminated by using a differential measurement circuit with two directly heated sensing units with different power dissipation. The wind velocity is determined from the temperature difference of these sensing elements. Temperature error compensation is automatic in this type of circuit: a change in atmospheric temperature affects the resistance of the elements, which are connected in adjacent arms of the measurement bridge, and the combination of the remaining elements in the circuit compensates for the change in heating power by a corresponding change in the current sensitivity of the circuit. The bridge contains two thermistors with identical temperature coefficents but different nominal resistances and surface areas. The relationship be-

Card 1/2

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

SMIRNOV, V.S.; CHURDNOVSKIY, A.F.; KAGANOV, M.A.

Theoretical way of evaluating the heat conductivity of porous alloys at high temperatures. Trudy LPI no.243:12-18 '65. (MIRA 18:6)

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.A.; ROZENSHTOK, Yu.L. [deceased]

Simulation of temperature dependences. Izm. tekh. no.11: 10-14 N '65. (MIRA 18:12)

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

L 06178-67

ACC NR: AP6017539 (A) SOURCE CODE: UR/0193/66/000/001/0039/0040

AUTHOR: Kaganov, M. A.; Kurtener, D. A.

ORG: none

TITLE: Experience with a multipoint instrument for remote measuring and automatic recording temperatures by semiconductor sensors

SOURCE: Byulleten' tekhniko-ekonomicheskoy informatsii, no. 1, 1966, 39-40

TOPIC TAGS: temperature measurement, temperature instrument

ABSTRACT: A 12/24-point temperature measuring-and-recording instrument was developed in the Agrophysical Scientific Research Institute. Thanks to the use of an unbalanced bridge circuit with an output electronic potentiometer, the resistance of connecting wires can be neglected. Semiconductor thermistors (over 1 kohm, 3—5% per 1C) are employed as sensors. Only three wires are needed for connecting the instrument to the sensors, the latter being switched in succession by a step-type switch. These characteristics are claimed: scale span, -5+45C; error, 0.25%; distance, 2—3 km. Orig. art. has: 1 figure.

SUB CODE: 13,09 / SUBM DATE: none

Card 1/1 UDC: 536.51-52

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.I.
CA

2

Temperature dependence of the thickness of the He II film. M. I. Kaganov and B. N. Esel'son (Phys. Tech. Inst. Acad. Sci. Ukr. S.S.R., Kiev). *Zhur. Eksptl. Teoret. Fiz.* 21, 656-7(1951).—An error is pointed out in the derivation of Atkins (*C.A.* 45, 4508gh): the right-hand member of the Euler equation should be written $-\nabla p/\rho_s$ (ρ_s = d. of the superfluid phase), instead of $-\nabla p/\rho$. With this correction, the expression for the thickness of the superfluid film becomes consistent with the optical measurements of Jackson and Burge (*C.A.* 44, 3760e) and with Peshkov's (*C.A.* 41, 2621i) data for ρ_s/ρ. N. Thon

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KAGANOV, M.E.

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.I.

USSR.

537.312.62

✓3198. Kinetics of destruction of superconductivity by an alternating field ($\omega \tau \sim 10^{11}$ sec^{-1}). I. M. LIFSHITS AND M. I. KAGANOV. *Dokl. Akad. Nauk SSSR*, 90, *No.* 5, 505-6 (1953) *In Russian*. English translation, *U.S. National Sci. Found.* NSF-tr-114.

In experiments by Lazarev and Galkin and others a steady magnetic field and an alternating one are superimposed on a superconductor so that during part of each period the field exceeds the critical value; destruction of superconductivity takes place by the movement into the metal of a boundary between superconducting and normal phases. The kinetics of this process is discussed, taking into account both the possibility of relaxation effects and of superheating. The discussion is limited to frequencies < 1 Mc/s, so that mean-free-path effects are unimportant, and expressions are given for the depth of the boundary as a function of time for various limiting conditions. See also Abstr. 1016 (1952). D. SHOENBERG

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Nuclear Sci Abs
V-8 Jan 15, 1954
Physics

KINETICS OF THE DESTRUCTION OF SUPERCONDUCTIVITY BY A HIGH FREQUENCY FIELD. I. M. Lifshitz and M. I. Kaganov. Translated from Doklady Akad. S.S.S.R. 90, 529-31(1953). 3p. (NSF-tr-91)

The kinetics of the destruction of superconductivity by an alternating field with frequency $\omega \gtrsim 10^6$ sec^{-1} was investigated. A kinetic equation was derived from the Maxwell equations limited by certain boundary conditions: $-\partial H/\partial z = (-4\pi/c)J$; $\partial E/\partial z = (-1/c)(\partial H/\partial t)$; $H|_{z=0} = H_0(\omega t)$; $E|_{z=\xi(t)} = H_k(\xi'(t)/c)$; and $d\xi/dt = (H(\xi) - H_k)/H_k)\nu_0$. (J.S.R.)

6/23/54

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.

"Interaction of Charged Particles with Slow Waves in an Anisotronic Dielectric." Cand Phys-Math Sci, Khar'kov State U, Khar'kov, 1954. (RZhFiz, Feb 55)

SO: Sum. No. 631, 26 Aug 55 - Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (14)

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.

Category : USSR/Electricity - Conductors G-4

Abs Jour : Ref Zhur - Fizika, No 1, 1957 No 1621

Author : Azbel', M.Ya., Kaganov, M.I.

Title : On the Theory ~~of the Anomalous~~ Skin Effect in Thin Films

Orig Pub : Uch. zap. Khar'kovsk. un-ta, 1955, 64, 59-65

Abstract : The authors consider the normal incidence of a plane monochromatic wave on a thin metallic film, the thickness of which is much less than the free path l. The behavior of the conduction electrons is described by the kinetic equation for the distribution function of the electrons in phase space. An expression is derived for the surface impedance of metal films in the normal and in the superconducting states. The dependence of the surface impedance on the film thickness d and on the frequency ω is investigated. The ratio of the active component R to the inducted component X for superconducting films is approximately equal to ω; for films made of metal in the normal state $R/X \sim 1/\omega$ (at low temperatures). In the case of superconducting films, the value of X depends little on d outside of the dependence on the behavior of the electrons at the metal boundary; in this case $R \sim 1/d$ in the case of mirror reflection of the electrons from the boundary, and $R \sim \ln d/l$ in the case of diffuse reflection.

Card : 1/1

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

USSR/Physics - Helium II FD-2386

Card 1/1 Pub. 146 - 23/26

Author : Lifshits, I. M.; Kaganov, M. I.

Title : Effective density of rotating liquid helium II

Periodical : Zhur. eksp. i teor. fiz., 29, August 1955, 257-258

Abstract : As has been shown (L. D. Landau, Ye. M. Lifshits, DAN SSSR, 100, 669, 1955), during rotation of a container with helium II the normal part of the helium mass rotates as a whole, but relative to the superfluid motion the cylindrical volume of liquid is resolved into a number of coaxial cylindrical layers in each of which superfluid motion holds with velocity distributed according to the law: $v_s^i = b_i/r$, $b_i = W(r_i^2-r_{i+1}^2)/(2\cdot\ln[r_i/r_{i+1}])$, where the values of the radii of the boundaries of separation are determined for two limiting cases of slow and fast rotation. In the present note the writers make more precise these limiting cases, and study the dependence of effective density upon angular velocity W for various temperatures. Two references: e.g. Ye. M. Lifshits, Sverkhtekuchest' (teoriya) [Superconductivity (Theory)], supplement to monograph of Keesom, Foreign Literature Press, 1949.

Institution : Physicotechnical Institute, Academy of Sciences Ukrainian SSR, Khar'kov

Submitted : March 31, 1955

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.

USSR/ Physics - Energy losses

Card 1/2 Pub. 22 -19/60

Authors : Sitenko, A. G., and Kaganov, M. I.

Title : About the energy losses by a charged particle moving in an anisotropic medium

Periodical : Dok. AN SSSR 100/4, 681-683, Feb 1, 1955

Abstract : Proof is given of the fact that systematic calculations of the energy losses of a moving charged particle, which moves in an anisotropic medium, lead to a uniform solution; for the simplest anisotropic medium the losses are expressed as follows:

$$-\frac{dE}{dz} = \frac{4\pi N e^2 q^2}{m v^2}\left\{\ln\frac{m v^2 \chi_{\Delta}^2}{4\pi e^2 N} + \ln\frac{\varepsilon_{\perp}-1}{\varepsilon_{\perp}(1-\beta^2)} - \beta^2\right\}$$

Institution : Acad. of Sci., USSR, Physico-Technical Institute

Presented by: Academician L. D. Landau, October 14, 1954

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Periodical : Dok. AN SSSR 100/4, 681-683, Feb 1, 1955

Card 2/2 : Pub. 22 - 19/60

Abstract : when $\beta < \frac{1}{\sqrt{\varepsilon_\perp}}$; $-\frac{dE}{dz} = \frac{2\pi N e^2 q^2}{m v^2} \left\{ \ln \frac{m v^2 \varepsilon_m}{4\pi\hbar^2 N} - \frac{1-\beta^2}{\varepsilon_\perp - 1} \right\}$

when $\beta > \frac{1}{\sqrt{\varepsilon_\perp}}$

These expressions are identical to those obtained by Fermi with only one variation, i.e. Fermi's ε's are replaced by $\varepsilon_\perp$'s. Five references: 4 USSR and 1 USA (1940-1953).

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Kaganov, M I

USSR/ Physics - Skin effect

Card 1/2 Pub. 22 - 12/49

Authors : Kaganov, M. I., and Azbel', M. Ya.

Title : Regarding the theory of the anomalous skin effect

Periodical : Dok. AN SSSR 102/1, 49-51, May 1, 1955

Abstract : An exact expression of the anomalous skin effect is sought. It is, basically, a further development of Pippard's theory on the same subject. Pippard, under the assumption that surface electrons are governed by the law of an optional dispersion, obtained an approximate expression for the skin effect. The authors, under the same assumption, obtained the

Institution : The Acad. of Scs., Ukr. SSR, Physico-Technical Institute

Presented by : Academician L. D. Landau, February 1, 1955

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Card 2/2 Pub. 22 - 12/49

Periodical : Dok. AN SSSR 102/1, 49-51, May 1, 1955

Abstract : following formulas for the skin effect, $Z_{x,y}$:

$$Z_{x,y} = \begin{cases} \left(\sqrt{3\pi}\,\dfrac{\omega^2}{c^4 B_{x,y}\gamma}\right)^{1/3} (1 + \sqrt{31}) & (q = 0); \\ \dfrac{8}{9}\left(\sqrt{3\pi}\,\dfrac{\omega^2}{c^4 B_{x,y}\gamma}\right)^{1/3} (1 + \sqrt{31}) & (q = 1) \end{cases}$$

The symbols q , B and ω are explained. Six references: 1 USSR, 1 Germ., and 4 Brit. (1938-1954).

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I., AZBEL, M. I., LIFSHITS, I. M., and KANNER, E. A., (Khar'kov)

"On the Theory of Galvanomagnetic Phenomena," a paper submitted at the International Conference on Physics of Magnetic Phenomena, Sverdlovsk, 23-31 May 56.

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

CARD 1 / 2 PA - 1571

SUBJECT USSR / PHYSCIS
AUTHOR KAGANOV, M.I., LIFŠIC, I.M., TANATAROV, L.V.
TITLE Relaxation between Electrons and Lattice.
PERIODICAL Žurn. eksp. i teor. fis, 31, fasc. 2, 232-237 (1956)
Issued: 10 / 1956

Here the relaxation between the electrons of a metal and a crystal lattice (phonons) is studied. The method employed for this purpose permits the determination of the heat transfer coefficient for any temperatures.
At first the quantity of energy ($\bar{U}$) transferred by the electrons (per unit of volume) to the lattice in the course of one second is computed. The phonon function changes as a result of the "creation" and "annihilation" of phonons. Such processes are possible because the velocity of the electrons exceeds that of sound. To the creation of a phonon (seen from the point of view of quantum mechanics) there corresponds the ČERENKOV-like radiation of sound waves (in the classical sense). The expression found for $\bar{U}$ is explicitly written down and specialized for low and high temperatures. Furthermore, $\bar{U}$ is computed for the case that the difference of the temperatures Θ and T of the lattice and the electrons respectively is considerably less than T, and besides, for the case $T \ll \Theta$.
The expression for $\bar{U}$ for the case $T \gg T_0$, $\Theta - T \ll T$ (T_0 - DEBYE temperature) can be determined in a purely classical manner. For this purpose the radiation of sound waves by an electron is studied which moves with constant velocity v through the lattice. The equations of the enforced oscillations of the elastic

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

CARD 1 / 2 PA - 1983

SUBJECT USSR / PHYSICS
AUTHOR ESEL'SON,B.N., BEREZNJAK,N.G., KAGANOV,M.I.
TITLE The λ -Temperatures of the Solutions of Helium-Isotopes.
PERIODICAL Dokl.Akad.Nauk 111, fasc.3, 568-570 (1956)
Issued: 1 / 1957

In connection with the determination of data which are necessary for the construction of the state diagram liquid-vapor of the system He^3-He^4, another possibility of determining the dependence $T_\lambda(x_{fl})$ was discovered. (Here x_{fl} denotes the concentration of the liquid). What is concerned here is the break of the curve: viscosity of vapor (vapor pressure) - temperature, which must occur at the λ -point of the solution. Whereas in the curve for the dependence of vapor pressure on temperature in the case of pure He^4 the λ -point was characterized by a break in the derivative dP_4^0/dT, the derivatives dP_3/dT, dP_4/dT and dP/dT are subjected to discontinuities in the λ -point on the curves for the dependence of partial pressure and the total pressure of the solutions of the helium isotopes. This follows from general thermodynamic deliberations. Next, an expression for the discontinuity of the derivation of concentration in the gaseous phase is derived. The experimental determination of the break in the curve of the dependence of the vapor pressure of the solution of isotopes on temperature makes it possible to determine $T_\lambda(x_{fl})$.

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

126-5-3-5/31

AUTHORS: Bass, F. G., Kaganov, M. I. and Slezov, V. V.

TITLE: The Theory of Galvanomagnetic Phenomena in Metals (K teorii gal'vanomagnitnykh yavleniy v metallakh)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol V, Nr 3, pp 406-411 (USSR)

ABSTRACT: Expressions for the Hall constant and resistance of a two-band model metal having square-law anisotropic dispersion are derived for any magnetic field, even up to magnetic fields such that the product of twice the Larmor frequency and the mean time between collisions (for electrons) is about unity. The special point of this treatment is that the effective masses and mean time between collisions are assumed anisotropic. Eq. (2) is the kinetic equation for the distribution function of electrons in one zone with the dispersion law as expressed by Eq.(1). The main part of the argument, which is fully evident from Eqs. (11) and (14), relates to the one-band case, extension to the two-band case being briefly considered in section 4. It is demonstrated that the assumption of anisotropy introduces no essentially new feature. A final note at the end indicates that better agreement with experiment is obtainable by considering three bands (groups of carriers). Acknowledgments are

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The Theory of Galvanomagnetic Phenomena in Metals 126-5-3-5/31

made to Ye. S. Borovik and I. M. Lifshits for useful discussions.
There are 5 references, 4 of which are Soviet, 1 English.

ASSOCIATION: Fiziko-Tekhnicheskiy Institut AN Ukr. SSR (Physico-Technical Institute, Ac. Sc., Ukr. SSR)

SUBMITTED: October 16, 1956

1. Metals--Electrical properties 2. Metals--Magnetic properties
3. Metals--Theory

Card 2/2

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

AUTHORS: Kaganov, M. I. and Tsukernik, V. M. 126-5-3-28/31

TITLE: The Thermodynamics of the Ferromagnetic State at Low Temperatures (K termodinamike ferromagnitnogo sostoyaniya pri nizkikh temperaturakh)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol 5, Nr 3, pp 561-3 (USSR)

ABSTRACT: The paper commences with a discussion of the thermal capacity of a metal at low temperatures, and of the extra term to be inserted for ferromagnetic metals. The effects of an external magnetic field on the various components (spin, electronic) of the thermal capacity is discussed, in relation to a method of determining the magnetic part of the thermal capacity by measuring in strong magnetic fields, in which the thermodynamic potential has to be deduced. The second section of the paper deals with this deduction for spin waves, following earlier treatments by Holstein and Herring (Refs.3 and 4). Eq.(2) gives the spin wave energy. The thermodynamic potential is equated to the free energy for spin waves, and the rest of the development is straightforward. Two cases (weak and strong magnetic fields respectively) are considered in turn, each being subdivided (Eqs.7-10). No comparison

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126-5-3-28/31

The Thermodynamics of the Ferromagnetic State at Low Temperatures

is made with experiment, as no suitable data are available. Acknowledgments are made to L. D. Landau, A. I. Akhiyezer and V. G. Bar'yakhtar. The paper contains 13 equations, 10 of which are numbered. There are 8 references, 2 of which are Soviet, 5 English, 1 German.

ASSOCIATION: Physico-Technical Institute Ac.Sc. Ukrainian SSR (Fiziko-tekhnicheskiy institut AN Ukr. SSR)

1. Metals--Thermodynamic properties 2. Metals--Temperature factors
3. Metals--Magnetic factors 4. Nuclear spins

Card 2/2

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.

PA - 2980

AUTHOR: KAGANOV,M.I., LIVSHITS,I.M., SINEL'NIKOV,K.D.

TITLE: On the Possibility of the Observation of the Modification of the Chemical Potential of Metal Electrons in the Magnetic Field. (O vozmoshnosti nabludeniya izmeneniya khimicheskogo potentsiala elektronov metalla v magnitnom pole, Russian)

PERIODICAL: Zhurnal Eksperim. i Teoret.Fiziki, 1957, Vol 32, Nr 3, pp 605-607 (U.S.S.R.)
Received: 6 / 1957 Reviewed: 7 / 1957

ABSTRACT: The order of magnitude of the potential difference caused by this effect between two samples of one and the same metal, the one of which is located in a strong magnetic field, is evaluated according to a formula from the work by I.M.LIVSHITS and A.M.KOSEVICH (Zhurnal Eksperim.i Teoret.Fiziki, 29, 730, 1955): in the case of $H=10^4$ G it amounts to about 10^{-6} V. The influence exercised by the mosaic structure of the crystal on the order of the effect is discussed. The modification of the chemical potential of the electron gas in the magnetic field leads to a dependence of the emission current (of cold as well as of thermoelectric emission) upon the magnetic field (ROSENTSVEIG, Zhurnal Eksperim. i Teoret. Fiziki 31, 520, 1956). The thermocurrent is given under special assumptions (magnetic field vertical to the surface of the metal, dispersion

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.I.

56-4-25/52

AUTHOR: AKHIYEZER, A.I., KAGANOV, M.I., LYUBARSKIY, G.Ya.

TITLE: On the Absorption of Ultrasonics in Metals (O pogloshchenii ul'trazvuka v metallakh. Russian)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 32, Nr 4, pp 837 - 841 (U.S.S.R.)

ABSTRACT: When investigating the absorption of sound vibrations in solid bodies, we have to distinguish between two cases. (a) the frequency of the sound vibrations ω is considerably higher than the reciprocal value of the relaxation time τ, (b) $\omega \ll 1/\tau$. In this first case ($\omega\tau \gg 1$) it is possible to treat the absorption of sound as an absorption of sound quanta with the energy $\hbar\omega$ and with the impulse $\hbar\vec{k}$ ($\vec{k}$ denotes the wave vector of the sound wave). This absorption takes place as result of the collisions of the sound quanta with the quasi-particles characterising the energy spectrum of the solid body, i.e. in the usual dielectric media with the phonons, and in the metals with electrons and phonons. In the second case ($\omega\tau \ll 1$) the sound vibrations may be viewed as a certain external field in which the gas of the quasi-particles is situated and which modulates the energy of these particles.

The paper under review investigates the absorption of sound in the metals at low temperatures. In this case the rôle played by the phonons is unimportant as their number tends towards zero in proportion to T^3 if the temperature is reduced. The absorption of sound is caused by the

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.

56-5-31/55

AUTHOR: AZBEL', M.Ya., KAGANOV, M.I., LIFSHITS, I.M.

TITLE: The Heat Conductance and the Thermoelectric Phenomena in Metals in a Magnetic Field.
(Teploprovodnost' i termoelektricheskiye yavleniya v metallakh v magnitnom pole - Russian)

PERIODICAL: Zhurnal Eksperim.i Teoret.Fiziki, 1957, Vol 32, Nr 5, pp 1188-1192 (U.S.S.R.)

ABSTRACT: The paper under review determines asymptotic expressions for the tensors of the heat conductivity andfor the Thomson's coefficients in a strong magnetic field. In this context, no special assumptions with respect to the law of dispersions and to the shock integral are made. The quantization of the motion of the electron is not taken into account in this connection. The limits of the applicability of such a classical treatment are pointed out in a previously published paper refered to in the paper under review. In order to determine the kinetic coefficients, it is necessary to compute the current density j_i and the energy current w_i which appear under the influence of the electrical field E_i and of the temperature gradient $\partial T/\partial x_i$. Brief reference is made in the paper under review to the computation of j_i and of w_i. In order to be able to express the experimentally measurable coefficients (resistance, heat conductivity, Thomson's coefficients) by the magnitudes $\sigma_{ik}^{(n)}$ and $s_{ik}^{(n)}$ as defined here, the law of preservation of energy for an electron gas is written down. The formulae obtained therefrom for the resistance, the tensor of the coefficients of the heat con-

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.

56-5-37/55

AUTHOR: BASS, F.G., KAGANOV, M.I.

TITLE: On the Problem of the Saturation of the Kholl's (read: Hall's) "Constant" in Semiconductors in Strong Magnetic Fields. (K voprosu o nasyshchenii "postoyannoy" Kholla v poluprovodnikakh v sil'nykh magnitnykh polyakh - Russian)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 32, Nr 5, pp 1233 - 1235 (U.S.S.R.)

ABSTRACT: The paper under review determines an expression for the Kholl's/ read: Hall's/ "constant" in strong magnetic fields. This expression is valid for semiconductors with narrow zones. Already in previously published papers, the expression $R = 1/ec(n_1 - n_2)$ was obtained for the Kholl's /read: Hall's/ constant, with n_1 and n_2 denoting the densities of the electrons and of the holes, respectively. This expression is correct if only the closed isoenergetic surfaces play a role J. A. Swanson, Phys. Rev., Vol. 99, p. 1799 (1955), derived an analogous expression for semiconductors. In the special cases of a donor semiconductor ($n_2=0$) and of an acceptor semiconductor ($n_1=0$), this expression goes over into the usual formulae. The above-listed formula loses its meaning for a semiconductor proper, because then $n_1=n_2$. In the paper under review, its authors derive an expression for the Kholl's /read: Hall's/ constant which is appropriate for the semiconductors proper. In this context, this expression is of particular importance for the semiconductors with narrow zones. For reasons of simplicity, the paper under review investigates a semiconductor with a certain spectrum as reproduced in the paper. At T=0, let two zones (a and b)

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.

56-4-18/54

AUTHORS: Yesel'son, B.N., Kaganov, M.I., Lifshits, I.M.

TITLE: The Thermodynamics of the Phase Transition between He I and He II in Solutions of Helium Isotopes (Termodinamika fazovogo perekhoda He I - He II v rastvorakh izotopov geliya)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 4, pp. 936 - 944 (USSR)

ABSTRACT: 1.) The phenomena that are connected with the transition from He I and He II in solutions of helium isotopes are thermodynamically (theoretically) treated. It is shown that this transition, in the range from 1,35 to 3,0°K, is a second type phase transition.
2.) It is shown that at the temperature of the second type phase transition a point of sudden irregularity should occur in the derivative as well of the partial as of the total pressure according to the temperature, which fact is experimentally confirmed.
3.) It is shown that at T_λ in dependence on the distribution coefficient, a point of sudden irregularity should be observed in the derivative according to the temperature.
4.) It is shown that at T_λ a point of sudden irregularity

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The Thermodynamics of the Phase Transition between He I and He II in Solutions of Helium Isotopes

should be observed for the heat of solution and the heat of vaporization. For weak solutions numerical data are given for the point of sudden irregularity of the heat of solution. For one solution the course of curve of the heat of solution is also calculated. There are 6 figures and 7 Slavic references.

ASSOCIATION: Physico-Technical Institute AN Ukrainian SSR (Fiziko-tekhnichseskiy institut Akademii nauk Ukrainskoy SSR)

SUBMITTED: April 19, 1957

AVAILABLE: Library of Congress

Card 2/2

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

SOV/109-3-9-7/20

On the Theory of a Traveling-Wave Tube, Taking into Account the Radial Oscillations of the Electrons

from the steady-state value of the electron beam ρ_0 and the electron velocity v_0 are small, Eqs.(1) can be written as Eq.(2), where Ω^{*2} is a tensor of the plasma frequency of the beam. From Eq.(2) it is possible to derive the dispersion equation of the system which is in the form of Eq.(3), in which γ_r is the radial wave number (determined from the boundary conditions at the walls of the waveguide). Eq.(3) determines the relationship between the propagating constant γ and the frequency of the signal ω, and can be used to investigate the conditions under which amplification or oscillation of the system is possible. If the beam velocity v_0 is equal to the wave velocity u_r, the dispersion equation can be written as Eq.(5) in which quantities x and y are defined by Eqs.(4). From Eqs.(4) and (5) the parameters ω and γ can be expressed by

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

SOV/109-3-9-7/20

On the Theory of a Travelling-Wave Tube, Taking into Account the Radial Oscillations of the Electrons

expressed by Eqs.(16) and (17) while, in the case of a fully isotropic system, they are given by Eqs.(18) and (19); these cases are illustrated in the graphs of Fig.5. For the case of the tube operating as an oscillator the resonant frequency and the propagation constant are defined by Eqs.(20) in which ν is given by Eq.(21). The optimum conditions for the oscillations can be determined from Eqs.(22). The conditions are indicated in Table 2 for three different cases. From the analysis it is concluded that apart from the usual longitudinal oscillations, a travelling wave tube also exhibits radial oscillations; this effect, however, does not lead to any significant alteration of the operation

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

AKHIYEZER, A.I.; BAR'YAKHTAR, V.G.; KAGANOV, M.I.

Width of ferromagnetic resonance lines. Fiz.met. i metalloved. 6 no.5:932-934 '58. (MIRA 12:2)

1. Fiziko-tekhnicheskiy institut AN USSR.
(Ferromagnetism)

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

56-1-16/56

Contribution to the Theory of Antiferromagnetism at Low Temperatures

sublattices with the magnetic moments $\vec{M}_1(\vec{r})$ and $\vec{M}_2(\vec{r})$. This observational method is obviously suited for uniaxial antiferromagnetics. First the Hamiltonian of the system is written down. The magnetic field $\vec{H}$ should be composed of the outer, constant, homogeneous magnetic field $\vec{H}_0$ and of the magnetic field $\vec{h}$ of the spin waves. Then the equation for the motion of the magnetic moments is written down. By using a system of equations given here, the magnetic branch of the energy spectrum of the antiferromagnetic substance near the ground state can be determined. For this purpose the mentioned system of equations is linearized. In the case of an antiferromagnetic the proper magnetic field of the spin waves never changes the dispersion law. Then, the spin proportion of heat capacity of the antiferromagnetic is determined according to the usual formulae of statistical physics. In order to determine the temperature of magnetic susceptibility the energy spectrum of the antiferromagnetic in a magnetic field in vertical position to the axis of easiest magnetizability in particular must be known. For this case the energy spectrum is also ascertained by using the linearized equations of motion. Of course, the temperature dependences

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56-1-16/56

Contribution to the Theory of Antiferromagnetism at Low Temperatures

of heat capacity and magnetic susceptibility found here agree with the analogous expressions found earlier by L. Néel (Neyel') (reference 1). The more complicated magnetic structures, in particular of such ferrites in the case of which magnetic moments of sublattices do not compensate, can be investigated in an analogous way. There are 8 references, 4 of which are Slavic.

ASSOCIATION: Physical Technical Institute AN Ukrainian SSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR)

SUBMITTED: July 8, 1957

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Card 3/3

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

56-2-44/51

The Magnetic Susceptibility of an One-Axis Antiferromagnetic Substance

the authors here investigated an one-axis ferromagnetic substance. First the equation for the magnetic moment for each of the two sublattices is given. When an external field is lacking (which is assumed as being at right angles to the outer axis of the antiferromagnetic substance) the magnetic moments of the sublattices are reversely equal to one another: $\vec{M}_1 = \vec{M}$, $\vec{M}_2 = -\vec{M}$. The magnetic alternating field $\vec{H} = H'e^{-i\omega t}$ is regarded as small and the equations of motion mentioned above are linearized. Then the expressions for the Bohr magneton and for the magnetic susceptibility are deduced. This susceptibility $\chi_1(\omega)$ does not contain any gyrotropy; the rotation of the moments of sublattices takes place in such a way that the total magnetic moment has the same direction as the magnetic field. This does, however, not apply for a strong magnetic field applied to the sample, because then $M_1(\vec{H}_0) \neq -M_2(\vec{H}_0)$ holds. The width of line Γ is not only determined by the relativistic effects but also by the energy of exchange interaction. When the antiferromagnetic substance is a metal the exchange interaction leads to an additional widening of the line because

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

56-2-44/51

The Magnetic Susceptibility of an One-Axis Antiferromagnetic Substance

of the inhomogeneity of the magnetic moments. There are 5 references, 1 of which is Slavic.

SUBMITTED: November 26, 1957

AVAILABLE: Library of Congress

1. Magnet moments-Motion-Analysis

Card 3/3

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Correlation Relations for Random Electric Currents and Fields at Low Temperatures

SOV/56-34-5-15/61

electric field strength $\vec{E}$. This relation is determined by solving the kinetic equation. In the general case for the integral relation between current density and field strength $j_i(\vec{r}) = \int K_{ik}(\vec{r},\vec{r}')E_k(\vec{r}')dV'$ holds. The spatial correlation function between the components of the electric current density is expressed by the components of the kernel $K_{ik}(\vec{r},\vec{r}')$. For the determination of the correlation relations only the concrete form of the interrelation between the current density $\vec{j}$ and the electric field strength $\vec{E}$ must be written down. For this purpose a given linearised kinetic equation is employed. Subsequently the dependence of the correlation function on $\vec{\rho} = \vec{r} - \vec{r}'$ is computed. The random currents are, as expected, correlated among each other in distances of the order of the free path. From the Maxwell (Makswell) equations the authors then derive a term for the electric field strength. In the following the limiting case with a long free path is investigated. The general formulae are very complicated and therefore the authors restrict themselves to asymptotic expressions

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Correlation Relations for Random Electric Currents and Fields at Low Temperatures SOV/56-34-5-15/63

for the two cases $\rho \ll \delta \ll l$ and $\delta \ll l \ll \rho$. The authors express their gratitude to L.D.Landau and Ye.M.Lifshits for having made available the book "Elektrodinamika sploshnykh sred(= Electrodynamics of Continuous Media) previous to its publication. There are 5 references, 4 of which are Soviet.

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy SSR (Institute of Radiophysics and Electronics, AS Ukr SSR)

SUBMITTED: November 26, 1957

1. Metals--Electrical properties 2. Metals--Temperature factors
3. Electric fields--Analysis 4. Electric current--Analysis
4. Mathematics--Applications

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APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

SOV/56-34-6-30/51

AUTHORS: Kaganov, M. I., Tsukernik, V. M.

TITLE: A Contribution to the Phenomenological Theory of Kinetic Processes in Ferromagnetic Dielectrics (K fenomenologicheskoy teorii kineticheskikh protsessov v ferromagnitnykh dielektrikakh) I. The Relaxation in the Gas of the Spin Waves (I. Relaksatsiya v gaze spinovykh voln)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 6, pp. 1610-1618 (USSR)

ABSTRACT: This paper investigates the relaxation processes in ferromagnetica with an interaction of the spin waves one with another. In contrast to a paper of Akhiyezer (Ref 1), this investigation is carried out without assuming the nominal magnetization of the ferromagnetic in the ground state. The relaxation processes in a ferromagnetic do not only consist of the interactions within the spin system, but the spin waves also interact with the lattice vibrations. But in some cases the interactions between the spin waves play the principal rôle in establishing the equilibrium. For the investigation of the kinetic processes in ferromagnetica it is necessary to know the energy spectrum and also the wave func-

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

A Contribution to the Phenomenological Theory of Kinetic Processes in Ferromagnetic Dielectrics. I. The Relaxation in the Gas of the Spin Waves SOV/56-34-6-30/51

tions of the spin waves, The probabilities of the transitions between the various states of the system may be calculated by means of these wave functions. The authors calculate in a consequent quantum mechanical way the energy levels of the ferromagnetic which are connected with the motion of the magnetic moment. In these calculations the strong exchange interactions and the small relativistic corrections (anisotropy energy and magnetic interaction) are taken into account. The calculations are discussed step by step. The second part of this paper deals with the interaction of the spin waves one with another. The terms of the third and of the fourth order with respect to certain operators a and a^* play the principal rôle in these interaction processes of the spin waves. First the case of high temperatures is discussed and then follow the calculations for low temperatures. At last the relaxation time which corresponds to the exchange interaction is calculated. For $T \gg \Theta^2/\Theta_c$ (Θ_c denotes the Debye (Debaye) temperature) the interactions of the spin waves with the phonons play the essential rôle. The authors thank A. I.

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

A Contribution to the Phenomenological Theory of Kinetic Processes in Ferromagnetic Dielectrics. I. The Relaxation in the Gas of the Spin Waves SOV/56-34-6-30/51

Akhiyezer, L. D. Landau and I. M. Lifshits for useful advice and also V. G. Bar'yakhtar and S. V. Peletminskiy for profitable discussions. There are 9 references, 6 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physics and Technical Institute, AS UkrSSR)

SUBMITTED: March 22, 1958

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

SOV/56-35-2-23/60

24(6)

AUTHORS: Kaganov, M. I., Tsukernik, V. M.

TITLE: The Influence of Thermoelectric Forces on the Skin Effect in Metal (Vliyaniye termoelektricheskikh sil na skin-effekt v metalle)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 2, pp 474-478 (USSR)

ABSTRACT: Formulae are deduced for the surface resistance in consideration of thermoelectric forces. The following system of equations serves as a basis:

$$\operatorname{curl} \vec{H} = \frac{4}{c}\vec{j}; \quad \operatorname{curl} \vec{E} = -\frac{1}{c}\frac{d\vec{H}}{dt}; \quad C\frac{\partial\theta}{\partial t} + \operatorname{div}\vec{q} = 0;$$

$$E_i = \varrho_{ik} j_k + \alpha_{ik}\,\partial\theta/\partial x_k; \quad q_i = T\alpha_k j_k - \varkappa_{ik}\,\partial\theta/\partial x_k$$

where Θ is the high-frequency addition to the average temperature T of the sample, C - the specific heat of the metal, $\vec{q}$ the heat current, $\varkappa_{ik}$ - the resistance tensor, ϱ_{ik} - the thermal conductivity tensor, and α_{ik} - the tensor of the thermoelectrical coefficients. ($\alpha_{ik} = \alpha_{ki}$).

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

SOV/56-35-2-25/60

The Influence of Thermoelectric Forces on the Skin Effect in Metal

For the surface impedance it holds that $\zeta_x = E_x(0)/H_y(0)$ and $\zeta_y = -E_y(0)/H_x(0)$; $\zeta_x = \zeta_{0x} = \sqrt{\omega\sigma_{xx}/4\pi i} = \sqrt{\omega\sigma_\perp/4\pi i}$; ($\sigma_\perp = \sigma_{22} = \sigma_{33}$; $\sigma_{11} = \sigma_\parallel$) and ζ_y is decomposed into ζ_y^{ad} and ζ_y^{isoth}, for which equations are deduced as well. In the case of isotropy $\zeta = 1/\sqrt{\varepsilon - \sin^2\varphi}$ and $\zeta^{isoth} = \sqrt{\varepsilon - \sin^2\varphi}/\varepsilon$ is obtained, and for ζ^{ad} a considerably more complicated expression is found, the first term of which is equal to the expression for ζ^{isoth}. In conclusion, the authors express their gratitude to L. D. Landau for his valuable discussions. There are 2 references, 2 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR (Physico-Technical Institute, AS UkrSSR)

SUBMITTED: March 26, 1958

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SOV/56-35-5-51/61

24(5)

AUTHORS: Bar'yakhtar, V. G., Kaganov, M. I.

TITLE: Cherenkov Radiation ~~During Passage~~ of a Charged Particle Through a Ferrodielectric (Cherenkovskoye izlucheniye pri prokhozhdenii zaryazhennoy chastitsy cherez ferrodielektrik)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 5, pp 766-770 (USSR)

ABSTRACT: The emission of electromagnetic waves during the motion of a charged particle in a ferrodielectric (ferrite) is characterized by the dispersion properties of the ferrites. In the present paper the authors investigate the Cherenkov radiation of a charged particle moving in a medium with gyrotropic magnetic permeability. For the gyrotropic permeability tensor the following is set up:

$$\hat{\mu} = \begin{pmatrix} \mu_1 & i\mu_2 & 0 \\ -i\mu_2 & \mu_1 & 0 \\ 0 & 0 & \mu_3 \end{pmatrix}$$

with growing frequencies ω the μ_1 and μ_3 tend towards 1, whereas μ_2 tends towards 0 (already at comparatively low fre-

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SOV/56-35-3-31/61

Cherenkov Radiation During Passage of a Charged Particle Through a Ferro-dielectric

cy ranges that depend on the electron dispersion $\hat{\varepsilon}$; these ranges differ from those in which $\hat{\mu}$-gyrotropy occurs. For the intensity of Cherenkov radiation dW/dz formulae according to Landau and Lifshits (Ref 1) as well as according to Sitenko (Ref 4) are given; for the Cherenkov radiation in the r-f region ($\lambda > 0,1 \div 1$ mm) a formula is given also for dW/dz (Ref 7), which is

$$\frac{dW}{dz} = -\frac{e^2}{c^2}\int_{I}(\ldots)\omega\, d\omega - \frac{e^2}{2c^2}\int_{II}(\ldots\ldots\ldots\ldots)\omega\, d\omega$$

In the (...) very complicated functions of ω, ω_1, β, ε, and μ_0 are partly found, where μ_0 is the value of $\mu_1(\omega)$ at $\omega = 0$. ($\lambda \ll \omega_0$). Furthermore, the integration of this equation is dealt with. In the last chapter the energy losses due to excitation of spin waves by the particle are calculated. As the coupling of electromagnetic and spin waves is weak, calculation of the excitation intensity of spin waves can be carried out by means of an expansion in series. The corresponding equations for

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SOV/56-35-3-31/61

Cherenkov Radiation During Passage of a Charged Particle Through a Ferro-dielectric

dW/dz are given. For the order of magnitude of the potential losses $dW/dz \approx -(e^2/c^2)\omega_p^2$ is obtained, where $\omega_p^2 = 4\pi Ne^2/m$ ($\omega_p \sim 10^{15}$ sec^{-1}) and for the ratio between loss due to excitation of spin waves and losses due to polarization it holds that $(gM/\omega_p)(\theta_c/\hbar\omega_p) \ll 1$. In conclusion the authors thank A. I. Akhiyezer for raising the problem and discussing the results obtained. There are 1 table and 9 references, 8 of which are Soviet.

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

SUBMITTED: April 21, 1958

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

SOV/56-35-4-44/52

The Galvanomagnetic Phenomena in Metals With Nearly Equal Numbers of Electrons and "Holes"

parameter $\Delta n/n$ ($\Delta n = n_1 - n_2$, $n = (n_1 + n_2)/2$) makes it possible to give a precise description of the dependence of the resistance tensor on magnetic field strength. The expressions for the resistance ϱ, which correspond to this case, and the Hall (Kholl) constant R are explicitly given. These results, by the way, are in good agreement with those obtained by N. Ye. Alekseyevskiy, N. B. Brandt, T. I. Kostina (Ref 2). There are 2 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physico-Technical Institute of the Academy of Sciences of the UkrSSR)
Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: July 8, 1958

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.

21(0) SOV/53-67-4-7/7

AUTHOR: Chentsov, R.

TITLE: The Fifth All-Union Conference on the Physics of Low Temperatures (5-ye Vsesoyuznoye soweshchaniye po fizike nizkikh temperatur)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 67, Nr 4, pp 743-750 (USSR)

ABSTRACT: This Conference took place from October 27 to November 1 at Tbilisi; it was organized by the Otdeleniye fiziko-matematicheskikh nauk Akademii nauk SSSR (Department of Physico-mathematical Sciences of the Academy of Sciences, USSR), the Akademiya nauk Gruzinskoy SSR (Academy of Sciences, Gruzinskaya SSR), and the Tbilisskiy gosudarstvennyy universitet im. Stalina (Tbilisi State University imeni Stalin). The Conference was attended by about 300 specialists from Tbilisi, Moscow, Khar'kov, Kiyev, Leningrad, Sverdlovsk, and other cities as well as by a number of young Chinese scientists at present working in the USSR. About 50 lectures were delivered which were divided according to research fields.

III. Galvanomagnetic [illegible] (10 lectures). I. M. Lifshits and V. D. Peschanskiy (KhPTI, Khar'kov Physico-technical Institute, Khar'kov University) showed that the most important part in connection with the galvanomagnetic properties of metals is played by the concrete form of the Fermi surface of conductivity electrons. Y. Ye. Alekseyevskiy (IFP) spoke about experiments he carried out together with Yu. P. Gaydukov. He investigated the variation of the resistance in the transversal magnetic field at helium temperatures of Au, Cu, Pb, Ta, Ga, Tl and (together with T. I. Kostina) of Bi. Ye. S. Borovik and V. [illegible] Volotskaya (KhPTI) investigated the galvanomagnetic properties at low temperatures of chromium and zirconium and found that the resistance of chromium grows with field strength without attaining a saturation value. L. S. Kan and B. G. Lazarev (KhPTI) investigated the resistance minimum in gold at low temperatures and found that if the sample is heated, the minimum disappears. Yu. P. Gaydukov (IFP) said in this connection in the course of the discussion that the minimum effect does not occur in gold in the case of very pure samples; the disappearance of the minimum is explained by the plastic deformation of the sample at helium temperatures. M. Ye. Azbel' (KhPTI) gave a report of his work in connection with the quantum theory of the high-frequency resistance of metal in a constant magnetic field at low temperatures. M. I. Kaganov and V. M. Tsukernik (KhPTI) spoke about a theoretical investigation of the influence exercised by thermoelectric forces upon the skin effect in various conductors. R. I. Verkin and B. N. Aleksandrov (KhPTI) spoke about measurements of the electric resistance of thin wires made from highly-pure tin, indium and cadmium, and computed the free length of path at 4.2°K in these metals as amounting to 1/3 to 2/3 cm. E. B. Brandt (MGU) and R. I. Verkin and I. V. Dmitrenko (KhPTI) investigated the influence exercised by the hydrostatic pressure (of 1000 atmospheres absolute pressure) upon the behavior of metals at low temperatures and investigated the quantum oscillations of the magnetic susceptibility of bismuth at 1.6 - 4.2°K. G. Ye. Gil'berman and S. M. Kozavich (KhPTI) gave a theoretical explanation of the fact that already relatively small deformations exercise considerable influence upon oscillation effects in metals. IV. Magnetism. A. S. Borovik-Romanov (IFP) delivered a report on investigations he carried out of the anisotropy of the weak ferromagnetism in monocrystal samples of the antiferromagnetic $MnCO_3$ (the effect of anisotropy was predicted by the thermodynamical theory developed by Dzyaloshinskiy). In the course of the discussion R. A. Alikhanov (IFP) spoke about neutronographical investigations he carried out of the magnetic structure of $MnCO_3$ and $FeCO_3$ at low temperatures. P. L. Kapitsa stressed the importance of the method based upon Dzyaloshinskiy's theory. N. M. Kreynes (VNIIFTRI), whose lecture was read by A. S. Borovik-Romanov reported on measurements carried out by him (in the IFP) of the magnetic anisotropy of the antiferromagnetic $CuSO_4$ and $CoSO_4$-monocrystals.

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Card 7/11 Ye. A. Turov (IFM AN SSSR, Sverdlovsk) spoke about his theore-

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M. I. KAGANOV

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21(0) SOV/53-67-4-7/7

AUTHOR: Cheatsov, R.

TITLE: The Fifth All-Union Conference on the Physics of Low Temperatures (5-ye Vsesoyuznoye soveshchaniye po fizike nizkikh temperatur)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 67, Nr 4, pp 743-750 (USSR)

ABSTRACT: This Conference took place from October 27 to November 1 at Tbilisi; it was organized by the Otdeleniye fiziko-matematicheskikh nauk Akademii nauk SSSR (Department of Physico-mathematical Sciences of the Academy of Sciences, USSR), the Akademiya nauk Gruzinskoy SSR (Academy of Sciences, Gruzinskaya SSR), and the Tbilisskiy gosudarstvennyy universitet im. Stalina (Tbilisi State University imeni Stalin). The Conference was attended by about 300 specialists from Tbilisi, Moscow, Khar'kov, Kiyev, Leningrad, Sverdlovsk, and other cities as well as by a number of young Chinese scientists at present working in the USSR. About 50 lectures were delivered which were divided according to research fields.

IV. Magnetism.

A. S. Borovik-Romanov (IFP) delivered a report on investigations he carried out of the anisotropy of the weak ferromagnetism in monocrystal samples of the antiferromagnetic $MnCO_3$ (the effect of anisotropy was predicted by the thermodynamical theory developed by Dzyaloshinskiy). In the course of the discussion R. A. Alikhanov (IFP) spoke about neutronographical investigations he carried out of the magnetic structure of $MnCO_3$ and $FeCO_3$ at low temperatures. P. L. Kapitsa stressed the importance of the method based upon Dzyaloshinskiy's theory. L. V. Kreynes (VNIIFTRI), whose lecture was read by A. S. Borovik-Romanov, reported on measurements carried out by him (in the IFP) of the magnetic anisotropy of the antiferromagnetic $CuSO_4$- and $CoSO_4$-monocrystals.

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Ye. A. Turov (IFM AN SSSR, Sverdlovsk) spoke about his theoretical investigations of the magnetizability, the susceptibility, the specific heat, and the resonance frequencies of antiferromagnetics and weak ferromagnetics. A. I. Sudovtsov and Ye. Ya. Semenenko (KhFTI) spoke about measurements of the electric resistance of iron in magnetic fields in a wide temperature range with simultaneous plotting of the magnetization curve. N. V. Pol'kanskiyem, G. V. Fedorov, E. V. Galoshina and N. I. Turchinskaya (IFM AN SSSR) spoke about measurements of magnetization and the Hall effect of polycrystalline samples, nickel and Pt_3Fe at low temperatures. Ye. I. Kondorskiy, V. Bode, E. Gofman and Chang, Shou-chiu (MGU) gave a report on susceptibility measurements on nickel and its alloys with copper at low temperatures; T. I. Sanadze (TSU) spoke about the spectrum of the paramagnetic resonance of Tb^{3+} in terbium nitrate at temperatures of liquid hydrogen. M. I. Kaganov and V. M. Tsukernik (KhFTI) dealt with the kinetic phenomena in ferromagnetics at low temperatures and with calculation of relaxation time; A. I. Akhiyezer, V. Ye. Lyakhter and S. Peletminskiy (KhFTI) carried out a theoretical investigation of the relaxation of the magnetic moment in ferrodielectrics; Vlasov (IFM AN SSSR) showed that a linearly polarized elastic

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(ultrasonic) wave of a frequency of 10^7 cycles when passing through a ferromagnetic substance in the direction of the magnetic field, is subjected to a turn of the polarization plane of the order of 10^{-3} - 10^{-4} radian/cm thereto. M. I. Kaganov pointed out that in this connection yet another phenomenon may be observed, namely the resonance absorption of ultrasonics if the wavelength is equal to the radius of the Larmor orbit of the electron. V. Varlamov questioned the one of the most interesting lectures

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M. I.: Doc Phys-Math Sci (diss) -- "Some problems in the kinetic theory of a solid body". Khar'kov, 1958. 11 pp (Min Higher Educ Ukr SSR, Khar'kov Order of Labor Red Banner State U im A. M. Gor'kiy), 150 copies (KL, No 5, 1959, 142)

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

SOV/25-59-9-8/49

9(3)

AUTHORS: Kompaneyets, A.S. (Moscow), Doctor of Physico-Mathematical Sciences; Kaganov, M.I. (Khar'kov), Candidate of Physico-Mathematical Sciences

TITLE: Electrical Conductivity

PERIODICAL: Nauka i zhizn', 1959, Nr 9, pp 24 - 29 (USSR)

ABSTRACT: The editor refers to the lecture "The 21st Congress of the CP USSR and the Tasks of Science" presented by the vice-president of the AS USSR, A.V. Topchiyev, at the general yearly assembly of the AS USSR. A.V. Topchiyev stated that the development of new and improved devices and apparatuses, using semi-conductors, e.g. diodes, triodes, rectifiers, photo- and thermo-generators, refrigerators for technical and private needs, is a most important task. The authors of the present article give general explanations of the fundamental principles of electrical conductivity. By means of an example with two elements - helium and lithium - they prove that crystals of a compact for-

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Electrical Conductivity SOV/25-59-9-8/49

mation are dielectrics and that those of loose formation are conductors. Besides metals, there exists still another class of crystal electronic conductors e.g. elements of silicon, germanium and selenium. Their electrical conductivity is much lower than that of metals and therefore they are called semi-conductors. There are 9 diagrams and 1 drawing.

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

INOPIN, Ye.V.; KAGANOV, M.I. [Kahanov, M.I.]; KRUGLIKH, A.A. [Kruhlykh, A.A.]; KHIZHNYAK, M.A. [Khyzhniak, M.A.]

Scientific conference of young scientists at the Physical and Technological Institute of the Ukrainian Academy of Sciences. Ukr. fiz. zhur. 4 no.3:406-408 My-Je '59. (MIRA 13:2)
(Physics--Congresses) (Technology--Congresses)

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

21(8), 18(7) SOV/89-6-4-3/27

AUTHORS: Lifshits, I. M., Kaganov, M. I., Tanatarov, L. V.

TITLE: On the Theory of the Radiation Induced Changes in Metals (K teorii radiatsionnykh izmeneniy v metallakh)

PERIODICAL: Atomnaya energiya, 1959, Vol 6, Nr 4, pp 391-402 (USSR)

ABSTRACT: Temperature fluctuation and the phenomena connected therewith are theoretically investigated in fissile material. Fluctuation is given by the quantity of energy liberated at every decay. The occurrence of similar non-thermodynamic fluctuations leads to a variation of the temperature-dependent characteristics of the irradiated medium. Here the case arises that during irradiation the kinetic coefficients (electric conductivity, diffusion, thermal reaction rate) do not correspond to the mean temperature of the medium determined from the total quantity of heat. The particles passing through matter thus cause local heating. The equations describing these processes are derived, in which connection the interaction between electrons and lattice was taken into account because it leads to the establishment of temperature equilibrium. Furthermore, a method is developed for the purpose of calculating the effective kinetic coefficients of the fissile material.

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SOV/89-4-4-3/27

On the Theory of the Radiation Induced Changes in Metals

In conclusion, it is explained in what way the mechanical properties of fissile substances vary as a result of local heating. In addition, the two following calculations are described: a) Calculating the average of a physical quantity $F(T_e, T_j)$ depending on 2 temperatures (T_e - electron temperature, T_j - lattice temperature). b) Evaluation of this calculation for high temperatures, in which case the equation no longer remains linear when calculating thermal conductivity and can therefore not be solved. If, however, the specific heat c and the thermal conductivity χ depend on temperature according to an exponential law, it is easier to determine the average. The equations and their solutions are given for several needle-shaped, an infinitely long and a punctiform source. (The solutions of an equivalent problem are by Ya. B. Zel'dovich and A. S. Kompaneyets). The most important results obtained by this paper have already been published in 1951-1952 in the reports of the FTI of the AN USSR (AS UkrSSR). There are 2 figures and 12 references, 9 of which are Soviet.

SUBMITTED: September 17, 1958

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

24(4), 24(3) SOV/126-7-2-20/39

AUTHOR: Kaganov, M. I.

TITLE: Selective Transparency of Ferromagnetic Films (Selektivnaya prozrachnost' ferromagnitnykh plenok)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 7, Nr 2, pp 288-289 (USSR)

ABSTRACT: The observation of ferromagnetic resonance, and generally the frequency dependence of the permeability of ferromagnetics, is usually carried out by studying the absorption of electromagnetic energy either in specimens whose linear dimensions are large compared with the skin depth (reflection from a half-space) or using small specimens when the field in the specimen is practically uniform. However, the unusual frequency dependence of the magnetic permeability $\mu = \mu' + i\mu''$ shown in Fig 1 should lead to interesting effects when an electromagnetic wave passes through a ferromagnetic film. The transmission coefficient for a film whose electromagnetic properties are described by the quantities $\varepsilon = \varepsilon' + i\varepsilon''$, $\mu = \mu' + i\mu''$ is given by:

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

Selective Transparency of Ferromagnetic Films

$$\frac{H_i}{H_t} = 4\sqrt{\frac{\mu}{\varepsilon}}\ \frac{\exp\left(i\frac{\omega}{c}d\right)}{(1+\sqrt{\mu/\varepsilon})^2\exp\left(i\frac{\omega}{\varepsilon}\sqrt{\varepsilon\mu}d\right)-(1-\sqrt{\mu/\varepsilon})^2\exp\left(-i\frac{\omega}{c}\sqrt{\varepsilon\mu}d\right)} \quad (1)$$

where H_i/H_t is the ratio of the incident and transmitted amplitudes, d is the thickness of the film and ω is the frequency. When $\mu = 0$ and $\varepsilon = \varepsilon' + (4\pi\sigma/\omega)i$ (where σ is the conductivity) we have

$$\zeta_a = \left|\frac{H_i}{H_t}\right|^2_{\omega=\omega_a} = \frac{4}{\left(2+\frac{4\pi\sigma d}{c}\right)^2 + \frac{\omega^2}{c^2}\varepsilon'^2 d^2} \quad (2)$$

Since usually the term containing σ is much greater than the remaining terms we have

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$$\gamma_a \approx \frac{c^2}{4\pi^2 d^2 \sigma^2} \qquad (3)$$

The latter relation holds if the quantities in the denominator of (1) can be expanded in series. In order to improve this condition we use the well known relation

$$\mu = \frac{\omega_a^2 - \omega^2 - 2i\omega\gamma_a}{\omega_r^2 - \omega^2 - 2i\omega\Delta\omega} \qquad (4)$$

where $\Delta\omega$ is the resonance line width and

$$\gamma_a = \frac{2B_o}{H_o + B_o}\Delta\omega \qquad (5)$$

The latter equation can be easily established from the equation of motion for a magnetic moment with a relaxation term in the form suggested by Landau and Lifshits. Using (4) and (5) we find that

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SOV/126-7-2-20/39

Selective Transparency of Ferromagnetic Films

$$\left| \frac{\omega}{c} \sqrt{\varepsilon\mu} \right| d \ll 1, \text{ if } d \ll \sqrt{\frac{2\pi M_o}{\Delta H}} \; \delta'_{skin}$$

$$\delta_{skin} = \frac{c}{\sqrt{2\pi\sigma\omega_a}}$$

where ΔH is the width of the ferromagnetic resonance line in oersted. Selective transparency will be observed if the following condition is obeyed

$$\delta_{skin} \ll d \ll \delta_{skin} \sqrt{\frac{2\pi M_o}{\Delta H}}$$

There is one figure.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN Ukr SSR (Physico-technical Institute of the Ac.Sc., Ukr.SSR)

SUBMITTED: March 19, 1958

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

24(3)

AUTHORS: Kaganov, M. I., Tsukernik, V. M. SOV/56-36-1-30/62

TITLE: On the Phenomenological Theory of the Kinetic Processes in Ferromagnetic Dielectrics (K fenomenologicheskoy teorii kineticheskikh protsessov v ferromagnitnykh dielektrikakh) II. The Interaction of Spin Waves With Phonons (II. Vzaimodeystviye spinovykh voln s fononami)

PERIODICAL: Zhurnal eksperimental'noyi teoreticheskoy fiziki, 1959, Vol 36, Nr 1, pp 224-232 (USSR)

ABSTRACT: The spin waves have to be described by the vector of the density of the magnetic moment $\vec{M} = \vec{M}(\vec{r}, t)$ by the deformation tensor $u_{ik} = (1/2)(\partial u_i/\partial x_k + \partial u_k/\partial x_i)$ where $u = u(\vec{r}, t)$ denotes the vector of displacement. In this case, the interaction Hamiltonian will be the sum of all components in the expansion of the energy of the ferromagnetic with respect to the powers of M_i, $\partial M_i/\partial x_k$, and u_{ik}: $\gamma_{iklm} \int M_i M_k u_{lm}\, dv$, $\lambda_{iklmrs} = \int \frac{\partial M_i}{\partial x_k} \frac{\partial M_l}{\partial x_m} u_{rs}\, dv$. The first of these terms corresponds to the energy of magnetostriction. The interaction Hamiltonian

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

On the Phenomenological Theory of the Kinetic Processes in Ferromagnetic Dielectrics. II. The Interaction of Spin Waves With Phonons SOV/56-36-1-30/62

play the most important part among the one-phonon processes. The two-photon processes are described by the square terms of the expansion of the energy of the ferromagnetic with respect to the powers of the deformation tensor. There are 2 types of such processes: scattering of a phonon on a spin wave (or vice versa) and emission (or absorption) of 2 phonons by a spin wave. Finally, the time necessary for the establishment of equilibrium (relaxation time) between spin waves and phonons is calculated. There are 5 Soviet references.

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

SUBMITTED: July 8, 1958

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SOV/56-37-2-36/56

9(3)

AUTHORS: Lifshits, I. M., Kaganov, M. I.

TITLE: On Electron Resonance in Crossed Electric and Magnetic Fields

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 2(8), pp 555-556 (USSR)

ABSTRACT: An electron placed into crossed electric and magnetic fields has a drift motion in the direction perpendicular to the electric and magnetic field. The drift velocity, i.e. the mean rate of motion of the particle (the initial speed not considered) is given by $\vec{v} = cH^{-2}\left[\vec{E}\,\vec{H}\right]$. Besides, the electron oscillates in the direction of the electric field, the frequency of these oscillations being eH/mc. This means that in crossed fields the frequency is independent of the electric field strength. The behavior of the electron is greatly different in metals and semiconductors, where the complicated dispersion law has a pronounced influence upon the character of conductivity electron motion. This study proceeds from the classical equation - the generalized Lorentz equation: $d\vec{p}/dt = e\left\{\vec{E} + c^{-1}\left[\vec{v}\,\vec{H}\right]\right\}$, $\vec{v} = \partial\varepsilon/\partial\vec{p}$. The

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On Electron Resonance in Crossed Electric and Magnetic Fields

integrals of motion are then: $\varepsilon^*(\vec{p}) \equiv \varepsilon(\vec{p}) - \vec{v}_0\vec{p} = \text{const}$, $\vec{v}_0 = cH^{-2}\left[\vec{E}\,\vec{H}\right]$, $p_z = \text{const}$. The z-axis is chosen as the direction of the magnetic field, $\vec{v}_0$ being the mean rate of motion of the electron. The motion of a particle in crossed fields obeying the dispersion law $\varepsilon = \varepsilon(\vec{p})$ can be regarded as the motion of the particle in a magnetic field alone obeying the dispersion law $\varepsilon^*(\vec{p}) = \varepsilon(\vec{p}) - \vec{v}_0\vec{p}$. Earlier results can easily be referred to this case. The period of gyration T^* of an electron in a closed orbit is $T^* = -(c/eH)\,\partial S^*/\partial\varepsilon^*$, where S^* denotes the surface bounded by the second equation, which naturally also depends upon the electric field strength. This dependence, however, does not occur with a quadratic dispersion law. The dependence of the period of gyration upon the electric field strength is characteristic of electrons with a complicated (not quadratic) dispersion law. The explicit period versus electric field strength function can be determined only if the dispersion law is actually given. If $E/H \ll 1$, $\Delta T/T \sim (c/v)(E/H)$ is obtained, T denoting the period of gyration in the magnetic

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SOV/56-37-2-36/56

On Electron Resonance in Crossed Electric and Magnetic Fields

field. If the gyration frequency of the electron is known there is no difficulty in writing down the distances between the quantized energy levels in a quasiclassical approximation $\Delta\varepsilon^* = \hbar\omega^* = 2\pi|e|\hbar H/c(\partial S^*/\partial\varepsilon^*)$. The non-quadratic dependence of the energy upon the components of the quasimomentum is frequently found at the edge of the conduction band, and it is often a result of the symmetry of the crystal. Such phenomena will very probably not be observed in metals. There are 7 references, 4 of which are Soviet.

ASSOCIATION: Tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Technical Institute of the Academy of Sciences, Ukrainskaya SSR)

SUBMITTED: May 21, 1959

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

24 (3) SOV/56-37-3-35/62

AUTHORS: Kaganov, M. I., Tsukernik, V. M.

TITLE: Nonresonance Absorption of the Energy of a Variable Magnetic Field by a Ferromagnetic Dielectrics

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3 (9), pp 823-832 (USSR)

ABSTRACT: A ferromagnetic substance may absorb the energy of a variable magnetic field in various ways: either the magnetic field (the amplitude of which is to be small, $H' \sim e^{-i\omega t}$) is polarized perpendicular to the equilibrium magnetic moment, in which case the magnetic field turns the moment without changing its value, or the field is polarized in the direction of the moment, in which case a superposed magnetization occurs, i.e. the absolute value of the magnetic moment is varied. In both cases dissipative processes are caused, which are interrelated with the interaction of spin waves, both among themselves, and also with phonons (it is assumed that the dielectric substance is magnetized up to saturation). In the present paper the authors confine their attention to those in which the variable magnetic field (frequency ω) is polarized in the direction of the

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Nonresonance Absorption of the Energy of a Variable Magnetic Field by a Ferromagnetic Dielectrics SOV/56-37-3-35/62

equilibrium moment. Calculation of absorption is then reduced to calculation of the imaginary part of longitudinal magnetic susceptibility $\mu_{\parallel} = \mu'_{\parallel} + i\mu''_{\parallel}$. The complex character of the relaxation processes in ferromagnetic dielectrics leads to a complex frequency dependence $\mu''_{\parallel}(\omega)$. The authors proceed from the simple model, in which the ferrodielectric body is considered to have a magnetic moment, the vibrations of which propagate in form of spin waves. This is justified at sufficiently low temperatures, when the vibrations of one of the magnetic sublattices are not excited by the others. The theory of spin waves may be applied to real bodies, e.g. to ferrites the semiconductor properties of which at low temperatures are insignificant (the number of free electrons with decreasing temperature tends exponentially towards zero). The first part of this paper deals with the low frequency range, i.e. ω is much smaller than the reciprocal spin-spin relaxation time τ_{ss}: $\omega\tau_{ss} \ll 1$. The following is obtained for the imaginary part of the longitudinal magnetic susceptibility after all frequency- and temperature ranges have been dealt with in detail:

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$$\mu'' \sim \begin{cases} \dfrac{M_0\mu}{\theta_c}\left(\dfrac{T}{\theta_c}\right)^{1/2} \dfrac{\omega\tau_{sl}}{1+\omega^2\tau_{sl}^2}, & \omega\sqrt{\tau_{sl}\tau_{ss}} \ll 1, \quad T \ll T_0 \\ \dfrac{\mu M_0}{\theta_c}\left(\dfrac{T}{\theta_c}\right)^{1/2} \dfrac{\omega\tau_{ss}}{1+\omega^2\tau_{ss}^2}, & \omega\sqrt{\tau_{sl}\tau_{ss}} \gg 1, \quad T \ll T_0 \\ \dfrac{\hbar\omega}{\mu M_0} \dfrac{1+\omega^2\tau_2^2}{(1+\omega^2\tau_1^2)^2+\omega^2\tau_3^2}, & \omega\tau_{ss} \ll 1, \quad T \gg T_0 \end{cases}$$

Here $T_0 \sim \mu M_0(\theta_c/\mu M_0)^{3/7}$, τ_{sl} denotes the spin-lattice relaxation time. The second part deals with high frequencies ($\omega \gg 1/\tau_{ss}$), the Hamiltonian of the interaction between field and spin being set up according to Kaganov (Ref 2): $\mathcal{H}_{int} = \mu\int \hat{H}_z \hat{a}^*(\vec{r})\hat{a}(\vec{r})dv$. If ω tends towards ∞, then magnetic susceptibility tends towards unity, and its imaginary part towards zero. For the frequency dependence of μ'' at very high

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Nonresonance Absorption of the Energy of a Variable Magnetic Field by a Ferromagnetic Dielectrics SOV/56-37-3-35/62

frequencies it holds that $\mu'' \approx \frac{8\sqrt{2}}{15}\frac{\mu^2}{a^3}\frac{(2\pi\mu M_0)^2}{\theta_c^{3/2}(\hbar\omega)^{3/2}}$, $\left(\hbar\omega \gg \frac{\hbar}{\tau_{ss}}, T, \mu H_{efi}\right)$. Thus, μ'' decreases inversely proportionally with $\omega^{3/2}$ and is independent of temperature. The authors thank V. G. Bar'yakhtar for valuable discussions. There are 10 Soviet references.

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

SUBMITTED: April 18, 1959

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

21(1), 24(5) SOV/53-69-3-3/6

AUTHORS: Lifshits, I. M., Kaganov, M. I.

TITLE: Some Problems of the Electron Theory of Metals. I. Classical and Quantum Mechanics of Electrons in Metals

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 69, Nr 3, pp 419-458 (USSR)

ABSTRACT: The first part of this detailed survey comprises 7 paragraphs. Paragraph 1: Introduction (posing of the problem; fundamental works by Bloch and Peierls, Bloch's model, Fermi statistics; quantum theory of the Fermi fluid by L. D. Landau; semiphenomenological theory, energy spectrum of free electrons, dispersion law $\varepsilon = \varepsilon(\vec{p})$); the entire article consists of 3 parts: mechanics of conductivity electrons, statistical thermodynamics of electron gas, kinetics (galvanomagnetic- and resonance phenomena); a large part of the results mentioned here is taken from the works of a group of theoretical physicists from Khar'kov. Paragraph 2: The geometry of the isoenergetic electron surfaces (representation of the dispersion law; the periodic function $(\varepsilon\vec{p})$ describes the closed isoenergetic surfaces; representation two-dimensional (Fig 1) and threedimensional (Fig 2); special cases for complicated dispersion law, spatial (Fig 3); open

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Some Problems of the Electron Theory of Metals. 1. Classical and Quantum Mechanics of Electrons in Metals

isoenergetic surfaces, discussion, representation of various types (Fig 4)). Paragraph 3: Classical mechanics of particles with arbitrary dispersion law (discussion of the conditions necessary for the classical treatment of a problem; investigation of metal in electric or magnetic fields, both general and for the case of a constant homogeneous electric and a constant homogeneous magnetic field, mathematical description, illustrated by figures 6-9. Paragraph 4: Collisions of quasiparticles. Scattering. (Collisions: interaction of electrons with local periodicity perturbations which lead to variations of momentum and energy of the electron; description of possible inhomogeneities and their effects.) Paragraph 5: Quasiclassical energy levels (quantum-mechanical description of conductivity electrons; diamagnetism of electron gas, De Haas - Van Alfen effect, theoretical investigation of the behavior of electrons in a magnetic field according to Landau; influence of the crystal lattice, quantization of momentum and energy, setting up of the equation describing the trajectories (Fig 11); the quantization of electron energy manifests itself in a peculiar behavior of

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26.2312

S/058/60/000/006/004/040
A005/A001

Translation from: Referativnyy zhurnal, Fizika, 1960, No. 6, p. 30, # 13142

AUTHORS: Sinel'nikov, K.N., Zeydlits, F.M., Nekrashevich, A.M., [illegible], Ya.A., [illegible], Kovpak, N.Ye., Leontovich, R.A., Akhiyezer, A.I., Lifshits, I.M., Paynberg, Ya.B., Rosenstveyg, L.N., Lyubarskiy, G.Ya., [illegible], Pargamanik, [illegible]

TITLE: A 20.5-Mev Linear Proton Accelerator 19

PERIODICAL: Tr. Sessii AN UkrSSR, po mirn. ispol'zovaniyu atomn. energii, Kiyev, AN UkrSSR, 1958, pp. 5-15

TEXT: The physical substantiation of the parameter choice is presented and the design of a linear proton accelerator with a drift tube at 20.5 Mev energy is described; the accelerator was constructed in the Fiziko-tekhnicheskiy institut AN UkrSSR (Institute of Physical Engineering of the AS UkrSSR). The main-computational data of the accelerator are the following: The operational wave length is $\lambda = 215$ cm; the injection energy is 1.7 Mev; the length of the accelerator is 1,446.8 cm; the synchronous phase is 20°; the length of the first half-tube is 4.875 cm; that of the last one is 16.725 cm; the length of the first gap is

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3.380 cm; that of the last one is 11.150 cm; the length of the first drift tube is 0.145 cm; that of the last one is 32.955 cm. Altogether, the number of drift tubes is 50, that of the half tubes is 2; the acceleration system begins and ends with the latter. At the entrance of every drift tube, focusing grids are fixed consisting of parallel tungsten wires of 0.07 mm thickness; their total geometric transmittance amounts to 30%. The drift tubes are installed within the resonator by means of a suspension system; the resonator is made as a 1,446.8-cm long regular 16-face prism. The resonator is fed from 20 h.f. generators. The Q-factor of the resonator in the loaded state is equal to $6.5 \cdot 10^4$ in consequence of which the h.f. power needed for accelerating particles to the rated energy amounts to 1.2 Mw. An electrostatic generator operating by pulses with the pulse duration of 500 μ sec at about 1 ma current intensity and 1.7 mv voltage serves as proton injector. The principal circuit and the design of the individual accelerator units are presented.

ASSOCIATION: Fiz.-tekhn. in-t AN UkrSSR (Physico-Engineering Institute of the Ukrainian Academy of Sciences)

A.P. Fateyev

Translator's note: This is the full translation of the original Russian abstract.

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

S/058/61/000/010/085/100
A001/A101

24.7700

AUTHOR: Kaganov, M.I.

TITLE: The influence of Hall effect on resistance of ferromagnetics

PERIODICAL: Referativnyy zhurnal. Fizika, no. 10, 1961, 267, abstract 10E325 (V sb. "Magnitn. struktura ferromagnetikov", Novosibirsk, Sib. otd. AN SSSR, 1960, 79 - 83)

TEXT: It is shown that Hall effect affects the relation between the resistance of ferromagnetics and magnetic field during magnetization.

[Abstracter's note: Complete translation]

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85974

S/126/60/010/005/029/030
E032/E414

24.2200 (1385,1144,1162)

AUTHORS: Kaganov, M.I., Tsukernik, V.M. and Chupis, I.Ye.

TITLE: Theory of Relaxation Processes in Antiferromagnetics

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.5, pp.797-798

TEXT: The method put forward by Akhiyezer (Ref.1) and Kaganov and Tsukernik (Ref.2) is used to calculate the mean probabilities of processes associated with the interaction between spin waves in ferromagnetics. The theory holds in the temperature region

$$\Theta_c \left(\frac{\mu_0 M_0}{\Theta_c}\right)^{1/2} \ll T \ll \Theta_c$$

in which the energy of the spin wave is given by the well-known expression

$$\varepsilon_\lambda = \Theta_c (ak_\lambda)$$

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Theory of Relaxation Processes in Antiferromagnetics

The notation is defined in the previous paper by the present authors (Ref.3). The processes considered are: (a) combination of two spin waves into one, and (b) collision of two spin waves. The probability of other processes, for example combination of three spin waves into one, have zero probability since energy and momentum conservation laws cannot be satisfied at the same time. It is found that the mean probabilities for the above two processes are respectively given by

$$\bar{W}_3 \approx \frac{\Theta_c}{h}\left(\frac{\mu_0 M_0}{\Theta_c}\right)^{5/2} \frac{T}{\Theta_c}^{3} \qquad (3)$$

$$\bar{W}_4 \approx \frac{\Theta_c}{h}\left(\frac{T}{\Theta_c}\right)^{5} \qquad (4)$$

Comparison of these two probabilities shows that in the above

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Theory of Relaxation Processes in Antiferromagnetics

temperature region the non-homogeneous exchange interaction is responsible for setting up the thermodynamic equilibrium in a spin wave system. Acknowledgments are expressed to V.G.Bar'yakhtara for valuable discussions. There are 3 Soviet references.

ASSOCIATIONS: Fiziko-tekhnicheskiy institut AN USSR (Physical-Technical Institute AS UkrSSR)
Khar'kovskiy gosudarstvennyy universitet im. A.M.Gor'kogo (Khar'kov State University im. A.M.Gor'kiy)

SUBMITTED: April 18, 1960

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

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S/056/60/038/004/036/048
B006/B056

9.4300 (1035,1138,1143)
24.7900

AUTHORS: Kaganov, M. I., Tsukernik, V. M.

TITLE: Nonresonance Absorption of the Energy of an Alternating Magnetic Field by a Ferromagnetic Dielectric. II

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 4, pp. 1320 - 1325

TEXT: In part I of the present paper, the nonresonance absorption of the energy of an alternating magnetic field by a ferromagnetic dielectric has already been investigated on the assumption that this field is polarized in the direction of the axis of easiest magnetization. The case is now dealt with, in which the field is polarized perpendicular to this axis. These two cases are described as longitudinal and transverse fields. Contrary to what is the case in a longitudinal field, energy absorption may occur in a transverse field even if no dissipative processes occur, but when the field frequency agrees with the ferromagnetic resonance frequency. Neither resonance nor the effects connected with it are considered. The results obtained here relate to frequencies

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Nonresonance Absorption of the Energy of an Alternating Magnetic Field by a Ferromagnetic Dielectric. II

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B006/B056

that are distant from resonance. The dissipative processes connected with the energy absorption are caused by the interaction between the magnetic field and the spin waves. The authors assume (like in Ref. 1) that the ferromagnetic dielectric is magnetized up to saturation at a given temperature, i.e., that it may be considered to be a single-domain sample. The sample is also considered to be sufficiently pure, so that impurity effects may be neglected. It is shown that the nonresonance absorption of magnetic field energy is connected with the forming of two spin waves as a result of a "collision" between a photon and a spin wave. Besides, an absorption of the photon in higher perturbation-theoretical approximations is possible due to processes in which a large number of spin waves participate. The most important process in this case is one of the fifth order, which occurs in second perturbation-theoretical approximation. The coefficient of the absorption of magnetic field energy $\Gamma = Q\left(\frac{h\delta}{8\pi}V\right)^{-1}$ is now investigated, where Q denotes the amount of energy absorbed per second within the entire sample volume.

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Nonresonance Absorption of the Energy of an Alternating Magnetic Field by a Ferromagnetic Dielectric. II

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One obtains $\Gamma = \frac{1}{32\pi^2} \frac{w^2 T^2}{\mu M_0 \theta_c^3} \omega (1 - e^{-\hbar\omega/T}) I(\eta, \nu)$, where $\eta = \mu H_e/T$ and $\nu = \hbar\omega/T$; the function $I(\eta, \nu)$ is represented as an integral equation by (13) and (13'). These equations are integrated for the special cases of low frequencies ($\nu \ll 1, \eta$), resonance frequency ($\nu = \eta$), and high frequencies ($1 \gg \nu \gg \eta$; $\nu \gg 1 \gg \eta$; $\eta \gg \nu \gg 1$; $\nu \gg \eta \gg 1$). The resulting asymptotic values of the integrals are used to determine approximate formulas for Γ in the various special cases. The authors thank A. I. Akhiyezer and V. G. Bar'yakhtar for discussions. There are 3 references: 2 Soviet and 1 US.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Institute of Physics and Technology of the Academy of Sciences Ukrainskaya SSR)

SUBMITTED: November 23, 1959

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

KAGANOV, M.I.

S/056/60/039/01/20/029
B006/B063

AUTHOR: Kaganov, M. I.

TITLE: Excitation of Standing Spin Waves in a Film

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 1(7), pp. 158-162

TEXT: Recently it has been observed that the curves of magnetic energy absorption in thin ferromagnetic films have several peaks which seem to confirm the excitation of standing spin waves in such films. As these experiments were made in a homogeneous magnetic field, and because of the high surface energy of anisotropy, Kittel suggested to assume equilibrium for the magnetic moment at the boundary, i.e., the variable part of the magnetic moment tends to zero at the boundary. Proceeding from this assumption Kittel determined the vibration frequencies of the magnetic moment, which in turn permitted the determination of the value of exchange interaction. In the paper under abstraction the author calculates the surface impedance of the ferromagnetic film, considering its finite conductivity. Moreover, he studies the effect of the boundary conditions for

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Excitation of Standing Spin Waves in a Film

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B006/B063

the magnetic moment upon the kind of surface impedance. All this is based on the assumption that the constant field H_0 be oriented along the axis of easiest magnetization, i.e., perpendicular to the surface of the film. The spatial dispersion of magnetic susceptibility is taken into account. For the surface impedance of a left-handed circularly polarized wave the author derives the expression (6) which is reduced to (8) for a vanishing conductivity of the film in the case in which the thickness of the film satisfies the condition (9). It is further reduced to (10) for very thin films ($d \sim 10^{-6}$cm). The effect of the skin effect and the boundary conditions on the curve of spin-wave excitation is discussed, and some special cases are described. Finally, the author thanks V. Bar'yakhtar for his discussions. L. Landau and Ye. Lifshits are also mentioned. There are 4 references: 1 Soviet and 3 US.

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

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APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0"

"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

S/056/60/039/002/044/044
B006/B070

AUTHORS: Kaganov, M. I., Tsukernik, V. M.

TITLE: Theory of the Non-resonant Absorption of a Variable Magnetic Field by a Ferromagnetic Dielectric

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 2(8), p. 518

TEXT: In an earlier paper, the authors calculated the absorption coefficient of a variable magnetic field polarized perpendicular to the axis of easiest magnetization. The Hamiltonian used in that case took only the exchange interaction into account. Later, Tsukernik showed that in this case only resonance absorption of a homogeneous magnetic alternating field may take place, since the total magnetic moment commutes with the Hamiltonian of the system; the results of the earlier paper (Ref. 1) are therefore wrong. The error is related to the fact that in the calculation of the matrix elements of the transition, the authors restricted themselves to the first approximation of the perturbation theory. A consideration of the second approximation shows that the matrix

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"APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000619920004-0

S/053/60/071/004/001/004
B004/B056

AUTHORS: Akhiyezer, A. I., Bar'yakhtar, V. G., Kaganov, M. I.

TITLE: Spin Waves in Ferromagnetics and Antiferromagnetics I

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol. 71, No. 4, pp. 533 - 579

TEXT: The present paper deals with the essential properties of the energy spectrum of a ferromagnetic near magnetic saturation. The following properties depend on this spectrum at low temperatures: The interrelation between the magnetization of the ferromagnetic and temperature as well as with the external magnetic field; the thermal properties of the ferromagnetic, the relaxation of the magnetic moment, and the behavior of the ferromagnetic in electromagnetic alternating fields and in sound fields. In crystals, the deviation of the magnetic moment of an atom from the predominant direction does not remain localized on the atom, but it propagates as a wave, which is called spin wave. In the present paper, the ferromagnetic theory is dealt with as follows from the viewpoint of the spin waves: I. Energy spectra, thermal and magnetic

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