The bulk of the theoretical and experimental investigations, on which this book is based, was carried out at the laboratory of physical modeling of the Moscow Power Institute. Some of these investigations were presented by the author at conferences and seminars of the Moscow Power Institute, the All-Union Correspondence Power Institute, the Leningrad Polytechnic Institute, and the Scientific Research Institute of Direct Current. A part of the research in ferroresonance in electric circuits was done by the Chair of Electrical Apparatus of the Moscow Power Institute. The author thanks the director in charge of the electrodynamic model of the Moscow Power Institute, Professor V.A. Venikov, Doctor of Technical Sciences; Professor D.A. Federov, and Professor M.A. Babikov, Doctor of Technical Sciences, Head of Electrical Apparatus Chair of the Moscow Power Institute, for their help in a number of investigations whose results appear in this book. Valuabe advice was given to the author by Professor Ya. Z. Tsypkin, Doctor of Technical Sciences, who reviewed the book and R.M. Kantor, Candidate of Technical

Sciences, the editor. There are 74 references, 55 of which are Soviet (including 2 translations), 14 English, 4 German, and 1 French.

TABLE OF CONTENTS:

AVAILABLE: Library of Congress

JP/ksv
10-17-58

Card 12/12

AID P - 4120

Subject : USSR/Electricity

Card 1/2 Pub. 27 - 7/33

Author : Dolginov, A. I., Kand. Tech. Sci., Dotsent, Moscow

Title : Theory of parametric self-excitation of electric machinery.

Periodical : Elektrichestvo, 12, 29-35, D 1955

Abstract : The self-excitation of synchronous machinery with capacitive load is investigated on a one-phase equivalent circuit by placing flux and circuit vectors in the complex plane along the longitudinal and cross rotor axes. The author constructs equations of the circuits in the absence of outside sources. He demonstrates that self-excitation in all the instances has a parametric character. For machines with uniaxial rotor winding, self-excitation in certain (indicated) zones is connected with the synchronous and dynamic moments of salient polarity and in another (indicated) zone

Elektrichestvo, 12, 29-35, D 1955

AID P - 4120

Card 2/2 Pub. 27 - 7/33

- in general with the asynchronous generator moment of the machine. The author presents an analysis of self-excitation in a machine with a symmetrical rotor. He demonstrates that the speed of the development of self-excitation is determined by the time constant of the rotor circuits. Eleven diagrams, 7 Soviet references (1940-1953).

Institution : None

Submitted : Mr 3, 1955

SOV/112-58-1-67

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1958, Nr 1, p 6 (USSR)

AUTHOR: Dolginov, A. I.

TITLE: Determination of Parametric-Instability Regions in Complicated Linear and Nonlinear Electric Circuits (Opredeleniye oblastey parametricheskoy neustoychivosti v slozhnykh lineynykh i nelineynykh elektricheskikh tsepyakh)

PERIODICAL: Tr. Vses. zaochn. energ. in-ta, 1957, Nr 7, pp 64-70

ABSTRACT: In order to find parametric-instability regions (H) in a variable-inductance linear circuit, a calculating scheme has been devised where boundary instability curves are expressed as equations of an electric circuit. If the parameters of the circuit in question are given as numerals, the parameters of the scheme are determined experimentally. Equations of the boundary curves of regions H are obtained, and a diagram of H is graphed. It is demonstrated that H regions for higher odd harmonics are so narrow that, in practice, only the fundamental harmonic resonance should be taken into consideration. There are no H regions in even harmonics. The method of equivalent

Card 1/2

SOV/112-58-1-67

Determination of Parametric-Instability Regions in Complicated Linear and . . . .

schemes is also used for nonlinear circuits where ferroresonance is possible; the method permits determining H regions without resorting to differential equations of the circuit and their analysis.

B. Ya. Zh.

AVAILABLE: Library of Congress

1. Electrical circuits--Analysis 2. Mathematics

Card 2/2

DOLGINOV, A.I.; FEDOROV, D.A.

Investigating the conditions for self-excitation in typical electric power transmission circuits. Nauch.dokl.vys.shkoly; energ. no.3:45-60 '58. (MIRA 12:1)

1. Rekomendovano kafedroy elektricheskikh setey i sistem Gidro-energeticheskogo instituta.
(Electric networks)

DOLGINOV, A.I., dotsent, kand.tekhn.nauk

Operator method in the theory of two reactions. Trudy VMEI no.9:94-102 '58. (MIRA 12:10)
(Electric machinery, Synchronous)
(Operators(Mathematics))

SOV/143-59-2-3/19

9(3)

AUTHOR: Dolginov, A.I., Docent, Candidate of Technical Sciences

TITLE: The Calculation of Transient Processes on Long Lines With Non-Linear Parameters (Raschet perekhodnykh protsessov na dlinnykh liniyakh s nelineynymi parametrami)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Energetika, 1959, Nr 2, pp 14-25 (USSR)

ABSTRACT: The article is based on lectures delivered by the author at the Polytechnical Institute Chiao-t'ung of the Chinese People's Republic. In electrical engineering, a great number of problems requires a solution of an equation for a long line with non-linear parameters which are written in the following form:

[illegible]

whereby R_k, L_k, g_k, C_k are non-linear parameters in the general case. Models are often used for the

Card 1/3

The Calculation of Transient Processes on Long Lines With Non-Linear Parameters

solution of such problems. However, it is possible to solve these problems under the same assumptions and with great accuracy by means of the characteristics method which was also used by Satche and Grosse [Ref 1]. Such a method is very flexible due to the possibility of calculating practically with any given initial characteristic of the parameters. The aforementioned equations belong to the group of quasi-linear hyperbolic systems and were investigated first by Academician S.A. Khristianovich for solving hydrodynamic problems [Ref 3]. The author explains the theory of a special case when the aforementioned equations may be solved in a closed form. He applies these equations for solving problems connected with transient processes on power lines with corona discharge and transient processes on extended

The Calculation of Transient Processes on Long Lines With Non-Linear Parameters

ground cables. Finally he presents a numerical example for this calculation method. There are 6 graphs, and 9 references, 8 of which are Soviet and 1 French.

ASSOCIATION: Vsesoyuznyy zaochnyy energeticheskiy institut (All-Union Correspondence Institute of Power Engineering)

PRESENTED: Kafedra teoreticheskikh osnov elektrotekhniki (By the Chair of the Theoretical Principles of Electrical Engineering)

SUBMITTED: November 20, 1958

DOLGINOV, A.I., kand.tekhn.nauk, dots.

Frequency method for calculating attenuation and distortion of waves on lines. Izv.vys.uchob.zav.; energ. 2 no.6:30-39 Je '59. (MIRA 13:2)

1. Vsesoyuznyy zaochnyy energeticheskiy institut. Predstavlena kafedroy elektrostantsiy.
(Electric lines)

VOROB'YEV, A.A., prof.; VOROB'YEV, G.A.; VOROB'YEV, N.I.; KALGANOV, A.F.; KALYATSKIY, I.I.; KUCHIN, V.D.; MESYATS, G.A.; POKROVSKIY, S.F.; SOMCHIK, K.K.; CHEPIKOV, A.T.; DOLGINOV, A.I., red.; VORONIN, K.P., tekhn.red.

[High-voltage test equipment and measurements] Vysokovol'tnoe ispytatel'noe oborudovanie i izmerenila. Pod red.A.A.Vorob'eva. Moskva, Gos.energ.izd-vo, 1960. 583 p. (MIRA 14:1)

1. Sotrudniki kafedry tekhniki vysokikh napryazheniy Tomskogo politekhnicheskogo instituta (for all except Dolginov, Voronin).

(Electric testing) (Electric measurements)

LOLGINOV, A. I., Dr Tech Sci — (diss) "Self-excitation in electrical systems with synchronous and asynchronous machines and non-linear inductance," Moscow, 1960, 34 pp Moscow Power Engineering Institute) (KL, 34-60, 121)

DOLGINOV, A.I., kand.tekhn.nauk (Moskva)

Synchronous compensators for long distance power lines. Elektrichestvo no.2:85 F '60. (MIRA 13:5)
(Electric power distribution)

DOLGINOV, Aleksandr Iosifovich, dotsent, kand.tekhn.nauk

Wave processes in a double-wound transformer with a grounded neutral. Izv.vys.ucheb.zav.; elektro-mekh. 3 no.1:30-36 '60. (MIRA 13:5)

1. Kafedra elektricheskikh stantsiy i podstantsiy Vsesoyuznogo zaochnogo energeticheskogo instituta.
(Electric transformers)

DOLGINOV, Aleksandr Iosifovich, dotsent, kand.tekhn.nauk.

Numerical frequency method for the calculation of oscillations in the windings of transformers. Izv.vys.ucheb.zav.; elektromekh. 3 no.2:3-7 '60. (MIRA 13:7)

1. Kafedra elektricheskikh stantsiy i podstantsiy Vsesoyuznogo zaochnogo energeticheskogo instituta.
(Electric transformers)

DOLGINOV, A.I., dotsent, kand.tekhn.nauk; LI KUAN-TSI (Li K'uang-ch'i), inzh.

Simplified method for calculating self-excitation conditions in systems with several synchronous and asynchronous machines. Izv.vys.ucheb.zav.; energ. 3 no.5:15-25 My '60. (MIRA 13:6)

1. Vsesoyuznyy zaochnyy energeticheskiy institut (for Dolginov). 2. Institut TSzyao-tun, Kitayskaya Narodnaya Respublika (for LI KUAN-TSI). Predstavlena kafedroy elektricheskikh sistem Moskovskogo energeticheskogo instituta.
(Electric machinery)

AVINOVITSKIY, I.Ya.; ALEKSEYEV, S.V.; BARANOV, B.M.; GEL'MAN, R.Ye.; DVOSKIN, L.I.; DOLGINOV, A.I.; YERMILOV, A.A.; ZALESSKIY, Yu.Ye.; KAMENEVA, V.V.; KLIMEKSEYEV, V.M.; KIYAZEVSKIY, B.A.; KUZNETSOV, P.V.; RIVKIN, G.A.; FEDOROV, A.A.; SERBINOVSKIY, G.V., red.; BOL'SHAM, Ya.M., red.; BRANDENBURGSKAYA, E.Ya., red.; VORONIN, K.P., tekhn. red.

[Manual for power engineers of industrial enterprises in four volumes] Spravochnik energetika promyshlennykh predpriiatii v chetyrekh tomakh. Moskva, Gosenergoizdat. Vol.1. [Electric power supply] Elektrosnabzhenie. Pod obshchei red. A.A.Fedorova, G.V. Serbinovskogo i IA.M.Bol'shama. 1961. 840 p. (MIRA 15:6)
(Electric engineering)

DOLGINOV, A.I., doktor tekhn.nauk

Self-excitation of synchronous machines with condideration of the saturation of the magnetic circuit. Izv. vys. ucheb. zav.; energ. 4 no.10:15-22 O '61. (MIRA 14:11)

1. Vsesoyuznyy zaochnyy energeticheskiy institut. Predstavlena kafedroy elektricheskikh sistem Moskovskogo energeticheskogo instituta.
(Electric machinery, Synchronous) (Magnetic circuits)

DOLGINOV, Aleksandr Iosifovich; RAZEVIG, D.V., retsenzent; BRANDENBURGSKAYA, E.Ya., red.; BORUNOV, N.I., tekhn. red.

[Overvoltages in electric power systems] Perenapriazheniia v elektricheskikh sistemakh. Moskva, Gos. energ. izd-vo, 1962. 511 p. (MIRA 15:3)
(Electric power distribution—High tension)
(Electric protection)

BORISOGLEBSKIY, Petr Vasil'yevich; DMOKHOVSKAYA, Lidiya Fedorovna; LARIONOV, Vladimir Petrovich; PANTAL', Yuriy Stanislavovich; RAZEVIG, Daniil Vsevolodovich, prof.; RYABKOVA, Yelena Yakovlevna; DOLGINOV, A.I., retsenzent; FERTIK, S.M., retsenzent; NIKOLAYEVA, M.I., red.; BORUNOV, N.I., tekhn. red.

[High-voltage engineering] Tekhnika vysokikh napriazhenii. [By] P.V.Borisoglebskii i dr. Moskva, Gosenergoizdat, 1963. 471 p. (MIRA 17:3)

DOLGINOV, A.I., doktor tekhn.nauk, prof.

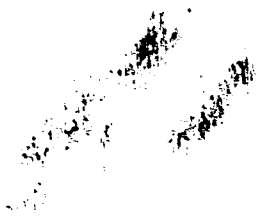
Small parameter and harmonic balance techniques in the calculation of periodic operating conditions of unloaded electric power transmission lines. Izv.vys.ucheb.zav.;energ. 6 no.1:115-117 Ja '63. (MIRA 16:2)

1. Vsesoyuznyy zaochnyy energeticheskiy institut.
(Electric power distribution)

DOLGINOV, A.I.

Suppression of self-excitation in electric power transmission lines operating in a δ3p mode. Trudy Inst. Sib. otd. AN SSSR no.14:50-53 '62. (MIRA 16:9)

(Electric power distribution)



PAVLOV, L.I., kand. tekhn. nauk, dots.; [illegible], A.I., red.

[Lectures for a course in "Overvoltages and overvoltage protection; Lightning and protection from direct lightning strokes"] Lektsii po kursu "Perenapriazheniia i zashchita ot perenapriazhenii: Molniia i grozozashchita ot priamykh udarov molnii." Moskva, Vses. zaochnyi energeticheskii in-t, 1963. 52 p. (MIRA 17:8)

MELENT'YEV, L.A.; DOLGINOV, A.I., doktor tekhn.nauk, prof. (Moskva); MEL'NIKOV, N.A., prof. (Moskva); YURENKOV, V.D., kand.tekhn.nauk (Moskva); SHCHERBAKOV, V.K., doktor tekhn.nauk (Novosibirsk)

"Long-distance electric power transmission" and "Prospects for increasing the voltage of overhead power transmission lines" by I.A.Syromiatnikov and others. Reviewed by L.A.Melent'ev and others. Elektrichestvo no.2:85-88 F '63. (MIRA 16:5)

1. Sibirskiy energeticheskiy institut. 2. Chlen-korrespondent AN SSSR (for Melent'yev).
(Electric power distribution) (Electric lines--Overhead)
(Syromiatnikov, I.A.)

ANISIMOVA, N.D., kand.tekhn.nauk, dotsent; VENIKOV, V.A., doktor tekhn.nauk, prof.; DOLGINOV, A.I., doktor tekhn.nauk; FEDOROV, D.A., kand.tekhn.nauk, dotsent

Self-excitation and self-rocking in electrical systems.
Elektrichestvo no.4:11-18 Ap '63. (MIRA 16:5)

1. Moskovskiy energeticheskiy institut.
(Electric power distribution)

DOLGINOV, A.I., doktor tekhn.nauk, prof.

Problem concerning the use of two-way switches with shunting resistances. Elektrichestvo no.11:91-92 N '63. (MIRA 16:9)
(Electric switchgear)

DOLGINOV, A.I. (Moskva); MEL'NIKOV, N.A. (Moskva)

Present day requirements of a course in "Theoretical principles of electrical engineering." Elektrichestvo no.10:83-85 O '63. (MIRA 16:11)

ACCESSION NR: AP4029143 S/0105/64/000/004/0038/0045

AUTHOR: Dolginov, A. I. (Doctor of technical sciences, Professor, Moscow); Shatin, V. S. (Engineer, Moscow); Motusko, V. Ya. (Engineer, Moscow)

TITLE: Wave method of calculating transients in electrical systems by digital computers

SOURCE: Elektrichestvo, no. 4, 1964, 38-45

TOPIC TAGS: electric power system, power system transients, transients calculation wave method, computer transients calculation, wave represented transients

ABSTRACT: By representing a transient wave as a series of numbers and by substituting segments of a distributed-parameter line for all apparatus (machines, transformers, reactors, etc.), many problems in electric-power supply systems (short-circuit, recovery-voltage, switching-surge, atmospheric-surge

Card 1/2

ACCESSION NR: AP4029143

calculations) can be solved on a digital computer. The concept of "digital waves" is introduced, and simple operations therewith are explained. The application of the method to single-phase and 3-phase systems having overhead and underground transmission lines is considered. Formulas for handling transformers, reactors, shunt capacitors, resistors, and valve-type lightning arresters are supplied. Programing hints covering the voltages across branch points, refraction indices, and wave delays in machinery are given. Orig. art. has: 7 figures, 20 formulas, and 1 table.

ASSOCIATION: VNIIE (All-Union Scientific Research Institute of Electric Power Engineering); VZEI (All-Union Correspondence Electrotechnical Institute)

SUBMITTED: 27Nov63 DATE ACQ: 01May64 ENCL: 00

SUB CODE: EE, IE NO REF SOV: 004 OTHER: 001

Card 2/2

DOLGINOV, A.I., [illegible]

Use of digital computers in the calculation [illegible] electrical system. Trudy MAI no.25:6-23 '52.

(MLRA 6:6)

DOLGINOV, A.I., doktor tekhn. nauk; YURENKOV, V.D., kand. tekhn. nauk

Use of capacitive voltage dividers for increasing carrying capacity and maintaining stability in long-distance power transmission lines. Trudy VNIIE no. 20:54-58 '65 (MIRA 19:1)

GALAKOVA, K. Yo., inzh.; DOLGINOV, A.I., doktor tekhn. nauk

Transients during the switching of a generator to supply power to a capacitive load. Trudy VNIIE no. 20:113-136 '65 (MIRA 19:1)

Methods for testing switches disconnecting nonloaded lines and transformers. Ibid.:151-171

BOL'SHAM, Ya.M.; VINOGRADOV, A.A.; VOLOHRINSKIY, S.D.; GEYLER, L.B.; GRUDINSKIY, P.G.; DOLGINOV, A.L.; ZIL'BERMAN, R.I.; KAZAK, N.A.; KLETENIK, B.I.; KNYAZEVSKIY, B.A.; LIVSHITS, D.S.; MEL'NIKOV, N.A.; MININ, G.P.; MUKOSEYEV, Yu.L.; NAYFEL'D, M.R.; PETROV, I.I.; RAVIN, V.I.; SAMOVER, M.L.; SERBINOVSKIY, G.V.; SYROMYATNIKOV, I.A.

Lev Veniaminovich, 1905; on his 60th birthday. Prom. energ. 20 no.9:43 S '65. (MIRA 18:9)

L 22578-66
ACC NR: AP6012975

SOURCE CODE: UR/0094/65/000/009/0043/0043

AUTHOR: Bol'sham, Ya. M.; Vinogradov, A. A.; Volobrinskiy, S. D.; Geyler, L. B.; Grudinskiy, P. G.; Dolginov, A. I.; Zil'berman, R. I.; Kazak, N. A.; Kletenik, B. I.; Knyazevskiy, B. A.; Livshits, D. S.; Mel'nikov, N. A.; Minin, G. P.; Mukoseyev, Yu. L.; Nayfel'd, M. R.; Petrov, I. I.; Ravin, V. I.; Samover, M. L.; Serbinovskiy, G. V.; Syromyatnikov, I. A.

ORG: none

TITLE: Lev Veniaminovich Litvak (on the occasion of his 60th birthday)

SOURCE: Promyshlennaya energetika, no. 9, 1965, 43

TOPIC TAGS: electric engineering personnel, electric power engineering

ABSTRACT: The noted specialist of industrial power production, Candidate of Technical Sciences, Docent of the Correspondence Power Institute Lev Veniaminovich LITVAK began his engineering activity at the Moscow Association of State Electric Stations in 1929. Later he became one of the coauthors of all the "Directives for the increase of the power factor" issued in 1954, 1955, and 1961. He published 70 scientific papers. For his successful activities in defense industries during World War II he was decorated by "Znak Pocheta." After the war he concentrated on scientific-pedagogical work and in recent years worked actively in

Card 1/2

L 22578-66

ACC NR: AP6012975

the Teaching-Methodological Commission of the Ministry of Higher and Intermediate Special Education USSR, for the specialty "Electrical supply to industrial enterprises and cities." Orig. art. has: 1 figure. [JPRS]

SUB CODE: 05, 10, 09 / SUBM DATE: none

Card 2/2 BK

DOLGINOV, A. Z.

PA 3/50T75

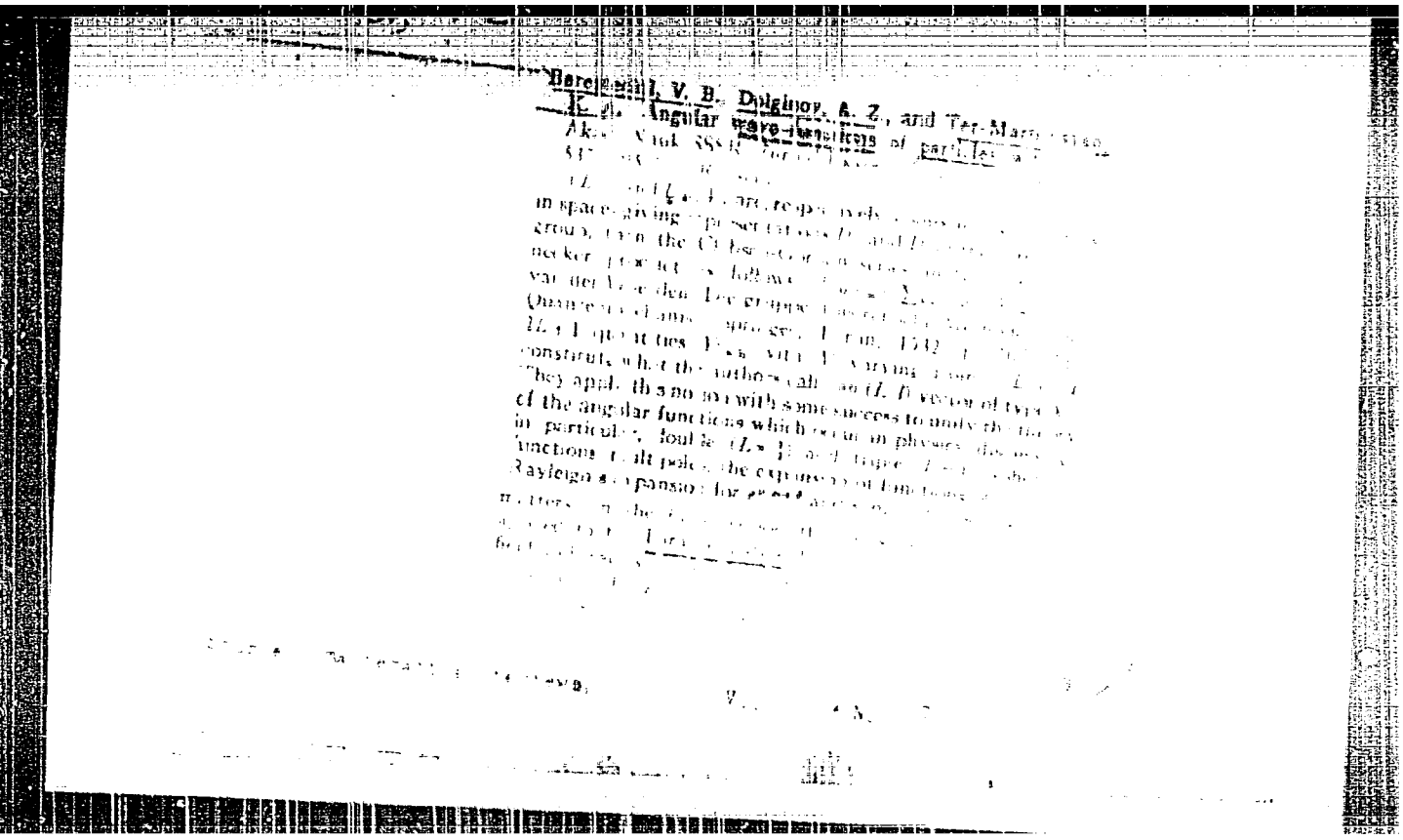
USSR/Nuclear Physics - Meson Spin — 11 Sep 49

"Probability of Meson Conversion," A. [illegible] Dolginov, S. V. Izmaylov, Leningrad Physicotech [illegible] Acad Sci USSR, Pedagogical Inst imeni A. I. Gertsen, 3 pp

"Dok Ak Nauk SSSR" Vol LXVIII, No 2, pp 261-3.

Primary particle and one of the secondary particles have same spin and are described by wave equations of same type (with different masses and, generally speaking, charges). These two particles are considered as two states of the same particle. Third particle, generated in transition from first to second and having an integral spin, is treated as a quantum wave field. Derives concrete formulas for disintegration of a meson with spin $\frac{1}{2}$ into particles with spin $\frac{1}{2}$ and 0, and of a meson with spin 1 into a meson with spin 0 and a neutretto or photon with the aid of Kemmer's matrices. Submitted by Acad A. F. Ioffe 4 Jul 49.

3/50T75



Dolginov, A. Z. The correlation between the direction ... β-electron and a γ-quantum ...

[illegible]

... second forbidden transitions. Finally the author considers the effect of the Coulomb field on the β-neutrino correlation, using the electron wave functions of Berestetskiĭ, Dolginov, and Ter-Martirosyan [see the following review].

N. Rosen (Chapel Hill, N. C.)

Source: Mathematical Reviews, Vol. 12 No. 7

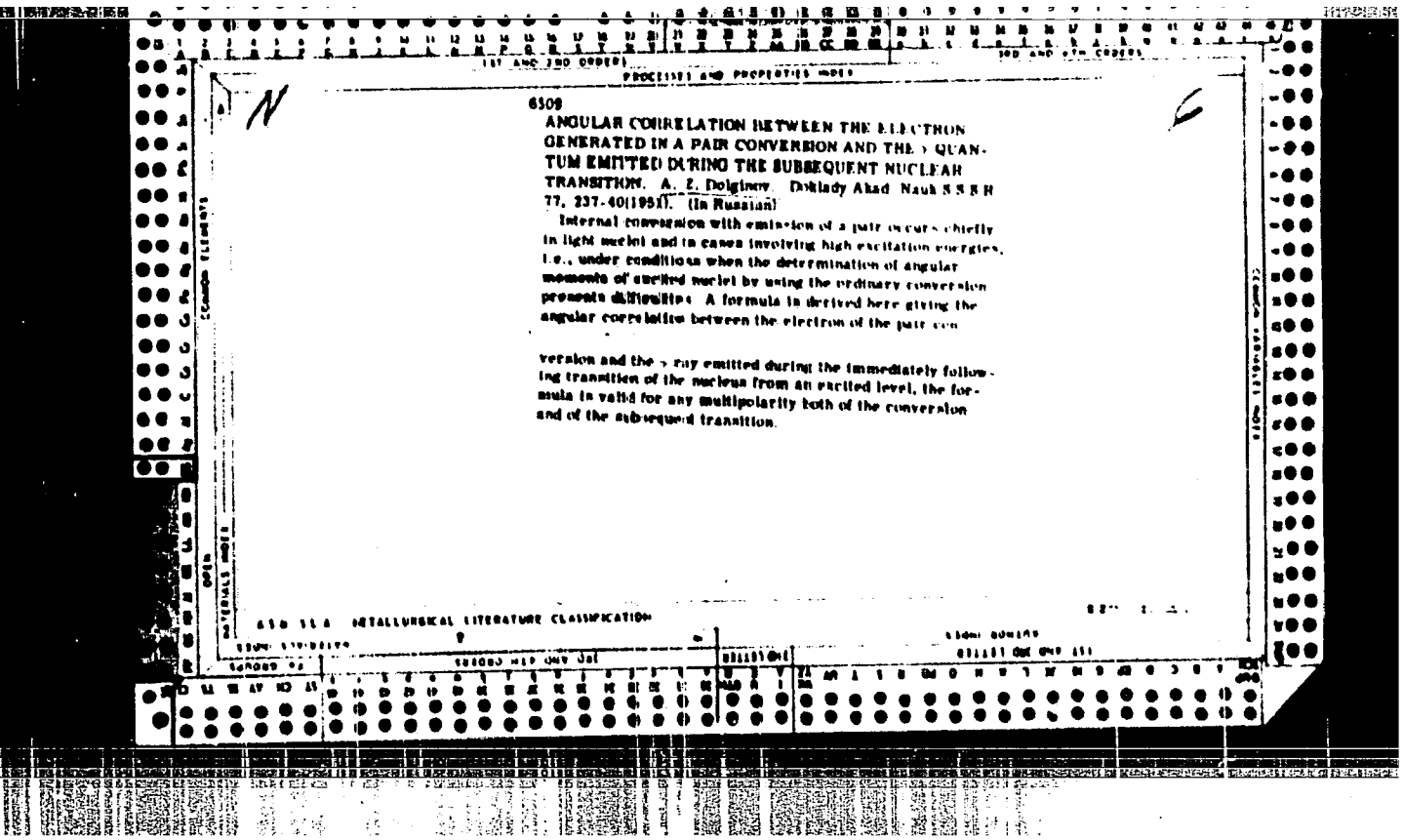
DOLGINOV, A. Z.

Dolginov, A. Z. The angular correlation between polarization and [illegible] quanta in successive emissions. Doklady Akad. Nauk SSSR (N.S.) 73 1149-1152 (1950). (Russian)

The author obtains an expression for a new angular correlation, based on the method used by C. N. Yang [Physical Rev. (2) 74, 764-772 (1948)].

N. Rosen.

Source: Mathematical Reviews, Vol. [illegible], [illegible]



6509

ANGULAR CORRELATION BETWEEN THE ELECTRON GENERATED IN A PAIR CONVERSION AND THE γ QUANTUM EMITTED DURING THE SUBSEQUENT NUCLEAR TRANSITION. A. Z. Dolginov. Doklady Akad. Nauk S.S.S.R. 77, 237-40(1951). (In Russian)

Internal conversion with emission of a pair occurs chiefly in light nuclei and in cases involving high excitation energies, i.e., under conditions when the determination of angular moments of excited nuclei by using the ordinary conversion presents difficulties. A formula is derived here giving the angular correlation between the electron of the pair conversion and the γ ray emitted during the immediately following transition of the nucleus from an excited level, the formula is valid for any multipolarity both of the conversion and of the subsequent transition.

DOLGINOV, A. Z.

232T96

USSR/Nuclear Physics - Conversion Electrons May/Jun 52

"Angular Distribution of Conversion Electrons," A. Z. Dolginov, Leningrad Phys-Tech Inst, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Fiz" Vol 16, No 3, pp 322-329

Report heard 5 Feb 52 in Acad Sci USSR. Subject process is considered in 3 stages: the nucleus emitting (or absorbing) the particle with spin s_1 or a gamma-quantum passes from the

232T96

state with angular momentum j_0 to the state with angular momentum j_1; then delivering the energy of excitation to a conversion electron the nucleus passes to the state with angular momentum j_2; finally the electron of the atomic shell under the action of the potentials created by the nucleus passes from the bound state with full angular momentum J_0 and orbital $l_0 = J_0 = \frac{1}{2}$ to the free state with full angular momentum J and l.

232T96

DOLGINOV, A. Z.

USSR/Nuclear Physics - Beta-Decay of Heavy Nuclei — Jun 52

"Angular Distribution of Beta-Particles During Beta-Decay of Heavy Nuclei," A. Z. Dolginov, Leningrad Phys-Tech Inst, Acad Sci USSR

"Zhur Eksper i Teoret Fiz" Vol XXII, No 6, pp 658-667

Discusses effect of Coulomb field on angular correlation between beta-particle and neutrino. Relativistic wave-functions of electron in a Coulomb field are used for computation. The field within

217T85

the nucleus is considered const. Shows that the effect of the Coulomb field should not be neglected in the case of forbidden beta-transition. Author compares his work with that by E. Greuling and M. L. Meeks (Phys Rev, 82, 531, 1951). Received 1 Nov 51.

217T85

USSR/Nuclear Physics - Beta-Gamma Correlation — Jun 52

"Beta-Gamma Angular Correlation for Heavy Nuclei," A. Z. Dolginov, Leningrad Phys-Tech Inst, Acad Sci USSR

"Zhur Eksper i Teoret Fiz" Vol XXII, No 6, pp 668-676

Discusses effect of the nucleus' Coulomb field on angular correlation between beta-particle and subsequent gamma quantum. Shows that for forbidden beta-transitions at $Z > A^{1/3} E_0$ the nucleus' Coulomb

217T86

field substantially effects the beta-gamma angular correlation. Expressions are found for the 1st forbidden beta-transition, correct for any Z for any multipolarity of the subsequent gamma-quantum. Received 1 Nov 52.

217T86

DOLGINOV, A. Z.

DOLGINOV, A. Z.

USSR/Nuclear Physics - Transitions Nov 52

"Angular Corelations During Multistage C. ade Transition of Nucleus," A. Z. Dolginov, Leningrad Phys Tech Inst, Acad Sci USSR

"Zhur Eksper i Teoret Fiz" Vol 23, No 5, pp 493-501

Derives general formulas defining corelation between directions of two arbitrary particles emitted during a complex cascade nuclear transition. Formulas are obtained without use of perturbation theory and are applied to analysis of angular corelation in N-stage and gamma cascade during nuclear reactions and radioactive decay. Received 30 Jun 52.

236T70

USSR

62.

Isotopic spin of light particles. A. Z. Dolginov (Leningrad Phys. Tech. Inst., Acad. Sci. U.S.S.R.). *Zhur. Eksptl. i Teoret. Fiz.* 25, 756-7(1953).—Theoretical math. D. discusses the isotopic spin of a system in β-decay consisting of protons, neutrons, antineutrons, and antiprotons, and then applies the results to a proton, neutron, antineutron, and electron system of particles. F. H. Ruthmann

DOLGINOV, A.Z.

Category : USSR/Theoretical Physics - Quantum Field Theory B-6

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 2962

Author : Dolginov, A.Z.
Inst : Leningrad Physicotechnical Institute, Academy of Sciences USSR
Title : Relativistic Spherical Functions

Orig Pub : Zh. eksperim. i teor. fiziki, 1956, 30, No 4, 746-755

Abstract : Analysis of the problem of whether it is possible to employ the eigenfunctions of the four-dimensional angular momentum to solve equations in the quantum field theory. The eigenfunctions of the four-dimensional angular momentum are a basis for representation functions of the Lorentz group. In connection with this, the author considers finite dimensional representations of rotation groups in pseudo-Euclidian and Euclidian space. The consideration of the Euclidian space becomes particularly interesting in those cases, when the equations admit of analytic continuation into the region of imaginary time. As was shown by Wick (Referat Zh. Fizika, 1956, 15778), this takes place for the Bethe-Salpeter equation. The four-dimensional spherical functions of a Euclidian space ψ_{nlm} are known (Fok, V.A., Z.

Card : 1/3

Category : USSR/Theoretical Physics - Quantum Field Theory

B-6

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 2962

Phys., 1935, 98, 145). The author introduces for these functions an expansion of the Clebsch-Gordan type $\psi_{n_1 l_1 m_1} \psi_{n_2 l_2 m_2} = \sum (-1)^{J-J_1-J_2} C^{lm}_{l_1 m_1 l_2 m_2} \times \times (J_1 J_1 - J_2 J_2; l_1 l_2, JJ, J) \psi_{nlm, n_1} = 2J_1 + 1$, where $C^{lm}_{l_1 m_1 l_2 m_2}$ is the Clebsch-Gordan coefficient. Substituting it for t we obtain the functions ψ_{nlm}, which effect the finite-dimensional representation of the Lorentz group. The ψ_{nlm} functions are not a direct generalization of the three-dimensional spherical functions in that sense that four dimensional scalars, vectors, tensor, etc are not each expressed in terms of one of these functions, but in terms of a complicated linear combination of these functions. Four-dimensional spherical functions that are a direct generalization of the three-dimensional spherical functions, are obtained for $Z^J_{m\psi}$. These functions can be time-like (the time-like vector is expressed in terms of one such function with $J = 1/2$) and space-like. For example, for $t = \rho \cosh \alpha$, $r = \rho |\sinh \alpha|$ we get $Z^{J}_{m\mu}(\alpha, \vartheta, \varphi) = \sum_{l,k} (-1)^{\mu - k} \times \sqrt{4\pi(2l+1)}\, Y_{lm}(\vartheta, \varphi)\, C^{lm}_{J-MJ\mu}\, C^{l0}_{J-kJk}\, e^{2k\alpha}$

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Category : USSR/Theoretical Physics - Quantum Field Thoery B-6

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 2962

An expansion of the Clebsch-Gordan type is derived for the $Z^J_{M\mu}$ functions; it is simpler than the expansion for ψ_{nlm}

$$Z^J_{M\mu} Z^L_{\Lambda\lambda} = \sum_N C^{N\nu}_{JML\Lambda} C^{Nx}_{JML\lambda} Z^N_{\nu x}.$$

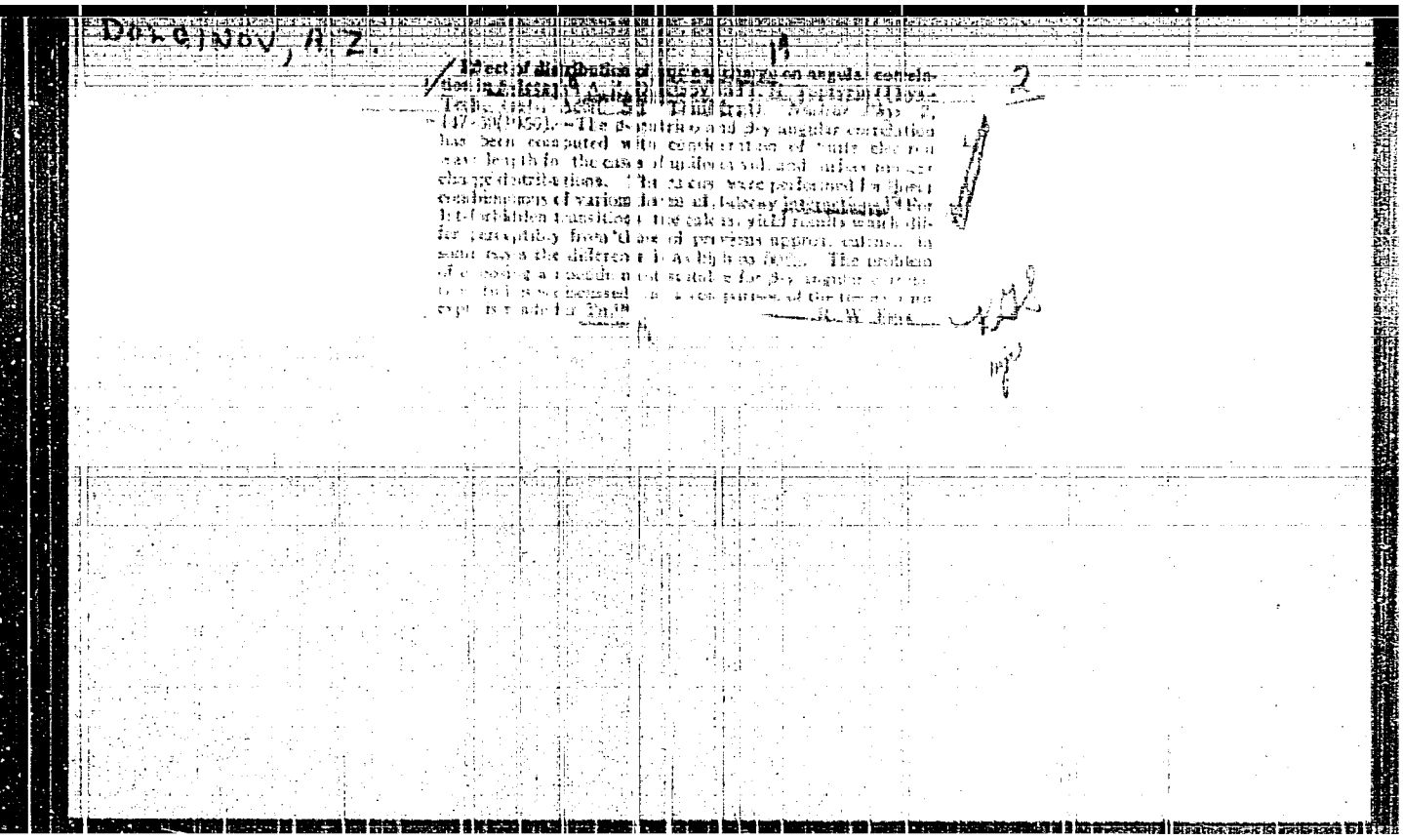
An expansion for e^{ikx} is obtained in terms of the Z functions. Four-dimensional spherical spinor and vector functions are derived. The bispinor $\psi^{Jl}_{M\lambda}$, composed of the two spherical spinors

$$[R^{Jl}_{M\lambda}]_\sigma = \sqrt{2l+1}\,(-1)^{l+\sigma+1/2} C^{JM}_{l\lambda\nu_1-\sigma} Y^l_{M\lambda}\ \ [\rho^{Jl}_{M\lambda}] = \sqrt{2J+1}\,(-1)^J C^{l\lambda}_{J\mu\frac{1}{2}\sigma} Z^J_{M\mu},$$

is an eigenfunction of the total four-dimensional momentum of a particle with spin $\frac{1}{2}$:

$$J^2 \psi^{Jl}_{M\lambda} = [4J(J+2J+2(J+1/2)]\ \psi^{Jl}_{M\lambda}.$$

By way of example of an application of the Z functions, the author considers the problem of the separation of variables in the Bethe-Salpeter equation for two scalar particles. It turns out to be possible to write down the Bethe-Salpeter equation in the form of an infinite system of "linked" equations of only single variable ρ -- the integral between particles. In some cases this may be more convenient that solving one equation with eight variables.



Dolginov, A. Z. Relativistic spherical functions. (Soviet Physics JETP 3 (1956), 589–595.

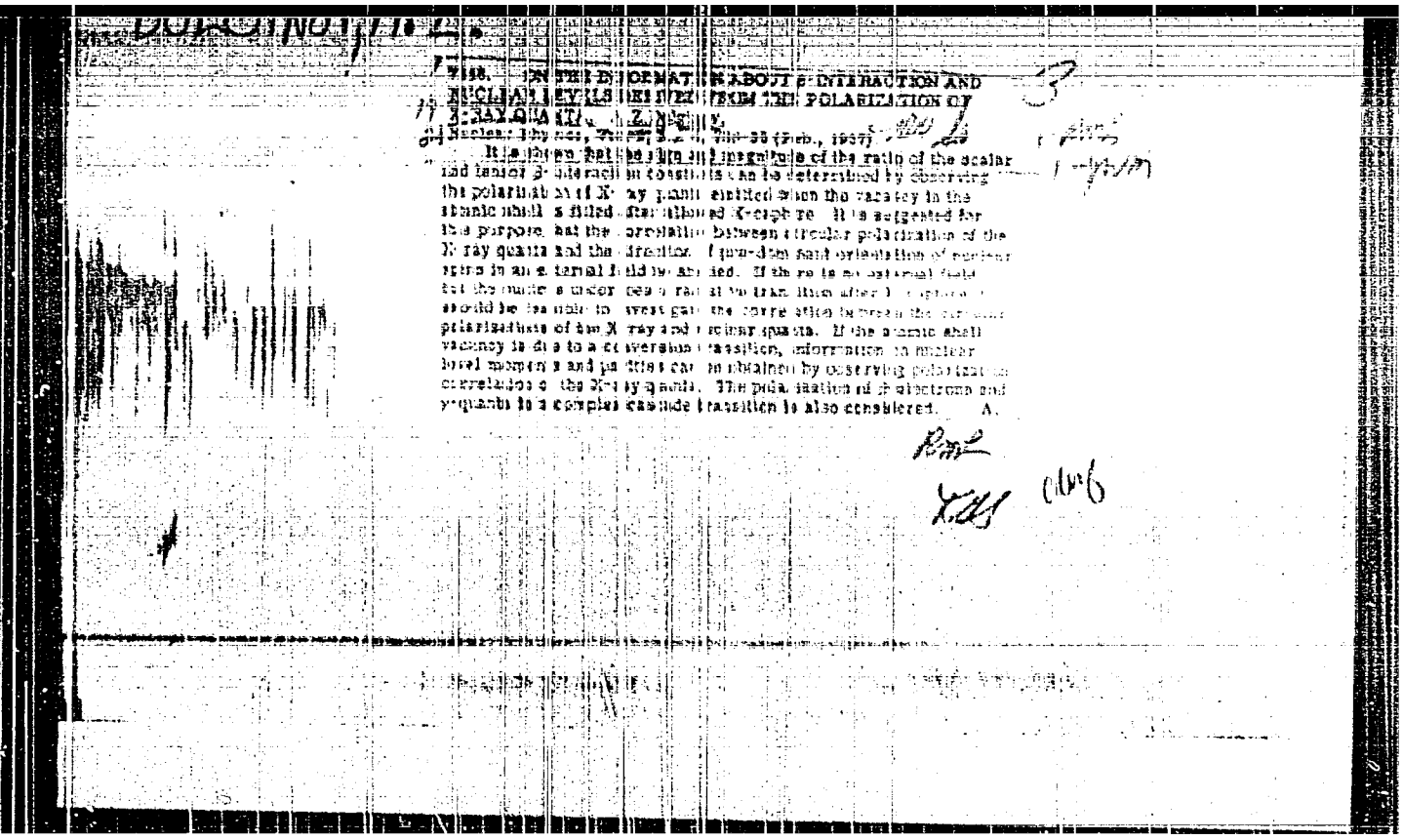
If one describes the relativistic bound two-particle system in terms of functions that [illegible] then expands the wave function in terms of these with the help of the Clebsch-Gordan coefficients. [illegible] the present paper [illegible] irreducible representations of the Lorentz group [illegible] analogues of the Clebsch-Gordan coefficients are also given. The procedure is applied to the Bethe-Salpeter equation to separate the variables for two scalar particles. It is promised that this last point will be elaborated upon in a future paper. — *M. J. Moravcsik* (Upton, N.Y.).

DOLGINOV, A. Z.

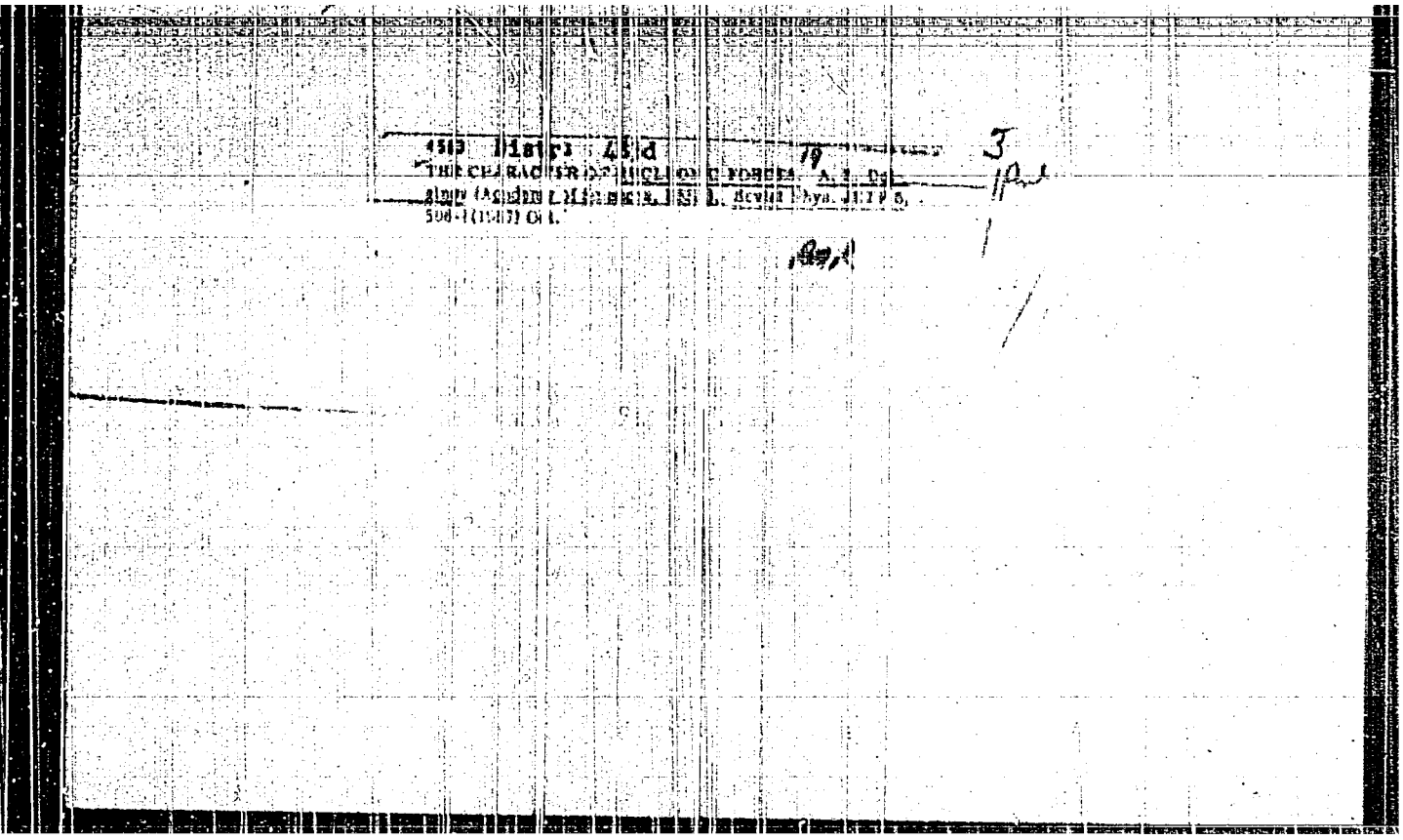
"Possible Experimental Test of 'Combined Parity' Conservation In β-Interaction,"

Physical-Technical Inst. Acad. Sci. USSR

paper submitted at the A-U Conf. on Nuclear Reactions in Medium and Low Energy Physics, Moscow, 19-27 Nov 57.



It is shown that the ratio of the scalar and tensor β-interaction constants can be determined by observing the polarization of X-ray quanta emitted when the vacancy in the atomic shell is filled. Stationary X-ray states are suggested for this purpose, and the correlation between circular polarization of the X-ray quanta and the direction of [illegible] of nuclear spins in an external field is studied. If there is no external field but the nuclei are under the influence of their own internal fields, it would be possible to investigate the correlation between the polarizations of the X-ray and corpuscular quanta. If the atomic shell vacancy is due to a cascade transition, information on nuclear level moments and parities can be obtained by observing polarization correlations of the X-ray quanta. The polarization of photons and corpuscular quanta in a complex cascade transition is also considered. A.



AUTHOR DOLGINOV A.Z.

TITLE On the Character of the Forces between the Nucleons. (O kharaktere sil mezhdu nuklonami.- Russian)

PA - 2985

PERIODICAL Zhurnal Eksperim. i Teoret. Fiziki 1957, Vol 32, Nr 3, pp 612 - 613 (USSR)

Received: 6/1957 Reviewed: 7/1957

ABSTRACT Within the domain of energies of up to 400 MeV the states $^1S_0$ and $^3P_0$ apparently play the main part. To be able to describe the large contribution of $^3P_0$- and the small contribution of $^3P_1$- and $^3P_2$ -states, the author introduces and interaction operator of the form:

$$\hat{U} = (1/4)(1- \vec{\sigma}_1\vec{\sigma}_2)\, V_1 + (1/3)V_2 \left[(\vec{l}\vec{S})-\beta\right]$$

Here $\vec{\sigma}/2$ and $\vec{l}$ denote the operators of the spin and the orbital moments of the nucleon respectively; V_1, V_2 and β - functions of the invariants r, $\delta/\delta r$, S^2 and l^2. Furthermore $\hat{S} = (\vec{\sigma}_1+\vec{\sigma}_2)/2$ applies. The author here does not examine the explicit form of V_1 and V_2, because the phase

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On the Character of the Forces between the Nucleons.

analysis existing up to now is not well-defined and does not furnish reliable data concerning the phases. In spite of this fact the data concerning the character of the interaction in the ^3P-states of such a separation of forces appear to be reasonable.

The most exact description of $^1D_2$, ^3F and the other states as well as taking into account the small contributions of $^3P_1$ and $^3P_2$ may be obtained by the introduction into $\hat{U}$ of additional terms (tensor forces), (1S)-forces. A small shift of the phases

$$\delta(^3P_1) \text{ and } \delta(^3P_2)$$

which does not noticeably disturb the isotropy of the angular distribution, is not able to exercise a strong effect as regards the character of polarization of the nucleons.

Data on np-scattering at T = 0 can apparently be explained on the basis of a central static potential.

The author examines the general form of the forces depending upon velocity. The potential between two nucleons may depend upon the four vectorial operators $\vec{n} = \vec{r}/r, \sigma_1, \sigma_2$ and $\vec{\tau}$

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On the Character of the Forces between the Nucleons. PA - 2985

as well as upon the scalar operators r, ∂/∂ r, l^2. The operator functions $Y_{Nr}(\vec{l})$ are introduced, the components of which are transformed on the occasion of rotations of the coordinates according to an (2N+1)-dimensional irreducible representation. There follow examples and discussion of the explicit form of Y_{Nr}.
(No illustrations)

ASSOCIATION: Leningrad Physical-Technical Institute of the Academy of Science of the U.S.S.R.
PRESENTED BY: -
SUBMITTED: 6. 11. 1956.
AVAILABLE: Library of Congress.

CARD 3/3

DOLGINOV, A.Z.

56-6-8/47

AUTHOR: Dolginov, A. Z.

TITLE: A Possible Verification of Re-Examining the Law of Conservation of "Combined Parity" for β-Interaction (Vozmozhnaya proverka zakona sokhraneniya "kombinirovannoy chetnosti" dlya β-vzaimodeystviya)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1957, Vol. 33, Nr 6 , pp. 1363 - 1370 (USSR)

ABSTRACT: Theoretically the β-γ correlation is dealt with, and it is shown that a β-γ correlation observed furnishes important information for permitted transitions concerning the nature of interaction:
1.) If there is no β-γ correlation , then a) β-interaction is invariant with respect to time inversion, and b) the vectorial and pseudo-vectorial interaction is of but minor importance.
2.) If there is β-γ correlation, and if it decreases with decreasing β-energy, then a) β-interaction is invariant with respect to time inversion and b) vectorial and pseudo-vectorial interaction plays an important part.
3.) An increase of correlation with increasing β-energy leads to a disturbance of the law of conservation of "combined parity".
The formulae for β-γ angular- and polarization correlation for

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56-6-8/47

A Possible Verification of Re-[redacted] Law of Conservation of "Combined Parity" for β-Interaction

orientated nuclei in the case of β-transitions of any degree of forbiddenness, are also derived. There are 23 references, 12 of which are Slavic.

ASSOCIATION: Leningrad Physical-Technical Institute AN USSR
(Leningradskiy fiziko-tekhnicheskiy institut Akademii nauk SSSR)

SUBMITTED: May 6, 1957

AVAILABLE: Library of Congress

Card 2/2

DOLGINOV, A. Z.

"Beta-Gamma Correlation and Polarization of Particles in the Beta Decay of Oriented Nuclei in Connection with Parity Non-Conservation," Nuclear Physics, Vol. 5, No. 3, Feb 1958, (No. Holland Publ. Co., Amsterdam)

Physico-Tech. Inst. Acad. Sci. USSR, Leningrad.

Abst: A formula for the angular distribution and polarization of β-particles emitted by polarized or aligned nuclei is derived; the formula is valid for β-transitions of an y order of forbiddenness. The investigation is carried out for β- interaction of a general form with possible parity non-conservation being taken into account. The β-γ angular and polarization correlation is determined. As a way of clarifying the problem of invariance of the theory under time reversal it is suggested that β-γ correlation in allowed transitions of alligned nuclei be studied. It is taken into account in the calculations that the field inside the nucleus differs from that of a point charge.

DOLGINOV, A. Z.

DOLGINOV, A. Z.
Physico-Technical Institute of the USSR Academy of Sciences, Leningrad

"Polarization of X-ray Quanta and Non-Conservation of Parity in K-Capture," Nuclear Physics, Vol. 6, pp. 460-463, 1958 (North Holland Publishing Co., Amsterdam).

Abstract: The effect of parity non-conservation in β -interaction on the correlation between circular polarization of X-ray quanta emitted by an atom after k-capture and polarization of nuclear spins or of subsequent nuclear quanta is considered. L-capture is examined and it is shown that in capture from the L_{III} shell the angular distribution of X-ray quanta is anisotropic.

DOLGINOV, A. Z.,

"A Possible Experiment for Determination of Spirality of μ-Mesons." Nuclear Physics, vol. 7, No. 6, p. 569-572, 1958. (No. Holland Publ. Co).

Physico-Tech. Inst. Acad.Sci. USSR, Leningrad.

Abstract: For the determination for the determination of the direction of the μ-meson spin with respect to its momentum it is suggested that circular polarization of X-ray quanta emitted by a mesic atom be investigated. This should simultaneously yield information on the degree of depolarization of μ-mesons after a certain level is reached in the mesic atom.

DOLGINOV, A. Z., and POPOV, N. P.

"First Order Forbidden β-γ-Correlation for Oriented Nuclei."

Nuclear Physics, vol. 7, No. 6, p. 591-598, 1958. (No. Holland Publ. Co).

Physico-Tech. Inst, Acad. Sci. USSR, Leningrad.

Abstract: Explicit formulae for β-γ correlation of oriented nuclei in first forbidden β-transitions are obtained. All five types of β-interaction are considered and the Coulomb field of an extended nucleus is taken into account. Explicit β-γ-correlation formulae for non-oriented nuclei are obtained as a particular case. Angular as well as polarization correlation is considered.

DOLGINOV, A.Z., Doc Phys Math Sci -- (diss) "Angular and polerization correlations of particles." Len, 1958, 12 pp (Len Phys Tech Inst of Acad Sci USSR) 150 copies. Bibliography at end of text (23 titles) (KL, 50-58, 119)

AUTHOR: Dolginov, A. Z.

56-34-4-23/60

TITLE: The Polarization and the Angular Distribution of the X-Ray Quanta Emitted After Electron Capture by a Nucleus, or After a Conversion Transition (Polyarizatsiya i uglovoye raspredeleniye rentgenovskikh kvantov, ispuskayemykh posle zakhvata elektrona yadrom ili posle konversionnogo perekhoda)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 4, pp. 931 - 941 (USSR)

ABSTRACT: This work generalizes the results of a previous work by the author to the cases of the K- or L- capture of arbitrary order of the prohibition under consideration of the non-conservation of parity. The computation of the correlation for this case is given in a supplement. The work itself only brings the final results and their discussion. The author first examines the case that the nucleus before a permitted K-capture was orientated in an external field. On this occasion, however, the direction and polarization of the nuclear γ-quantum which after the K-capture can be emitted are not studied. For the correlation between the circular polarization of this quantum and the direction of orientation of the nuclear spin a formula is

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The Polarization and the Angular Distribution of the X-Ray Quanta Emitted After Electron Capture by a Nucleus, or After a Conversion Transition

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written down. In the computation of the correlation the general form of the β-interaction, suggested by T. D. Lee and C. N. Yang, was used. If the permitted capture of the electron takes place from the L_I-shells or from the L_{II}-shells the correlation has the same character as in the case of the K-capture. Various details are indicated. The second paragraph deals with the polarization and the angular distribution of the x-ray quanta after a conversion transition. The work itself brings only the final formulae for the most important cases; the derivation of the formulae is made in a mathematical supplement. There the author first examines the case that an orientated nucleus performs the conversion transition; the nuclear γ-quanta which form on that occasion are not interesting. For the circular polarization of the electrons, for the electrical transition, and for the magnetic transition formulae are written down. Finally terms for the correlation between the circular polarization of the x-ray K_{α_2} -quantum (transition of the elec-

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The Polarization and the Angular Distribution of the X-Ray Quanta Emitted After Electron Capture by a Nucleus, or After a Conversion Transition 56-34-4-23/60

tron from the level I = 1/2) and the circular polarization of the nuclear quantun after a K-conversion transition of a non-orientated nucleus are written down and shortly discussed. There are 18 references, 5 of which are Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut Akademii nauk SSSR (Leningrad Institute of Physics and Technology, AS USSR)

SUBMITTED: October 24, 1957

1. X-radiation--Polarization

Card 3/3

AUTHOR: Dolginov, A. Z. SOV/56-35-1-25/59

TITLE: The Polarization Correlation of β-Particles and γ-Quanta in the Allowed Decay of Oriented Nuclei (Polyarizatsionnaya korrelyatsiya β-chastits i γ-kvantov pri razreshennom raspade oriyentirovannykh yader)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 1, pp 178 - 183 (USSR)

ABSTRACT: The investigations recently carried out of angular- and polarization correlations in β-transition yielded a number of new data concerning β-interaction and do not contradict the hypothesis of A-V-interaction in the case of the non-conservation of parity. They are, however, not sufficient as a proof, and it is the task of the theory of β-decay uniquely to determine the type of β-interaction and to obtain clearness concerning the interaction constants. The author contributes towards solving this problem by investigating the ratio between the polarization of β-particles and the (circular) polarization of subsequent γ-quanta in allowed β-decays. From the formulae obtained it is possible to draw conclusions concerning the interaction

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constants. In the allowed β-transitions there is no contribution by pseudoscalar interaction, so that there are 8 (in general complex) constants for scalar, tensor, vector, and axial-vector interaction. The methodical part of the calculation of the interaction to be investigated was already dealt with by the author in reference 4 (see also reference 5-β-γ-correlation), and the present paper is based upon the results obtained there. The expression for the correlation between $\vec{j}_o, \vec{p}, \vec{k}$ and $\vec{\xi}$ ($\sigma = \pm 1$) has the form

$$W(\vec{j}_o, \vec{p}, \vec{\xi}, \vec{k}, \sigma) = \sum (-1)^G \sqrt{2S+1}\, h_G(\vec{j}_o) B_{S\sigma} Z^{ba}_{JGS} F^{ba}_{JGS}(\vec{p}, \vec{\xi}, \vec{k})$$

j_i are the nuclear angular momenta in the β-γ-transition $j_o(\beta) j_1(\gamma) j_2$, $\vec{p}$ is the electron momentum $\vec{p}(p, \vartheta, \varphi)$, and $\vec{\xi}(1, \chi, \omega)$ is the pseudovector of the electron momentum in the rest system, $\vec{k}(k, \Theta, \Phi)$ is the momentum of the γ-quanta. There are 1 figure and 8 references, 1 of which is Soviet.

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The Polarization Correlation of β-Particles and γ-Quanta in the Allowed Decay of Oriented Nuclei SOV/56-35-1-25/59

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

SUBMITTED: February 10, 1958

Card 3/3

16(1)
AUTHORS: Dolginov, A. Z., Toptygin, I. N.

SOV/56-35-3-41/61

TITLE: The Expansion of Clebsch-Gordan for Infinite-Dimensional Representations of the Lorentz Group (Razlozheniye Klebsha-Zhordana dlya beskonechnomernykh predstavleniy gruppy Lorentsa)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 3, pp 794-796 (USSR)

ABSTRACT: A. Z. Dolginov deduced the explicit form of the Clebsch (Klebsh)-Gordan (Zhordan) coefficients for the expansion of finite-dimensional representations of the Lorentz (Lorents) group. An explicit expression of this expansion is given. By a certain substitution in this expression, the basic functions of one of the irreducible unitary infinite-dimensional representations of the Lorentz group may be deduced. These basic functions $\psi_{nlm}(\alpha, \vartheta, \varphi)$ are orthogonal and normalized. The authors then deduce the Clebsch-Gordan expansion for the functions ψ_{nlm}, and they give recurrence formulae for ψ_{nlm}. Formulae are given also for the inverse

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The Expansion of Clebsch-Gordan for Infinite-Dimensional Representations of the Lorentz Group

SOV/56-35-3-41/61

Clebsch-Gordan series and for the expansion of the derivatives of Ψ_{nlm} with respect to irreducible representations. There are 2 references, 1 of which is Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut Akademii nauk SSSR
(Leningrad Physico-Technical Institute of the Academy of Sciences, USSR)

SUBMITTED: May 29, 1958

Card 2/2

DOLGINOV, A.Z.

21(1,8); 24(5) PHASE I BOOK EXPLOITATION SOV/3369

Vsesoyuznaya mezhvuzovskaya konferentsiya po kvantovoy teorii poley i teorii elementarnykh chastits. Uzhgorod, 1958

Problemy sovremennoy teorii elementarnykh chastits. No. 2: Trudy konferentsii... (Problems in the Modern Theory of Elementary Particles. Nr. 2: Transactions of the All-Union Inter-Vuz Conference on the Quantum Field Theory and the Theory of Elementary Particles) Uzhgorod, Zakarpatskoye oblastnoye izd-vo. 1959. 214 p. 5,000 copies printed.

Ed.: Yu. Lomsadze, Docent; Tech. Ed.: M. Belous.

PURPOSE: This book is intended for physicists, particularly those concerned with problems in the field of elementary particles and the quantum theory.

COVERAGE: This book contains articles on elementary particles originally read at the All-Union Inter-Vuz Conference held at Uzhgorod State University on October 26, 1958. Among the topics discussed are: the spinor field theory, the fusion theory, Lorentz contractions, parity studies, nucleon-nucleon scattering, etc. English abstracts accompany each article. References follow each article.

DOLGINOV, A.Z.; POPOV, N.P.

Polarization of β-particles and the β-γ correlation of the first forbidden transition for oriented nuclei. Zhur.eksp. i teor.fiz. 36 no.2:529-538 F '59. (MIRA 12:4)

1. Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Nuclear reactions)

SOV/56-37-3-28/62

21(8)

AUTHORS: Dolginov, A. Z., Kharitonov, Ye. V.

TITLE: The Angular Distribution and the Polarization of β-Particles in Transitions Forbidden in Second Order

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3(9), pp 776-785 (USSR)

ABSTRACT: As shown by papers recently published, the vectorial and axially-vectorial interaction play the principal part in the conservation of time parity in β-decay processes. If it is intended to determine the nuclear matrix elements, an investigation of the forbidden β-transitions is of great interest; however, hitherto only the angular distribution and the polarization of β-particles for transitions forbidden in the first order have been theoretically investigated. In continuation of a previous paper (Ref 1), in which the method of dealing with the problem was explained, the authors therefore describe an investigation of β-transitions which are forbidden in the second and higher orders. First, the transitions forbidden in the second order are investigated: $\Delta j = 2(no)$. Formulas describing the angular distribution of β-electrons in the case of orientat-

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The Angular Distribution and the Polarization of β-Particles in Transitions Forbidden in Second Order

ed nuclei are given, as also one that describes the longitudinal polarization of β-particles in approximate form. The second part of the paper deals with unique transitions $\Delta j = N + 1$. In the case of β-transitions of this kind, for which the order in which transition is forbidden, is determined by the variation of the nuclear momentum in such a manner that $\Delta j = |j_o - j_1| = N + 1$, the formulas describing the angular correlations do not depend on the nuclear matrix elements, and therefore no conclusions may be drawn from analyses of these transitions as to nuclear structure. Such transitions are described by Gamow-Teller-interaction with a considerable contribution of A-coupling. Formulas are derived, which describe the longitudinal polarization and the angular distribution of the β-particles, at β-transitions which are forbidden in N-th order, and for orientated and nonorientated nuclei. The formulas, which are at first written down in a general manner, are specialized for the transitions $\Delta j = 3$(no). In appendix A the coefficients occurring in the formulas (4), (5), and (7'), as

The Angular Distribution and the Polarization of β-Particles in Transitions Forbidden in Second Order

well as the matrix elements K_A, K_V, and L_V are explicitly written down. In appendix B the approximation formulas, which, in the principal part describe the angular correlations for $(\alpha Z)^2 \ll 1$ and $(\alpha Z/r)^2 \ll 1$, are more accurately given (for an arbitrary Z). Appendix C finally gives numerical data for the coefficients occurring in formulas (10) - (17). There are 1 figure and 6 references, 2 of which are Soviet.

SUBMITTED: April 9, 1959

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16.8300, 16.7500

76985
SOV/56-37-6-25/55

AUTHORS: Dolginov, A. Z., Moskalev, A. N.

TITLE: Relativistic Spherical Functions. III

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 6, pp 1697-1707 (USSR)

ABSTRACT: Equations for the wave function of a particle were expanded over irreducible representations of the Lorentz group. This yielded a relativistically invariant classification of the states. The connection between the various modes of realization of the irreducible representations was established. The form of cperators H_μ and F_μ corresponding to the Lorentz group was obtained from the relation:

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$$H_{\pm 1} f = \pm \frac{1}{\sqrt{2}} e^{\pm i(\theta' - \theta)} \left\{ \pm \frac{\partial f}{\partial \vartheta} + \frac{i}{2} \operatorname{tg} \frac{\vartheta}{2} \frac{\partial f}{\partial \theta} + \frac{i}{2} \operatorname{ctg} \frac{\vartheta}{2} \frac{\partial f}{\partial \theta'} \right\},$$

$$H_0 f = \frac{i}{2} \left\{ \frac{\partial f}{\partial \theta} - \frac{\partial f}{\partial \theta'} \right\}, \qquad (10)$$

$$F_{\pm 1} f = \pm \frac{1}{\sqrt{2}} e^{\pm i(\theta' - \theta)} \left\{ (i + n) \sin \vartheta f - i \cos \vartheta \frac{\partial f}{\partial \vartheta} \mp \frac{1}{2} \operatorname{tg} \frac{\vartheta}{2} \frac{\partial f}{\partial \theta} \pm \frac{1}{2} \operatorname{ctg} \frac{\vartheta}{2} \frac{\partial f}{\partial \theta'} \right\},$$

$$F_0 f = (i + n) \cos \vartheta f + i \sin \vartheta \, \partial f / \partial \vartheta.$$

(cf. M. A. Naymark, Uspekhi mat. nauk, 9, 19, 1954). To obtain the expansion of wave function $\Psi_\sigma(p)$ according to the irreducible concept, the function $f(p)$ must be taken in the form:

$$f(\omega) = \sum_{lm} \int_0^\infty dn a_{lm}(n) \Psi_{nlm}(\omega).$$

With the aid of previously derived equations in Parts I and II of this series of investigations (A. Z. Dolginov, Zhur. eksp. i teoret. fiz., 30, 746. 1956;

A. Z. Dolginov and I. N. Toptygin, ibid., 37, 11, 1959), the following relation was derived:

$$u^{s\sigma}_{s\sigma}(\eta, \lambda) \Psi_{nlm}(\omega) = \sum_{k_0 J} (-)^{J-l-k_0} (2J + 2k_0 + 1) [(2l + 1)/(2s + 1)(2J + 1)]^{1/2} \times \times C^{k_0}_{lm s\lambda} W(JJsj; lJ + k_0) T^{nk_0}_{jk s\sigma}(\tau_1), \quad (48)$$

where

$$\eta \equiv (\omega, \Omega_2) \equiv (\Omega_1, \alpha, \Omega_2)$$

$$T^{rk_0}_{jk s\sigma}(\tau_1) = \sum_{\mu} D^{j}_{\mu\kappa}(\Omega_1) D^{s}_{\kappa\sigma}(\Omega_2) Q^{js}_{nk_0\kappa}(\alpha), \quad (49)$$

and

$$Q^{js}_{nk_0\kappa}(\alpha) = \sum_{l=|l-s|}^{l+s} (2l + 1)[(2j + 1)/(2J + 1)]^{1/2} W(Jj + k_0 s; jJ) \times \times C^{s\kappa}_{j0l\kappa} e^{i\kappa\alpha} \Pi_l(n, \alpha). \quad (50)$$

(here, σ is spin variable; λ is projection of the particle spin; angles $\Omega_2 \equiv (\varphi_2, \vartheta_2, \chi_2)$

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Relativistic Spherical Functions. III

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SOV/56-37-6-25/55

determine the direction of the particle spin in the system at rest with OZ||p; angles $\Omega_1 \equiv (\varphi_1, \vartheta, \chi_1)$ define the direction of the momentum p in the selected system of coordinates; th α = v/c). There are 14 references, 10 Soviet, 4 U.S. The U.S. references are: G. Racah, Phys. Rev., 62,438, 1942; A. Arima, H. Horie, Y. Tanabe, Prog. Theor. Phys. 11, 143, 1954; H. Matsunobo, H. Takebe, Prog. Theor. Phys. 14, 589, 1955; H. Bateman, Higher Transcendental Functions, N. Y., 1953.

ASSOCIATION: Leningrad Phys.-Tech. Inst., Acad. Sciences, USSR (Leningradskiy fiziko-tekhnicheskiy institut, Akademii nauk SSSR)

SUBMITTED: June 25, 1959

Card 4/4

Dolginov, A.Z.

S/051/60/008/03/001/038
E201/E191

AUTHORS: Bukat, G.M., Dolginov, A.Z., and Zhitnikov, R.A.

TITLE: On the Hyperfine Structure of Many-Electron Atoms

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 3, pp 285-293 (USSR)

ABSTRACT: The hyperfine interaction, i.e. the interaction of magnetic and electric moments of atomic nuclei with electron shells, in atoms with several valence electrons was dealt with in a number of papers (Refs 3, 4). Racah (Refs 5, 6) and Trees (Ref 4) described calculation of the magnetic-dipole and electric-quadrupole interactions of nuclei with electron shells, containing s-, p- and d-electrons, in the central field and LS-coupling approximation. Such a treatment is insufficient in the case of rare-earth atoms, whose partly filled shells contain several equivalent electrons with an orbital quantum number $\ell \geq 3$. The present paper describes a calculation of the electron matrix elements which appear in the hyperfine structure constants of atoms with several equivalent electrons in a partly filled shell. The authors discuss LS- and jj-couplings. "Genealogical"

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coefficients of terms with maximal multiple-order and with f^n configurations are given in a form convenient in calculations. It is shown that using the sum rule the problem can be solved in some cases without calculation of the "genealogical" coefficients. The paper is entirely theoretical.

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There are 6 tables and 16 references, of which 2 are Soviet, 9 English, 1 German, 2 Japanese and 2 translations from English into Russian.

SUBMITTED: June 18, 1959

DOLGINOV, A.Z.; MOSKALEV, A.N.

Relativistic spherical functions. Part 3. Zhur.eksp.i teor.fiz. 37 no.6:1697-1707 D '59. (MIRA 14:10)

1. Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Wave mechanics)

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B006/B070

24.6520

AUTHORS: Dolginov, A. Z., Popov, N. P.

TITLE: Polarization of Beta Electrons From Oriented RaE

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 5, pp. 1518 - 1524

TEXT: The β-transition of RaE is a forbidden transition in first order. The spectrum of the electrons so emitted is, therefore, different from the usual form. A. I. Alikhanov, G. P. Yeliseyev, and V. A. Lyubimov (Ref. 2), and B. V. Geshkenbeyn, S. A. Nemirovskaya, and A. P. Rudik (Ref. 3) have already carried out investigations on the anomalous form of the RaE spectrum and attempted to give a theoretical interpretation of the experiments. It is shown in the present work that the difficulties of interpretation may be overcome by taking account of the transverse polarization of the electrons emitted by a RaE nucleus whose spin is oriented with respect to the external field. If time parity is conserved, the degree of polarization of the electrons in the $[\vec{n}\vec{n}_0]$ direction does not exceed 2%. ($\vec{n} = \vec{p}/|\vec{p}|$, $\vec{p}$ - momentum of the β-electron, $\vec{n}_0$ - direction

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of the predominant spin orientation). If the conservation of time parity is violated, the degree of polarization can reach a value of 45%. Using the experimental data concerning the form of the spectrum, and considering the longitudinal polarization of the β-particles, the authors determine the possible range of values of the nuclear matrix elements x and y. $x = i\varepsilon_V \int \vec{r}/\varepsilon_A \int [\vec{\sigma}\vec{r}]$ and $y = \varepsilon_V \int \alpha/\varepsilon_A \int [\vec{\sigma}\vec{r}]$; $\varepsilon_V^2 = |C_V|^2 + |C_V'|^2$, $\varepsilon_A^2 = |C_A|^2 + |C_A'|^2$; x and y are real quantities, the C are constants of β-interaction. It appears from the form-factor curves $C(E) = f(E_0)$, shown in the accompanying figure, that the experimentally observed form of the spectrum and the magnitude of longitudinal polarization can be best described by the values of x in the range 0.67 ÷ 1.0 and the corresponding values of y (depending on the radius of the nucleus). The coefficients a_i and b_i in the polarization formula were calculated by taking account of the finite dimensions of the nucleus for the AV-interaction variant. For this purpose, a homogeneous distribution of charge in the nucleus for two values of the nuclear radius (r_0 = 1.2 and 1.5 fm)

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Polarization of Beta Electrons From Oriented RaE

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has been assumed at a limiting energy of $E_o = 3.26\ mc^2$; a_o characterizes the deviation of the longitudinal polarization of the β-particles of the unoriented RaE from v/c. The results of numerical computations are given in tables. Table 2 gives the values of a_o experimentally determined by various authors. K. A. Ter-Martirosyan is thanked for information and interest; L. A. Sliv, B. A. Volchok, B. S. Dzhelepov, and L. N. Zyryanova are mentioned. There are 1 figure, 4 tables, and 11 references: 5 Soviet, 4 US, 1 Japanese, and 1 Dutch.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut Akademii nauk SSSR (Leningrad Institute of Physics and Technology of the Academy of Sciences USSR)

SUBMITTED: November 24, 1959

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DOLGINOV, A.Z.

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PHASE I BOOK EXPLOITATION SOV/5914

Akademiya nauk SSSR. Fiziko-tekhnicheskiy institut im. A. F. Ioffe

Gamma-luchi (Gamma Rays) Moscow, Izd-vo AN SSSR, 1961. 720 p. Errata slip inserted. 3300 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Fiziko-tekhnicheskiy institut im. A. F. Ioffe.

Resp. Ed.: L. A. Sliv, Doctor of Physics and Mathematics; Ed. of Publishing House: N. K. Zaychik; Tech. Ed.: A. V. Smirnova.

PURPOSE: This book is intended for theoretical and experimental physicists working in the field of nuclear spectroscopy and in related fields where gamma rays are utilized. It may also be useful to advanced students of physics.

COVERAGE: The book, representing a symposium of papers whose authors are specialists in their areas, attempts to provide the fullest possible coverage of theoretical and experimental methods of

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determining nuclear gamma-radiation characteristics and the use of gamma rays to study matter, particularly nuclear structure. The book contains a large number of tables, graphs, and nomographs and can be used as an encyclopedical manual on gamma rays. No personalities are mentioned. References accompany each part.

TABLE OF CONTENTS [Abridged]:

PART 6. ANGULAR CORRELATIONS FOR RADIATIVE NUCLEAR TRANSITIONS
(A. Z. Dolginov)

BAYMAN, B.F.; KHARITONOV, Yu.I.[translator]; DOLGINOV, A.Z., red.

[Lectures on the application of the theory of groups to nuclear spectroscopy]Lektsii po primeneniiu teorii grupp v iadernoi spektroskopii. Moskva, Gos.izd-vo fiz.mat.lit-ry, 1961. 226 p. Translated from the English. (MIRA 16:1)
(Groups, Theory of) (Spectrum, Atomic)