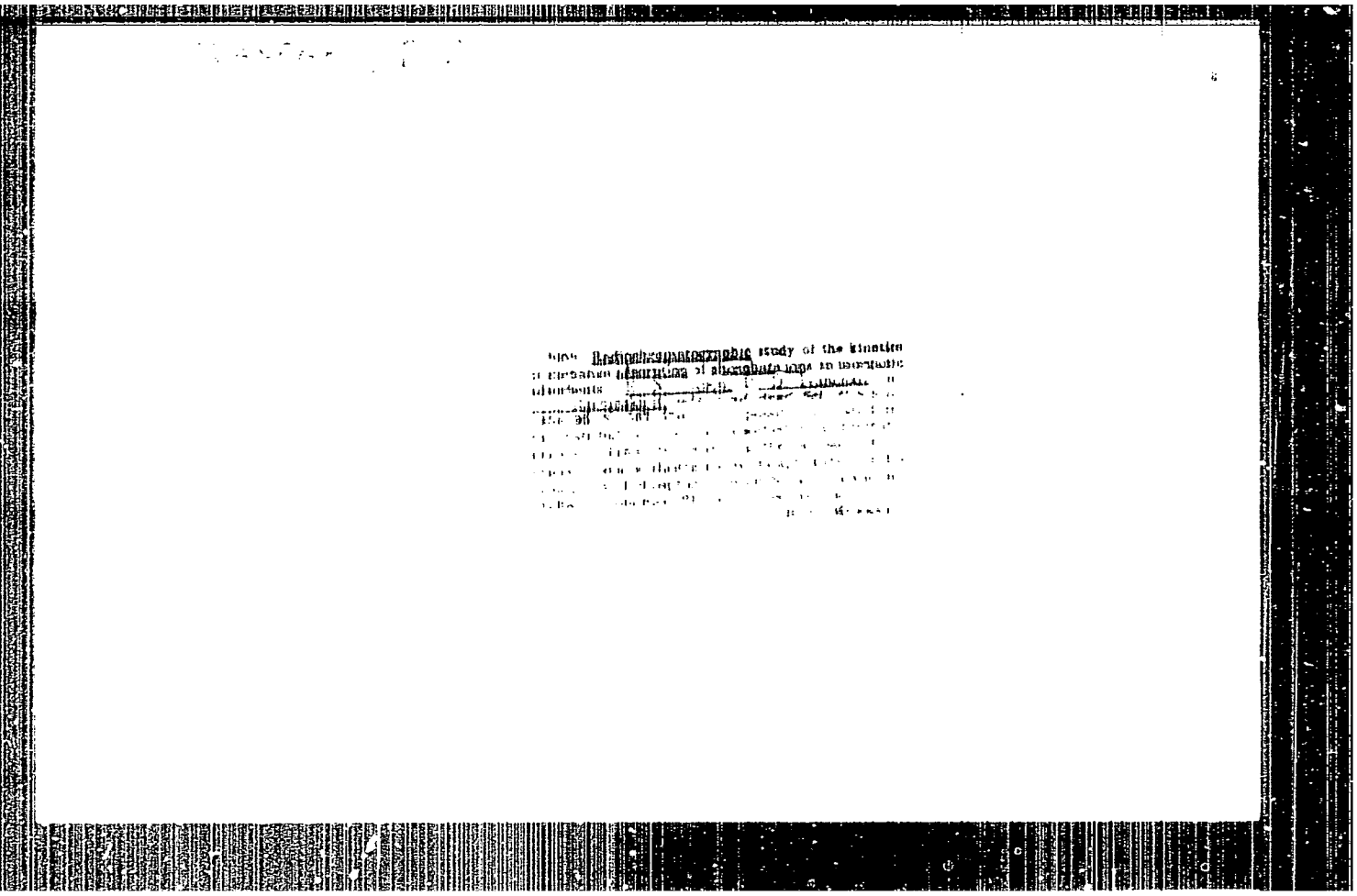


USSR

Ivanenko, D. D., and Kurdgelaidze, D. F. The basic equations of mesodynamics. Dokl. Akad. Nauk SSSR (N.S.) 96, 39-42 (1954). (Russian)

1 - F/W

MS 02 (1)

The first part of this paper gives detailed examples of non-linear terms in the Lagrangian arising from fourth-order Feynman processes. The second, gives closed solutions of the equation $[\Box - k^2 - \lambda\varphi^2]\varphi = 0$ in terms of elliptic functions. This equation is "basic" in the sense that it is the simplest equation manifesting the type of non-linearity shown in §1 to be characteristic of meson theory. Finally, approximate methods of solving the equation

$$\Delta\varphi + \sum_n \lambda_n \varphi^{2n+1} = 0 \quad (1)$$

are sketched for the cases (a) $|\Delta\varphi^2| \ll |\lambda_n\varphi^{2n}|$ and (b) $\lambda_n\varphi^{2n} \to \lambda_n$ for $n = 0$. [...] *Coleman* (Princeton, N.J.)

USSR

Ivanenko, D., and Sokolik, G. The theory of particles of arbitrary isotopic spin and the method of fusion. Dokl. Akad. Nauk SSSR (N.S.) 97, 635–637 (1954). (Russian)

De Broglie's method of fusion is extended to include isotopic as well as ordinary spin. An equation of Pais [Phys. Rev. (2) 92, 836–837 (1953); MR 15, 706] is discussed as a particular case of the theory. A. J. Coleman.

IVANENKO, D.

USSR/ Physics - Movement equations

Card 1/1 Pub. 22 - 9/40

Authors : Ivanenko, D., and Tsytovich, V.

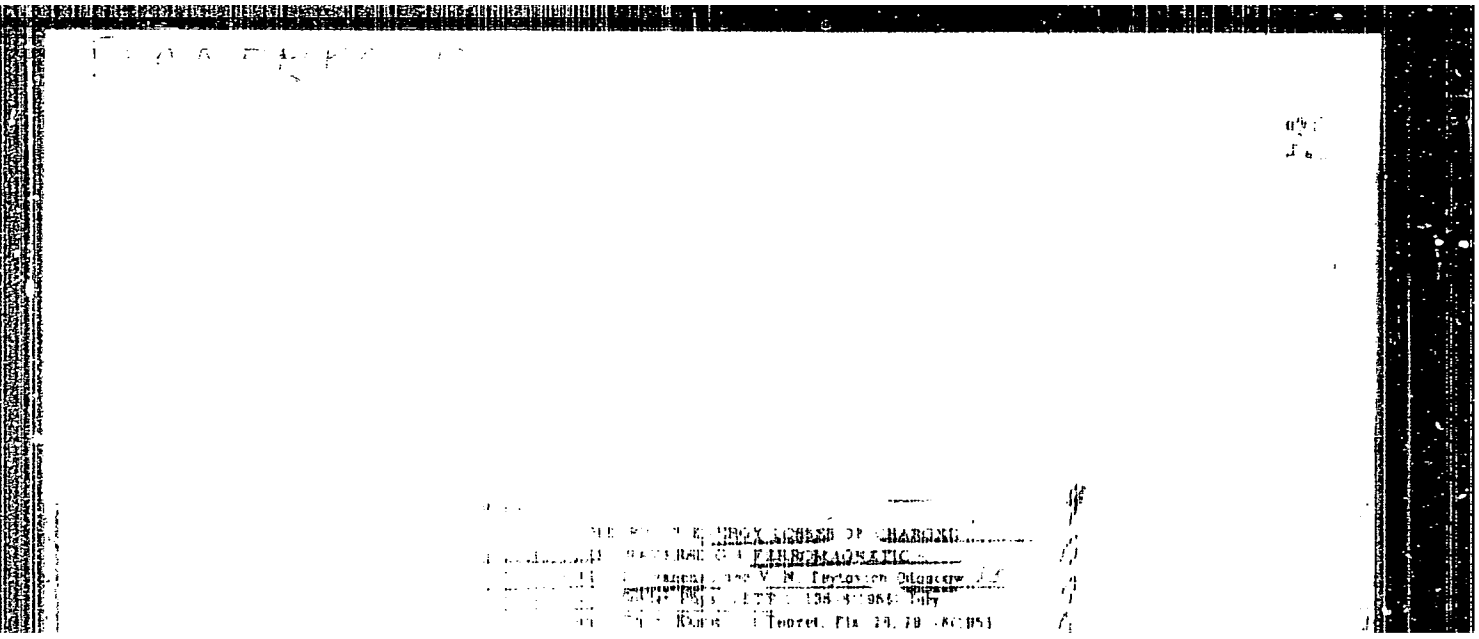
Title : Relativistic equation of three-bound bodies

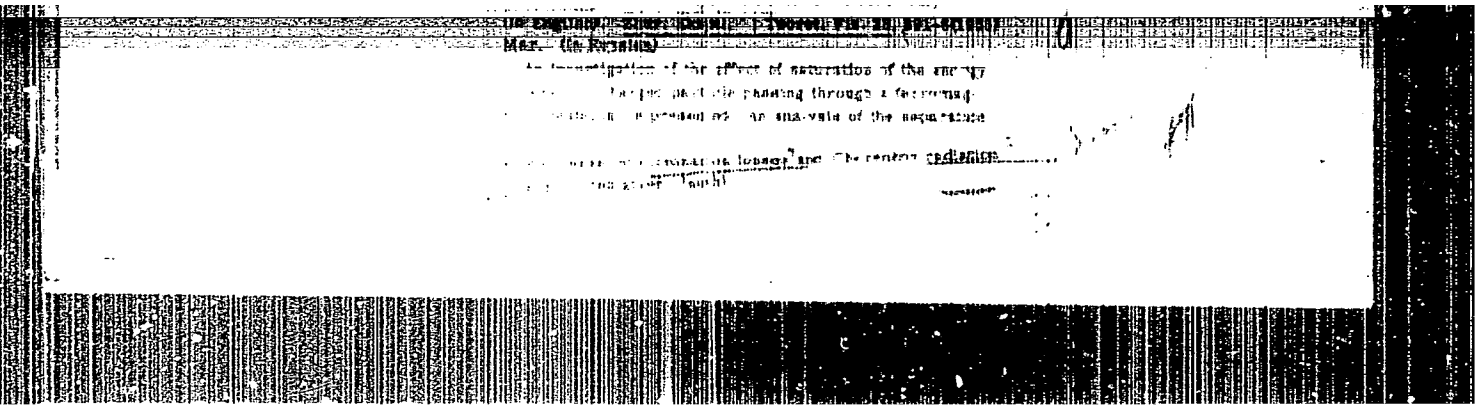
Periodical : Dok. AN SSSR 99/3, 373-376, Nov 21, 1954

Abstract : Properties of the interreacting operators are described. The operators were obtained in the process of the derivation of a movement equation for three bodies in an electromagnetic field reacting upon each other (only electromagnetically for simplicity). The equation was derived by a method based on the calculus of variations which led to the convariance of equation tensors which had been discussed by Wentzel. In the present article the derived equation differs somewhat from that obtained by Wentzel. Four references; 1-USSR and 4-Foreign (1951-1954).

Institution: Moscow State University M.V. Lomonosov

Presented by: Academician A.A. Lebedov, August 7, 1954





IVANENKO, D. D.

"In Memory of Albert Einstein" from Works of the Historical Inst. on Natural Sciences and Engineering, Vol. 5, p. 3, 1955.

USSR/Physics - Electrodynamics FD-1844

Card 1/1 Pub. 146-4/25

Author : Ivanenko, D., and Tsytovich, V. N.

Title : Theory of the loss of energy of charged particles through a ferromagnetic

Periodical : Zhur. eksp. i teor. fiz. 28, 291-296, March 1955

Abstract : The authors investigate the effect of saturation of energy losses when charged particles pass through ferromagnetics, as studied by D. Ivanenko and V. S. Gurgenidze (DAN SSSR, 67, 997, 1949; Vestnik MGU, 2, 69, 1950) and Ch. Weizsaecker (Ann. d. Phys., 17, 1933). They analyze the division of the losses into ionizational and Cherenkov losses. Nineteen references; e.g. V. N. Tsytovich, Vestnik MGU, 11, 27, 1951.

Institution: Moscow State University

Submitted : March 5, 1954

USSR/Physics - Nuclear Structures

Card 1/1 Pub. 22 9/50

Authors : Ivanenko, D., and Kolesnikov, N.

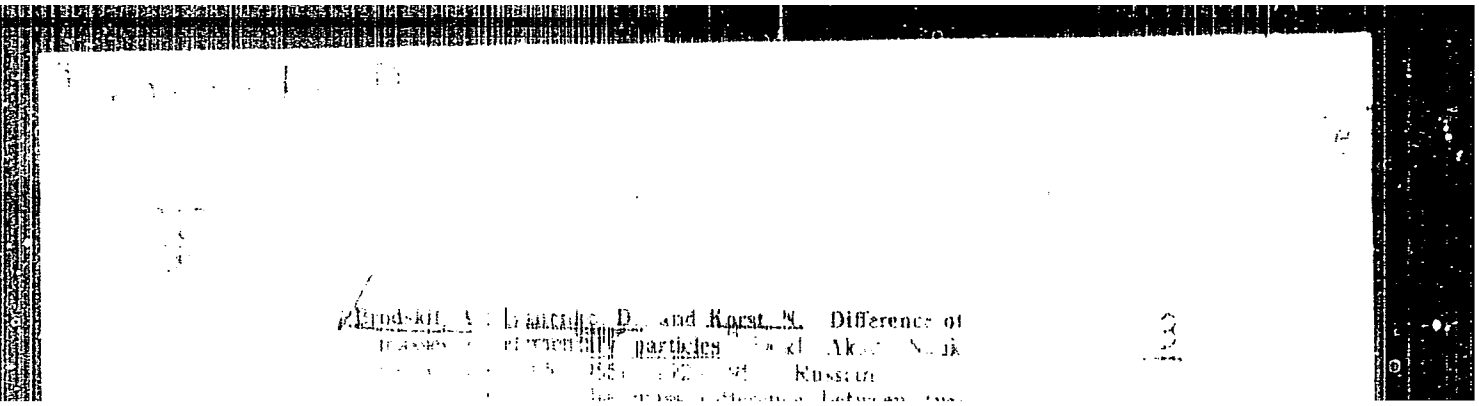
Title : Remarks regarding a nuclear model

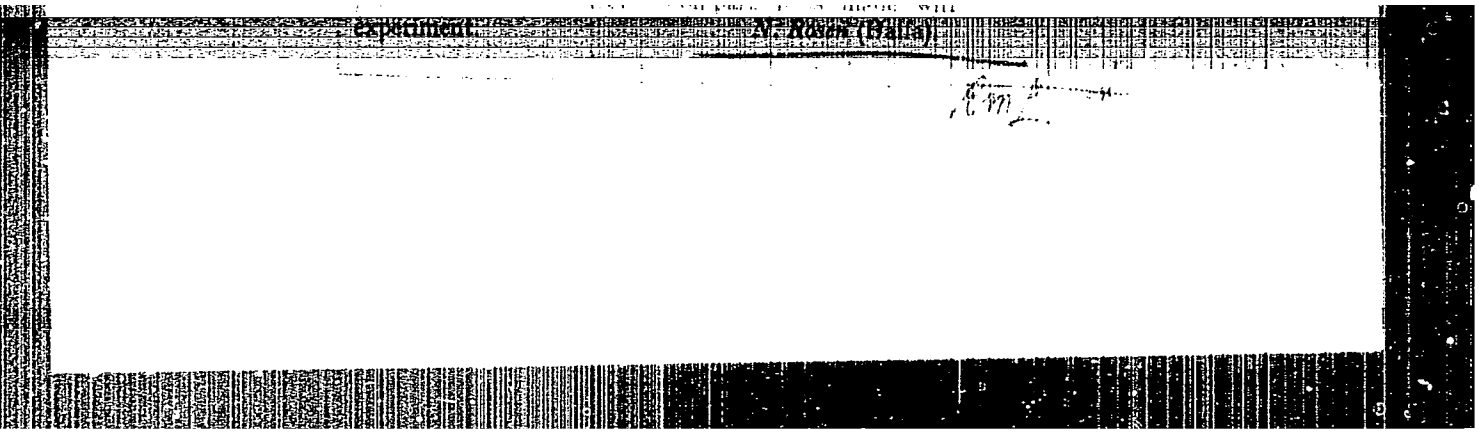
Periodical : DOK. AN SSSR 100/1, 37-40, Jan. 1, 1955

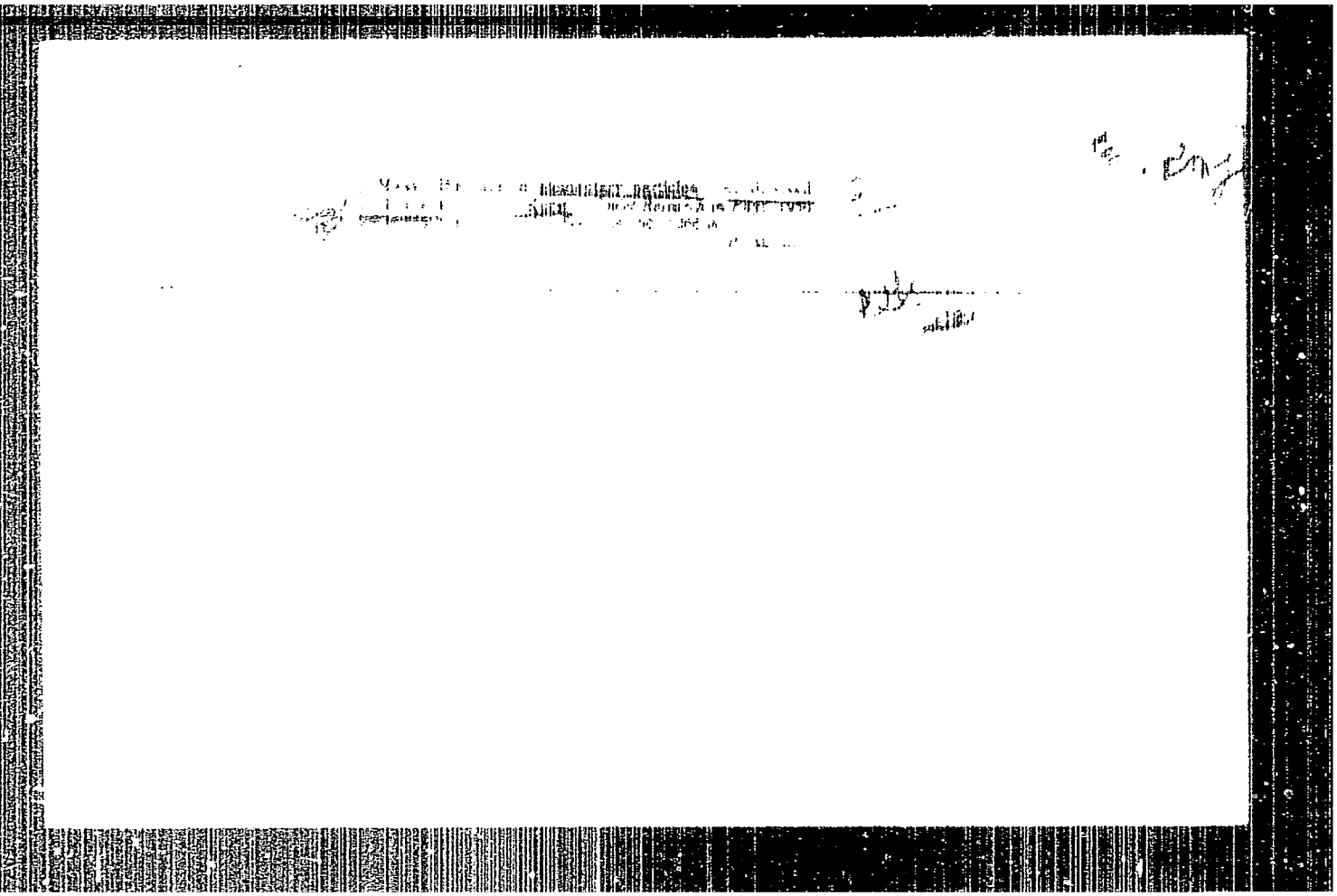
Abstract : Nuclear models (shell, liquid-drop) are discussed. A modified model of the nuclear structure is suggested in order to overcome some difficulties in the interpretation of observed nuclear phenomena. These modifications (mostly concerning weakly excited states of an atom) are as follows: 1. nucleons are moving independently (the filling of energy levels and shells is determined through a self adjusted potential of the field and of the nucleons); 2. the considerations of the liquid-drop-collective movements, mainly, connected distortions of the wave function; and 3. existence of of a certain number of nuclear groups of the α, and bi-particle types. Seventeen references: 7 USSR, 8 USA, 1 French and 1 German (1932-1953). Graph.

Institution : The M. V. Lomonosov Moscow State University

Presented by: Academician A. A. Lebedev, September 27, 1954







Ivanenko, D.

Category : USSR/Nuclear Physics - Elementary Particles C-3

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 5897

Author : Ivanenko D., Kolesnikov, N.
Inst : Moscow State University
Title : Binding Energy of Hypernuclei.

Orig Pub : Zh. eksperim. i teor. fiziki, 1956, 30, No 4, 800-801

Abstract : The binding energy and the stability of hypernuclei is investigated. An analysis of the experimental data available at present time leads to the conclusion that: (a) the binding energy B_Λ of a Λ^0 particle in hypernuclei does not depend noticeably on the spin and on the isotopic spin of the core comprising the nucleus minus the Λ^0 particle, and increase approximately linearly with increasing mass number A; (b) the interaction between the Λ^0 particle and the nucleon N is somewhat weaker than the NN interaction.

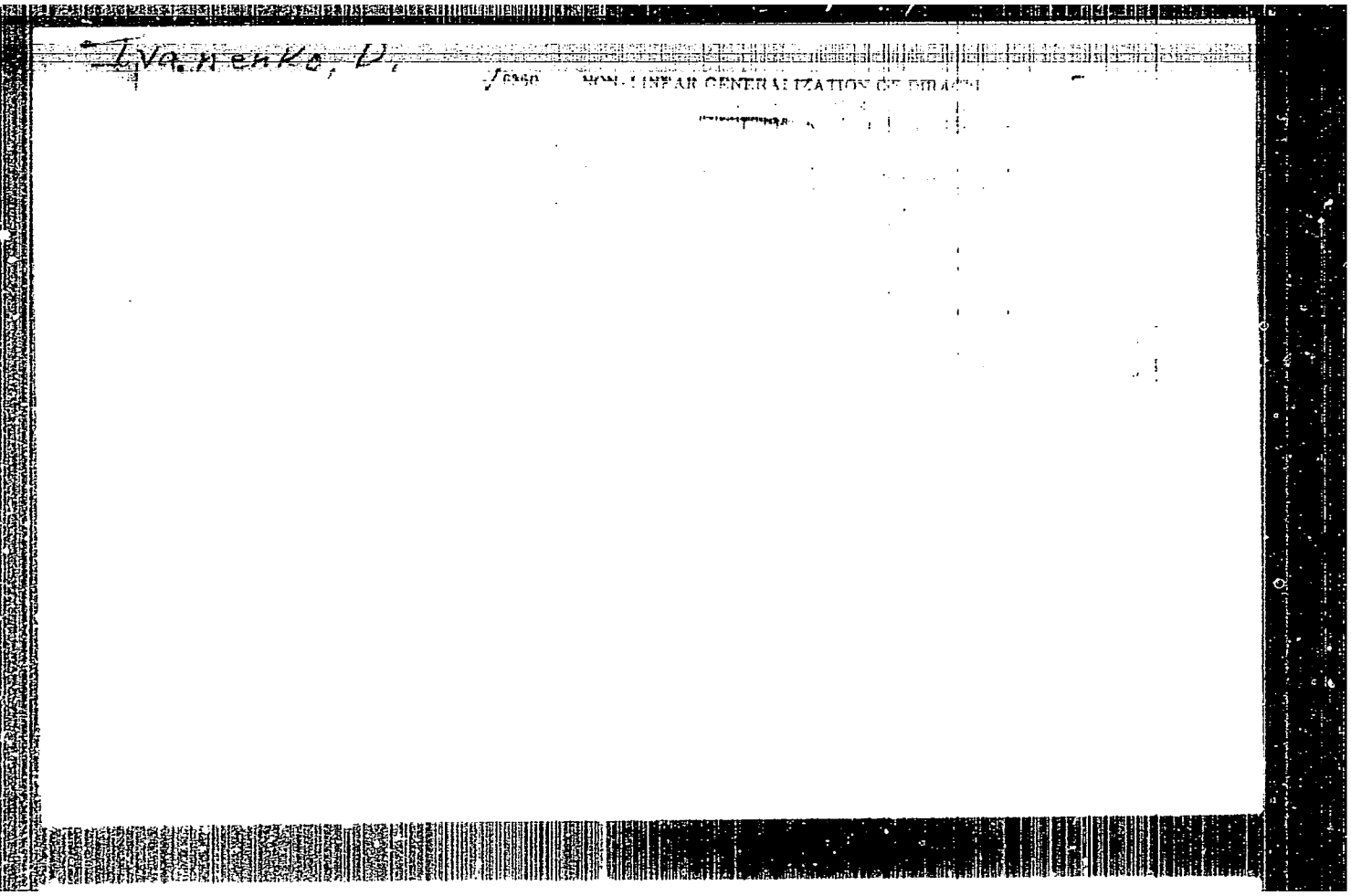
Based on the assumption that adding the Λ^0 particle changes little the core potential in that the radii of the Λ^0-N forces are not greater than that of the NN forces, the authors explain

Card : 1/2

IVANENKO, D.D.

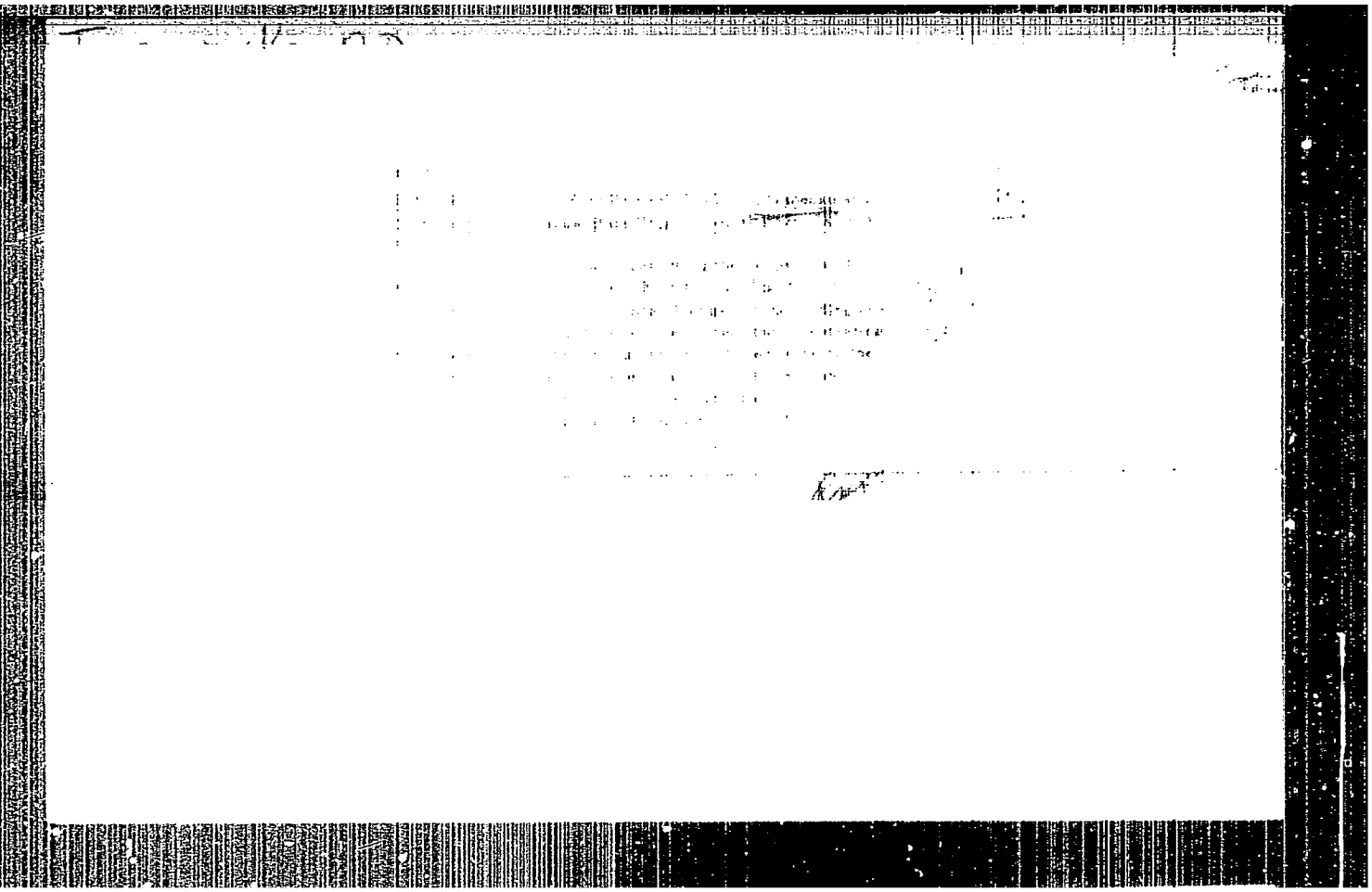
SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1456
AUTHOR IVANENKO, D.D., KERIMOV, B.K.
TITLE A Two-Nucleon Potential of the Intermolecular Type and Nuclear Saturation.
PERIODICAL Žurn.eksp.i teor.fis, 31, fasc.1, 105-112 (1956)
Issued: 9 / 1956 reviewed: 11 / 1956

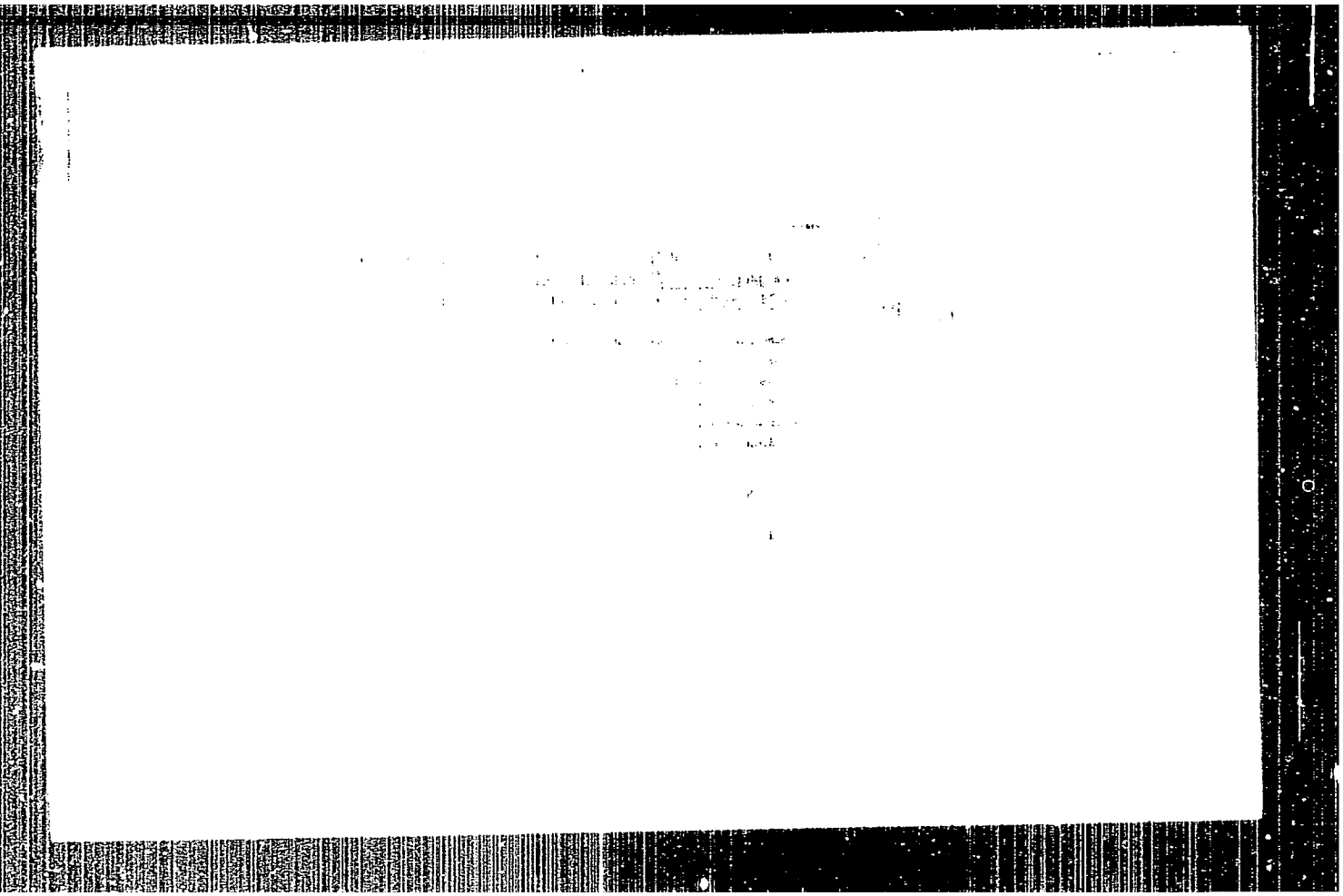
The present work points out a possibility for explaining repulsion on the basis of a semiphenomenological interaction potential of the type of the intermolecular potential of LENNARD-JONES, which, apart from a YUKAWA force of attraction, contains the usual not exchangelike repulsive force. For reasons of simplicity the spin terms are not investigated. Many experimental data concerning scattering make it necessary that, apart from attractive forces at distances of $r \quad r_c$ also repulsive forces at smaller distances of $r < r_c$ exist. A special rule is shown the form of which is easily generalized (as for example by the addition of a "repulsion term" to the "best" known potential of pseudoscalar mesodynamics) and which may explain the lack of a constricted (?) state in the nuclei. The preliminary character of these deliberations must, however, never be forgotten. In the case of $r < r_c$ only a strong repulsion ("hard core") is assumed to act. If the interaction potential has a repulsive core, the wave function Ψ of the basic state of the nucleus is assumed with A particles in form of a point of SLATER'S determinant and a symmetrical function of the spatial coordinates of the A nucleons. Next, expressions for the average potential energy V of the



SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1979
AUTHOR SOKOLOV,A.A., IVANENKO,D.D., TERNOV,I.M.
TITLE On the Excitation of Macroscopic Oscillations by Quantumlike Fluctuations.
PERIODICAL Dokl.Akad.Nauk 111, fasc.2, 334-337 (1956)
Issued: 1 / 1957

The energy of a relativistic electron moving in a homogeneous magnetic field H can be represented as the sum of the energy of the rotation movement E_l of the electron and the energy of the oscillation motion E_s along the radius: $E_l \sim \sqrt{2eHc\hbar\, l + m^2c^4}$, $E_s \sim \hbar\omega\, d = E\omega^2a^2/2c^2$. Here $n = l + s$ denotes the principal quantum number, l - the azimuthal- and s - the radial quantum number, a - the amplitude of the radial oscillations. Next, formulae for the modification of the rotation- and oscillation energy on the occasion of the transition of an electron from the state n into the state $n' = n - \nu$ is given. The sum of these two modifications results in the entire energy loss by radiation while taking account of quantumlike corrections with an accuracy of up to $\hbar$. The quantumlike corrections to the rotation movement can take effect only in the case of high energies. With $\hbar \to 0$ there is no modification of the energy of the radial oscillations at all, i.e. in the classical case the value of s remains constant even if radiation is taken into account. Only in the quantumlike case ($\hbar = 0$) does one peculiar energy jump occur if rotation energy is used not only for radiation but also for the excitation of radial oscillations





GRIGOR'YAN, A.T.; IVANENKO, I.D.

"History of physics" by P.S. Kudriavtsev. Reviewed by A.T. Grigor'ian, D.D. Ivanenko. Vop.ist.est. i tekh. no.5:200-203 '57. (MIRA 11:2)

(Physics) (Kudriavtsev, P.S.)

IVANENKO, D.D., professor.

Impressions on the status of the physical sciences in Italy.
Vest.Mosk.un. 12 no.1:196-198 '57. (MLRA 10:8)
(Italy--Physics)

IVANENKO, D.D.

History of development of the general theory of relativity.
Trudy Inst.ist.est.i tekh. 17:389-424 '57. (MIRA 10:7)
(Relativity(Physics))

IVANENKO, D.D.

AUTHORS: Brodskiy, A.M., Ivanenko, D.D., 56-4-12/54

TITLE: A New Possibility in the Neutrino Theory. (O novoy vozmozhnosti v teorii neytrino)

PERIODICAL: Zhurnal Eksperim.i Teoret.Fiziki, 1957, Vol. 33, Nr 4, pp. 91o-912 (USSR)

ABSTRACT: Analogous to the hitherto existing description of the electrons and other fermions by second order spinors it is proposed to put first order Cartanian spinors for the neutrino, in which connection, however, new rules governing the transformation on the occasion of reflection occur. Quite apart from the obtention of parity a number of conclusions of the new theory are analogous to that given by Yang-Lee, as for instance the disintegration of τ and θ mesons. It shall not be omitted to point out an interesting possibility of using mixed spinors of first order in the case of spatial reflection (space inversion) and those of second order in the case of time reflection. There is 1 Slavic reference.

ASSOCIATION: Moscow State University (Moskovskiy gosudarstvennyy universitet)

SUBMITTED: April 1, 1957

AVAILABLE: Library of Congress.

Card 1/1

AUTHOR: IVANENKO,D.D., PUSTOVALOV,G.F. PA - 2170

TITLE: Mesoatoms. (Russian)

PERIODICAL: Uspekhi Fiz.Nauk, 1957, Vol 61, Nr 1, pp 27-43 (U.S.S.R.)
Received: 3 / 1957 Reviewed: 4 / 1957

ABSTRACT: Compared with ordinary hydrogen-like atoms with electrons, mesoatoms have some peculiar features: small distance between meson and nucleus, the possibility of capture of a meson by the nucleus, nuclear interaction between the meson and the nucleons of the nucleus, simultaneous existence of particles of various sorts (electrons and mesons) in the orbits of the atom, various spins of mesons etc. The study of mesoatoms furnishes many new data concerning the structure of nuclei and the interaction of particles. The energy values, orbital radii, and the transition probabilities of mesoatoms are described in first approximation by the formulae for ordinary hydrogen-like atoms with electrons. Shape and dimensions, however, influence to a great extent the entire system of energy levels of the meson in the mesoatom. Therefore, the meson in the mesoatom, as a much more effective medium (compared to the electron in an ordinary atom) is suited for the investigation of nuclear properties (dimensions, shape, distribution of positive charge over the nuclear volume, electric quadrupole momentum of the nucleus, forces of non-electromagnetical origin between meson and nucleons). On the other hand, the study of meso-

Mesoatoms.

atoms facilitates the precise mentioning of some data concerning the meson itself, e.g. concerning its magnetic momentum and its mass. First the experimental investigation of mesoatoms is discussed. A device typical for this purpose is demonstrated by means of a drawing. The energy of the transitions of some mesoatoms could be investigated also by means of the method of critical absorption. Also the quantum yield can be determined by the same method. By means of the quantum yield the ratio between the capture probability of the meson by a nucleus with a given orbit and the probability of radiation transition can be determined. Consideration of nuclear volume: Because of the smeared out character of the charge over a finite volume the levels of mesoatoms are shifted in an upward direction with respect to the level expected for punctiform nuclei. This effect is strongest in the case of an S-level, and less expressed in the case of P- and D-levels. The influence of the dimensions and the shape of the nucleus is expressed to a great extent especially by the position of the energy levels of mesoatoms with great Z.
The polarization of the vacuum in mesoatoms supplies an interesting and essential correction for the energy of levels of meso-

IVANENKO, [illegible]

AUTHOR: IVANENKO,D., KHRISTOV, KHR. PA - 2290

TITLE: Discussion of the book by WALTHER THIRRING "Introduction into Quantum Electrodynamics", Vienna, Franz Deuticke, 1955.(VAL'TER TIRRING, Vvedeniye v kvantovuyu elektrodinamiki, Russian).

PERIODICAL: Uspekhi Fiz.Nauk, 1957, Vol 61, Nr 2, pp 308-310 (U.S.S.R.)
Received: 4 / 1957 Reviewed: 5 / 1957

ABSTRACT: The following are the most important points of this discussion: Unlike all other existing monographies on quantum electrodynamics this book is very short (VIII + 122 rather small pages). Formulae contained in the text are comparatively simple. In spite of this, the material dealt with is very voluminous.
In the introduction some formulae on classical relativistic electrodynamics are given and some phenomena in nuclear physics are sketched out. The first part of the book, "The Quantization of Free Fields", (39 pages), successfully formulates the general principles of the quantum theory of the field, discusses the most important relations of the second quantization, as well as the connection between spin with statistics. Further, some concrete fields (scalar, vectorial, spinorial) and vacuum fluctuations are investigated.
The second part "Fields with Interaction" deals with general equations of quantum electrodynamics and their solution by means of the perturbation method. The scattering matrix is given and several types ofFEYNMANediagrams are explained.

Card 1/2

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000618930008-6

Pa - 2290

Discussion of the book by WALTHER THIRRING "Introduction into Quantum Electrodynamics", Vienna, Franz Deuticke, 1955.

The third part, "The Limits of the Theory", discusses the divergences, self energy of the electron, LAMB'S shift, the vacuum-dependent magnetic moment of the electron, the theory of the renormalization of mass and discharge, the convergence of the extension of the S-matrix, etc.
Two annexes (supplements) deal with DIRAC matrices, FOURIER representations, as well as with 25 exercises with solutions.
From the outset this book concentrates on general physical principles, the most important mathematical methods and the most important results of quantum electrodynamics, but it does not deal with different applications on concrete problems.
The excellent representation of the vast and complicated material within so narrow a space is amazing. The entire book does not contain a single superfluous word. Also the initial assumptions of the theory were well-chosen. The book also contains much that is new. According to the opinion of the Russian reviewer the book ought to contain more explanations of basic conceptions and supplementary remarks. According to the reviewer's opinion it ought furthermore to be translated into the Russian language (together with the book by DYSON). (No illustrations).

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress
Card 2/2

Ivanenko, D. D.

AUTHOR: Ivanenko, D. D. 53-4-10/10

TITLE: Physical Sciences in Italy (Fizicheskaya nauka Italii)

PERIODICAL: Uspekhi Fiz. Nauk, 1957, Vol. 62, Nr 4, pp. 523-537 (USSR)

ABSTRACT: The author was able, when attending the Congress on Fundamental Constants, to form a fairly complete opinion on the present stage of physical sciences in Italy and on the organization of universities and institutes. This congress took place at Turin in the autumn of 1956 and was organized by the Italian Physical Society in collaboration with the International Physical Union of the UNESCO (UN).
First, the author gives a report on the congress. After the congress the author visited all important centers of physical sciences in Italy, which are sections of the National Nuclear Institute and are connected with the universities of Turin, Milan, Padova and Rome. The sections of the Nuclear Institute are better equipped than the other laboratories and special budgets are at their disposal. Italian Physics has reason to be proud of the traditions of Galilei and the old Italian academies. During the middle and end of the 19.century, Italian physicist played no leading part within the most important domains of physics. In the twenties and thirties, however, E.Fermi and Segrè and later others (Razetti, Amaldi, Pontecorvo and others) distinguished themselves.

Card 1/4

Most members of this group,however, emigrated. Italy suffered great hardships during World War II and a noticeable advance in the sciences did not occur before 1952 when the National Nuclear Institute was established.

The main task of all four sections of the Nuclear Institute consists in the investigation of elementary particles and serving this purpose the research of cosmic radiation Proper nuclear physics, however, does not exist in Italy because of the lack up to quite recently of reactors and accelerators. Thus,special photoplates for irradiation in accelerator laboratories are specially sent over to the USA and are then utilized in Italy (!!). By this fact the great interest displayed by Italian physicists for the Soviet accelerator laboratories is explained.

The first small but very good accelerator (betatron, bought from the Swiss firm of Brown-Boveri) was installed in the summer of 1956 at Turin university. A synchrotron for 10^9 eV is at present under construction at the university of Rome. The parameters of this accelerator are given here. E. Amaldi takes active part in CERN in Geneva. (A proton accelerator for 5.10^{10} eV, by the way, is planned in the USSR. Besides a Cockcroft-Walton device at the Cise laboratory at Milano, no important proton accelerator exists in Italy (laboratoriya "Chize",i.e. Centro informazioni,studie

esperienze). Above all, not one single cyclotron exists in Italy. Professor Bolla is an active propagationist of technical nuclear physics. Next, a short report is given on the lectures delivered at the technical college of Milano. A qualified but very modest training of staffs within the domain of technical nuclear physics is concerned. Till recently no nuclear reactors existed in Italy. In spite of this fact, according to the opinion of the author, the physics of elementary particles and cosmic rays is highly developed in Italy. Thus, the Italians were successful in discovering the Σ-particles. This fact is connected with the existence of some stations for cosmic rays in alpine districts. Most of all the author was impressed by the photoemulsion chambers. Italian theoreticians at present partly keep up the traditions of the Fermi school. Young talented physicists, conversant with the latest developments already obtained new results in the theory of the nucleus, in the quantum theory of the field, and in the theory of the elementary particles. The non-atomic branches of physics are represented in Italy much less frequently or not at all. The insignificant development of work dealing with spectroscopy and X-rays is remarkable. Also the physics of low temperatures is still in its elementary stages. The physics of magnetic phenomena, ferromagnetic, and semi-conductors is hardly represented in Italy

at all. However, liquids are subjected to ultrasonic investigation. In conclusion the author though stressing the excellent quality of Italian physics, says that it is confined to a very limited category of problems. Demands of modern science and especially of their technical applications (particularly within the domain of nuclear physics and atomic physics) at the present level of Italian science cannot be satisfied. Within the next 1o years various institutes will be founded which are enumerated here. The Academies of Science, with their center at Rome and branches at Turin, Naples, etc, are representative institutes and do not play a noticeable part within the organization of Italian sciences, The type of the discussions taking place at summer schools remind on of the antique Platonian Academy. The author then gives a report on Italian universities. There are 2 figures.

AVAILABLE: Library of Congress

MAYER, Maria (Goeppert); KOLESNIKOV, N.N. [translator]; IVANENKO, D.D., red.

[Elementary theory of nuclear shell structure] Elementarnaia teoriia iadernykh obolochek. Moskva, Izd-vo inostr.lit-ry, 1958. 318 p. (MIRA 13:8)
(Nuclear shell theory)

IVANENKO, D.

"Evolution of the physics of elementary particles." Tr. from the Russian. p. 111.

FIZIKAI SZEMLE. (Eotvos Lorand Fizikai Tarsulat). Budapest, Hungary, Vol. 8, No. 9, Nov. 1958..

Monthly list of East European Accessions (EEAI), LC, Vol. 8, No. 8, August 1959.
Uncla.

AUTHOR: None given SOV/3-58-12-30/43

TITLE: Intervuz Scientific and Methodical Conferences (Mezhvuzovskiye nauchnyye i metodicheskiy konferentsii). A Conference on the History of Physics (Konferentsiya po istorii fiziki)

PERIODICAL: Vestnik vysshey shkoly, 1958, Nr 12, p 77 (USSR)

ABSTRACT: The recent Intervuz Conference on the History of Physics, held at the Tambovskiy pedagogicheskiy institut (Tambov Pedagogical Institute) was attended by 50 scientific workers of pedagogical institutes of the RSFSR, Ukraine, Georgia, Baltic Republics, Moldavia, the MGU and the Institut istorii yestestvoznaniya i tekhniki AN SSSR (Institute for the History of Natural Science and Engineering of the AS USSR). The Director of the latter, Professor N.A. Figurovskiy, spoke on the role of the conference as the first successful attempt to unite the efforts of Soviet Historians of Physics on an All-Union scale. The scientific worker of the Institute for the History of Natural Science and Engineering of the AS USSR, O.A. Lezhneva , told the conference of the first theories of elec-

Card 1/2

tromagnetism. Professor D.D. Ivanenko (Moscow) gave a detailed analysis of the peculiarities of development of physical science in some foreign countries. The report of Dotsent B.I. Spasskiy (Moscow) was on the periodization of the history of physics. Other orators were Professor P.S. Kudryavtsev (Tambov) and G.G. Lekhemas (Vil'nyus).

Card 2/2

AUTHOR: Ivanenko, D. D. SOV/53-65-2-14/14

TITLE: The International Congress Held in Italy on Elementary Particles (Mezhdunarodnyy kongress po elementarnym chastitsam v Italii)

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol. 65, Nr 2, pp. 331-349 (USSR)

ABSTRACT: 1.) The laboratories of Bologna and Pisa.
The Congress of the Italian Physics Society was held at Padova and Venice from September 23-28, 1957 and was attended by about 600 scientists. The following list contains the names of prominent scientists from America, England, France, Western Germany, Switzerland, Holland, Hungary, and Poland, who took part in this congress. The Russian delegation, headed by A. A. Vorob'yev of the Tomsk Polytechnical Institute (Tomskiy politekhnicheskiy institut) was composed of 10 scientists, of which A. I. Alikhanov, A. M. Baldin, S. Ya. Nikitin and I. I. Gurevich are mentioned by name. The United Institute of Nuclear Research (Dubno) was represented by: Danish (Warsaw), Ulehla (Prague), Khu Ning (Peking). The congress was further attended by several scientists of CERN (Centre Européen des Recherches Nucléaires). The author of this article further gives

Card 1/3

a report about the first days at Padova during which the congress was held in the university buildings, as well as about the following period during which sessions took place at Venice, Bologna, and Pisa. In this connection a large number of Italian institutes and Italian physicists are mentioned as well as geographical and historical details.

2.) The Paris Laboratories.

In the following the author tells about a visit to the Centre Nucléaire; visits to Paris, Avillon, Chatillon, and above all to the reactor centers of Saclé and Marcoule are described and several reactors (Zoe, G1, G2, G3 etc.) are also described in short. The author further deals with "reactor training", problems of organization, universities, etc. in France.

3.) The Non-Conservation of Parity.

The principal problem dealt with on this congress was the non-conservation of parity in the case of weak interaction. The introductory lecture was delivered by T. D. Li. The author discusses the problem and says in connection with the experiments carried out by Frauenfeld et al. (Phys.Rev. 106, 386 and 107,

643) that similar but much more accurate experiments were carried out by the Russian research scientists Alikhanov and Nikitin.
4.) The Nonlinear Field Theory and other theoretical lectures.
In this chapter the author deals in detail with the lectures delivered by various famous non-Soviet scientists such as Heisenberg, Goldhaber, Kamefuchi, Pauli et al.
5.) Experimental data.
This chapter contains numerous data concerning the results obtained by research work carried out above all by American scientists and institutes (Michigan University, Brookhaven (Brukkheven), Columbia University, Berkeley, MIT, University of California etc.).
No Soviet lectures, institutes, or research results are mentioned.

1. Scientific reports 2. Nuclear physics

Card 3/3

24(0) SOV/53-66-3-6/7

AUTHOR: Ivanenko, D. D.

TITLE: The Planck-Celebrations at Berlin and Leipzig (Plankovskiye torzhestva v Berline i Leyptsige)

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol 66, Nr 3, pp 523-534(USSR)

ABSTRACT: The German Academy of Sciences of Berlin (German Democratic Republic) together with the Physics Society of the German Democratic Republic and the Union of Physics Societies of the German Federal Republic celebrated the hundredth anniversary of Max Planck (Maks Plank), the creator of the quantum theory. The celebration was held on April 23 and 24, 1958. They were followed by the annual congress of physicists of the German Democratic Republic held at Leipzig (April 27 - 30). At the Planck-Jubilee congress and at the congress held at Leipzig the USSR was represented by a delegation consisting of: N. N. Bogolyubov (head of the delegation), D. D. Ivanenko, S. A. Azimov, A. F. Ioffe, A. V. Ioffe, G. P. Keres, V. I. Mamasakhlisov, A. B. Migdal, G. I. Rakhmaninov (secretary of the delegation), A. A. Smirnov, B. I. Stepanov and Zh. S. Takibayev. The delegates visited Physics Institutes and de-

Card 1/6

livered a number of scientific and popular lectures. - The conferences were further attended by all active physicists of the German Democratic Republic under the leadership of Gustav Hertz (Gerts), holder of the Nobel Prize and Director of the Physics Institute of the University of Leipzig, and further also by R. Rompe, Secretary of the Department of Mathematics, Physics, and Technology of the German Academy of Sciences (German Democratic Republic), Professor Barwick (Barvikh), Director of the Dresden Nuclear Center, Professor Gerlich (Gerlikh) scientific manager of the firm of Zeiss (Tseyss), and others. The German Federal Republic was represented by the holders of the Nobel Prize Heisenberg (Geyzenberg), Laue, Born, and Hahn (Gan), the theoreticians Hund (Gund), Bopp, Hönl (Genl'), Sauter (Zauter), and Bagge. The Chinese representative was the physicist Hu Ning, Poland was represented by Infeld, Rubinowicz, and others, Hungary by Jánossi, Budó, Bulgaria by Datsev, and Romania by Titeica. Further, a list of the representatives of "Western science" is given such as Dirac, Möller, Meitner, Weisskopf, and others, who were also present. A total of 12 countries was represented. The Planck celebrations were held partly in the eastern and partly in the western part of Berlin (on April 23 in East-Berlin

on April 24 in West-Berlin). The Planck celbrations are then described in detail, and an account is given of his life and his scientific work. Heisenberg's lecture "Planck's Discovery and the Basic Philosophical Problems of Atomic Theory" is discussed as well as other details as e.g. musical performances. The annual meeting of the Physics Society of the German Democratic Republic was held at Leipzig form April 27 to April 30, 1957. The meeting was connected with a theoretical conference. It was opened in the auditorium of the Physics Institute of the university, which is able to accomodate 450 persons. The important lecture delivered by Heisenberg(Geyzenberg) dealt with the standardized nonlinear theory of matter. The lecture is dealt with with respect to its main outlines. The same is the case with Dirac's lecture on the theory of gravitation. The third of the principal lectures was delivered by N. N. Bogolyubov, Member, Academy of Sciences, USSR. He spoke about a new method in the theory of superconductivity and superfluidity. This method is based upon the canonical transformation, which the speaker had recommended already in 1947 for the development of the microscopical theory of

superfluidity and for calculation of the interaction between bosons, and which he now applies also to fermions. He thus continued along the same lines as Fröhlich (Frelikh) (in his paper on the interaction between electrons and phonons) and Bardin, Cooper (Kuper) et al. N. N. Bogolyubov and his collaborators (V. V. Tolmachev, D. V. Shirkov, S. V. Tyablikov, D. N. Zubarev, Yu. A. Tserkovnikov) further spoke about a mathematically correct superconductivity theory, which takes not only single-fermion excitation but also collective excitation and the part played by Coulomb (Kulon)-forces into account. Further lectures were delivered by: J. P. Vigier (?) (Zh. P. Vizh'ye), L. Jánossi on experiments carried out by him in a depth of 30 m below the surface of the earth together with Nárai, Varga, Ádám et al. in the optical laboratory of the Central Physics Institute of the Hungarian AS at Budapest (interference tests); further, a number of experimental lectures were held only some of which are mentioned (Krebs, Bernhard, Ardenne, Unangst, Müller, Eder, Barwick, Meyer, Tsel'mer (at present in Dubna) on the dispersion relations for $\pi + N \rightarrow 2\pi + N$ processes. F. Kaplun (Dubna) spoke about the

dispersion relations for elastic p-d scattering, K. S. Tseyten, A. B. Migdal (quantum field theory), Kagan, Hönl (Genl'), T. Kakushadze (Tbilisi) on X-ray spectra, V. Kofink, and others). - The members of the Soviet delegation delivered a number of lectures dealing with the development of physics in the USSR. The important lectures delivered by Bogolyubov and Ivanenko were attended by more than 1000 persons. Ivanenko spoke about the Novosibirskiy nauchnyy tsentr (Novosibirsk Scientific Center) and about the success attained by Soviet scientists in the fields of nuclear physics and accelerators. Several members of the delegation delivered lectures on the situation of science in the various republics of the Union: Gruziya (Professor V. I. Mamasakhlisov, Corresponding Member AS Gruzinskaya SSR); Estoniya (Professor O.P. Keres); Ukraina (Professor A. A. Smirnov, Corresponding Member, AS UkrSSR); Kazakhstan (Doctor Zh. S. Takibayev); Belorussiya, Minsk (Professor B. I. Stepanov, Member AS Belorusskaya SSR); finally, reports were delivered concerning several institutes of the Academy of Sciences of the German Democratic Republic, and visits as well as tours of inspection were

AUTHORS: Ivanenko, D., Brodskiy, A. SOV/20-120-5-18/67

TITLE: On Non-Linear Theory of Elementary Particles (K nelineynoy teorii elementarnykh chastits)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 5, pp. 995 - 998 (USSR)

ABSTRACT: This is a study of a non-linear generalization of the Dirac (Dirak) equation for a quantized spinor field. The invariants can be obtained by a method described already earlier by the authors (Ref 2). This method is characterized by setting equal all spinor fields in the expression for the interaction of two Fermion pairs (as, for example in the theory of β-decay). The method is based upon the hypothesis of universal interaction and the description of matter by a uniform "world spinor". The Lagrangian corresponding to these conceptions is written down. In the not quantized theory a number of relations exists between the terms of this Lagrangian. A few of the non-linear terms apparently are identically equal to zero. The spinor ψ is then transformed to a form, in which every particle is described by a two-component hall-spinor. This investigation is limited to a certain non-linear part of the Lagrangian. The field

Card 1/3

equations resulting from a variation of the Lagrangian are given. The problem of an ansatz for the equations of the causal propagation functions for this non-linear Lagrangian is discussed by the authors. In order to solve this problem additional terms with fictitious sources are introduced into the Lagrangian. An operator for the mass M is also introduced, taking into account the translation invariance of the kernels. The equation for the causal kernel in the non-linear case in the absence of external fields is equivalent to the equation for the linear case, if an interaction with the boson vacuum of an "electromagnetic" and of a "boson" type with the field mass and with the "bare mass" is assumed. From the considerations presented the addition of non-linear terms in the case of a free particle is effectively reduced to a modification (or the introduction) of a mass. When a two-particle kernel is considered the equations of non-linear theory cannot be distinguished by their appearance from the equations of linear theory with a boson field. According to the results obtained the boson fields can in the non-linear theory be considered as a result of the unification of the "primary" spinors as in a

On Non-Linear Theory of Elementary Particles SOV/2o-12o-5-18/67

fusion. The authors express their gratitude to Professor B. Heisenberg (Geyzenberg) for his friendly note on new interesting results of non-linear theory. There are 8 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova (Moscow State University imeni M.V.Lomonosov)

PRESENTED: April 9, 1958, by N.N.Bogolyubov, Member, Academy of Sciences, USSR

SUBMITTED: April 7, 1958

1. Beta decay---Theory 2. Particles--Mathematical analysis

Card 3/3

KUKARKIN, Boris Vasil'yevich, prof.; RYBNIKOV, Konstantin Alekseyevich, prof.; BASHMAKOVA, Izabella Grigor'yevna; YUSHKEVICH, Adol'f Pavlovich; YANOVSKAYA, Sof'ya Aleksandrovna; SPASSKIY, Boris Ivanovich, dotsent; MIKHAYLOV, Glab Konstantinovich, starshiy nauchnyy sotrudnik; MATYNOV, D.Ya., prof., otv.red.; GORDEYEV, D.I., prof., red.; IVANENKO, D.D., prof., red.; KUDRYAVTSEV, P.S., prof., red.; KULIKOVSKIY, P.G., dotsent, red.; KHRGIAN, A.Kh., prof., red.; SHEVTSOV, N.S., prof., red.; VERKHUNOV, V.M., assistent, red.; KONONKOV, A.F., red.; YERMAKOV, M.S., tekhn.red.

[Programs of courses on the history of the physicomathematical sciences] Programmy po istorii fiziko-matematicheskikh nauk. Moskva, 1959. 40 p. (MIRA 12:12)

1. Moscow. Universitet. 2. Orgkomitet Vsesoyuznoy mezhvuzovskoy konferentsii po istorii fiziko-matematicheskikh nauk (for Kukarkin, Rybnikov, Spasskiy, Gordeyev, Ivanenko, Kudryavtsev, Kulikovskiy, Mikhaylov, Khrgian, Shevtsov, Verkhunov, Kononkov).
(Physics--Study and teaching)
(Mathematics--Study and teaching)

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

Card 1/6

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.

TABLE OF CONTENTS:

IVANENKO, D.D., red.; LARIN, S.I., red.; BELEVA, M.A., tekhn.red.

[Nonlinear quantum field theory; collection of articles]
Nelineinaia kvantovaia teoriia polia; sbornik statei. Moskva,
Izd-vo inostr.lit-ry, 1959. 464 p. (MIRA 13:2)
(Quantum theory)

IVANENKO, D. D.

"Transmutation of Gravitational Energy into Ordinary Matter."

paper presented at the Intl. Colloquium on Relative Theories of Graviations, Paris, 21-29 Jun 59.

pre-print in Russian available.
A-3135948

Moscow State Univ.

Ludmilla Dubna

AUTHORS: Lebedev, P., Saxrodinskiy, Ya., Tyapkin, A. S/053/60/070/02/009/014 B006/B007

TITLE: The Physics of Elementary Particles

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 2, pp 361-374 (USSR)

ABSTRACT: The authors give a report on the International Conference on High Energy Physics held at Kiyev in July 1959.

D. I. Blokhintsev and I. Ye. Tamm. Two of the seven holders of the Nobel Prize represented were Russians: I. Ye. Tamm and P. A. Cherenkov. Apart from the surveying lectures seminars were held, in which the following Russian lecturers spoke: I. Ye. Tamm on "Diagram Technique and Field Theory"; D. D. Ivanenko on the "Nonlinear Field- and Gravitation Theory", V. P. Dzhelepov on "Nucleon-Nucleon Collisions", and I. V. Chuvilo on "Bubble Chambers". The plenary sessions began on July 20. In the first session Bernardini (CERN) spoke. His scientific secretaries were A. Baldin and A. Belousov (Moscow). The report on the lecture mentions the data obtained at the Fizicheskiy Institut im. P. N. Lebedeva AN SSSR (Physics Institute named P. N. Lebedev AN USSR) on the "Polarizability of Protons in (γp)-Collisions". B. Pontekorvo (Dubna) delivered a lecture, which is discussed here in detail, on "Pion Scattering by Nucleons and Production of Singly Pions in Nucleon-Nucleon and Pion-Nucleon Interactions". Next, M. I. Yakilar (Dubna) spoke about "Nucleon-Nucleon and Pion-Nucleon Interactions in the 1.5 - 10 Bev Range".

Ivanenko, D.D.

BINDING ENERGIES OF HYPER-NUCLEI AND INTERACTIONS OF TYPE Λ-N AND Λ-Λ

D.D. Ivanenko, N.N. Kolesnikov, V.A. Lyul'ka, V.A. Philimonov

Hypernuclei systems containing Λ or Σ^- hyperons in addition to protons and neutrons, are of great interest both for the understanding of cosmic ray processes and for research into ordinary nuclear forces. By making use of the binding constants known from scattering theory, and having carried out the "cut off" as in the Chou-Hartenhaus method in the theory of ordinary nuclei, we obtained values for hyper-nuclei binding energies in satisfactory agreement with experimental results.

An evaluation made on the basis of field theory revealed the existance of weak forces of Λ-Λ attraction in addition to the stronger Λ-N interaction, which, in turn, is noticeably weaker than the N-N forces. In this connection, the binding energies of the normal and the excited states of a series of light nuclei containing one or two Λ^- particles were calculated using the approximation of a short range of action and a phenomenological potential depending on the spin, whose parameters were selected so as to insure the necessary binding energy of the Λ^- particle in H^4_Λ and He^5_Λ

The data on forces proceeding from hyper-nuclei were employed to calculate the cross section of scattering and capture of slow Λ particles by nuclei.

Report presented at the International Cosmic Ray Conference, Moscow, 1-11 July 1959

IVANYENKO, D.D. [Ivanenko, D.D.]; ABONYI, Ivan [translator]

Development in the physics of elementary particles. Fiz szemle 9 no.4:111-116 Ap '59.

24(5)

AUTHORS: Brodskiy, A. M., Ivanenko, D. D. SOV/56-36-4-46/70

TITLE: Anomalous Spinors and Bosons (Anomal'nyye spinory i bozony)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1279-1285 (USSR)

ABSTRACT: The discovery of the isotopic and strange properties of particles and of the nonconservation of parity in the case of weak interaction stimulated a more intense investigation of the properties of spinors and bosons in reversals. As, however, the usual representations of the Lorentz group do not suffice for the purpose of describing the variety of the new particle properties, the (3- or 4-dimensional) iso-space theory was developed (Ref 1). This also showed that additional consideration of previously neglected possibilities of projective representations in the spinor- and "integron" theory (particles with integral spin) offers the possibility of being able to describe iso-spin and strangeness already within the framework of the ordinary space. These problems are of interest for the application of the fusion method, the model of the complex particles, and also in connection with the nonlinear theory of matter. The authors here give an analysis of the

new spinor types, they discuss the problems of the unusual bilinear combinations, and problems of spin and statistics. The anomalous commutation relations, to which these spinors which show an unusual behavior with respect to inversions obey, are investigated (cf. Gel'fand and Tsetlin, Ref 7). Finally, the possibility is investigated, by means of spinors of the class $\phi^{1A1A} = \phi^{e}$ to describe the electron-positron, by means of the self-adjoint spinors $\phi^{1C1C} = \phi_{\nu}$ (zero mass) the neutrino, and by means of the spinors $\phi^{2A2A} = \phi_{\mu}$ - the μ-meson. The authors finally thank G. A. Sokolik for discussing the results. There are 12 references, 9 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: November 5, 1958

AUTHORS: Ivanenko, D. D., Mitskevich, N. V. SOV/56-37-3-49/62

TITLE: Taking into Account Gravitational Energy

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3(9), pp 868-869 (USSR)

ABSTRACT: The determination of the energy and momentum of the gravitational field (which is especially necessary for the conversion of these quantities into the energy and momentum of other fields) has met with serious difficulties already since the foundation of the general theory of relativity. The difficulties are due to the fact that the equation of continuity gets the physical meaning of a divergence brought about by the disappearance of the usual, but not covariant divergence. The authors denote the law of conservation in the disappearance of the usual divergence an exact law of conservation. The "pseudotensor" of the exactly conserved energy-momentum density of the gravitational field introduced by Einstein is, on the one hand, no generally covariant quantity, on the other, the energy defined by this quantity considerably depends on the selection of the reference systems which are in connection with the purely spatial coordinate transformations at invariable time. For this reason,

Card 1/4

Lorentz and Levi-Civita suggested other definitions of the energy-momentum density. The tensor of all fields which they suggested and which is accurately conserved has no great physical importance. C. Møller (Refs 2, 3) supplied a new expression (and the corresponding exclusion proof) for the total energy of the systems of gravitational fields and other fields with the elimination of the above difficulty. On the other hand, quantities are obtained by the new formulation of Noether's theorem (which was derived earlier by the authors (N. V. Mitskevich, Ref 4)) which are conserved when applied to the field of gravity. These quantities differ from those derived by Einstein and - as will be shown in the present paper - are closely connected with the pseudotensor derived later by Møller. In this connection gravitation and the other fields are dealt with in the same way. The gravitational field is defined by a metric tensor so that particles with spin are bound to correspond to it. On the basis of the expressions derived by Møller and N. V. Mitskevich (Ref 4) the relation

$\gamma_{\beta}^{\alpha} = -\mathcal{U}_{\beta}^{\alpha}$ (grav) is easily obtained. γ_{β}^{α} denotes the

"pseudotensor" of the energy momentum of the total system of fields introduced by Møller and

$\mathcal{U}_\beta^\alpha$ (grav) the value of the spin part of the energy of the gravitational field derived by the authors. This quantity has the necessary gravitational properties also for ot.. fields (invariance of the integral energy in purely spatial transformations which do not refer to time). The tensor determined by the authors agrees with the expression by Levi-Civita also for the total system of the fields. For this reason the following relation holds: $\mathfrak{T}_\beta^\alpha$ (sym)(tot) = $\mathcal{A}_\beta^\alpha$ (tot) + $\mathcal{U}_\beta^\alpha$ (tot) = 0

Therefrom it may be concluded that

$\mathcal{A}_\beta^\alpha$ (f) = $\mathcal{A}_\beta^\alpha$ (grav) = - ($\mathcal{U}_\beta^\alpha$ (f) + $\mathcal{U}_\beta^\alpha$ (grav)), where $\mathcal{A}_\beta^\alpha$ (f) and $\mathcal{A}_\beta^\alpha$ (grav) belong to ordinary fields in the presence of gravitation and to a pure field of gravity, respectively.

Taking into Account Gravitational Energy SOV/56-37-3-49/62

The authors think it more natural to regard the sum of canonic (unsymmetrical) quasi-tensors of all fields as the energy-momentum density of the total system of the fields and not the sum of the symmetrical tensor of the fields of ordinary matter and of the canonic quasi-tensor of the field of gravity. The opinion of the author corresponds also to the generally covariant bases of the second quantization. There are 6 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: May 30, 1959

Card 4/4

AUTHORS: Brodskiy, A. M., Ivanenko, D. D. SOV/56-37-3-53/62

TITLE: On the Connection of the Isospin and the Strangeness With the Behavior of Spinors in Inversion

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3(9), pp 876-877 (USSR)

ABSTRACT: The usual treatment of the isotopic properties and strangeness properties is connected with an isospace of 2, 3, and 4 dimensions, with transitions into the pseudoeuclidian space being possible. These properties may also be described within the usual space, however, by using the hitherto not used possibility of a different behavior of the spinors in inversions and under consideration of the non-conservation of parity P. The treatment of isotopic properties within the usual space suggested here extends the more special considerations made already earlier. As is known, spinors may behave differently towards one another in space and time reflections. In this case, the matrices of transformations differ by the factors -1, i, γ_5 or by their products. Thus, spinor representations of the Lorentz group are given which differ from one another and part of which is unitarily equivalent (which is different

Card 1/4

in the case of charge conjugation). A considerable difference between the spinors (which has not the character of a unitary equivalence) occurs in the presence of the afore-mentioned additional factors only in the case of purely space- or purely time reflections. The spinors are characterized here by the two index pairs a,b and α,β . Index a assumes the value 1 or 2, depending on whether the additional factor γ_5 is added or not in space reflection. In similar way, index b = 1, 2 characterizes the geometric time reflection T^0, which may be replaced by Schwinger's transformation $T^s = T^0 \times (\sim) = TC$, where $(\sim)$ denotes the transposition in Hilbert's space and T Wigner's inversion. Indices α,β assume the 4 values (0,1,2,3) correspondingly to the occurrence of the additional factors i^α in space-, and i^β in time inversions. The essential difference of the spinors is characterized by the differences (a - b) and (α - β), more exactly by the moduli of these differences.

In the invariance only with respect to P^s and T^s the problem of the mutually different spinors arises. In order to solve it,

On the Connection of the Isospin and the Strangeness With the Behavior of Spinors in Inversion

SOV/56-37-3-53/62

the self-conjugate ("large") spinors are introduced.

$$\Psi(1) = 1/2\,[(1 + i\gamma_5)\,\phi + (1 - i\gamma_5)\,\phi^c],$$
$$\Psi(2) = 1/2\,[(1 - i\gamma_5)\,\phi + (1 + i\gamma_5)\,\phi^c],$$
$$\Psi^c(1,2) = C\,\Psi^*(1,2) = \Psi(1,2)\,.\quad \gamma_5^2 = -1$$

In strong inversions of small ϕ the quantities $\Psi(1,2)$ transform linearly and separately. In the phase transformation $\phi' = e^{i\alpha}\phi$ it holds that $\Psi(1,2) = \exp(\pm\gamma_5\alpha)\Psi(1,2)$. In the case of self-conjugate small ϕ (neutrino) $\Psi(1)$ and $\Psi(2)$ agree with each other. To characterize the behavior of spinors in strong inversions P^s, T^s, the index pairs $J = a + \alpha$, $K = b + \beta$ are sufficient and correspondingly also the difference $N = J - K = (a - b) + (\alpha - \beta)$ (mod 2). In this connection a, b, α, β refer to the initial small spinors ϕ. The Lagrangian of the interaction is constructed by means of $\Psi(1,2)$ because in this case the invariance with respect to P^s and T^s becomes

Card 3/4

On the Connection of the Isospin and the Strangeness With the Behavior of Spinors in Inversion SOV/56-37-3-53/62

manifest. The best way is to characterize the leptons by "normal spinors" (by attributing the various factors ± 1, i, γ_5 to the particles e, ν, μ) and the baryons by spinors which are mixed in strong inversions. There are 11 references, 6 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: June 10, 1959

Card 4/4

21(1),21(7)

AUTHORS: Ivanenko, D. D., Lyul'ka, V. A., Filimonov, V. A.

SOV/53-68-4-[illegible]/12

TITLE: The Theory of Hyper-nuclei (Teoriya giperyader)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 68, Nr 4, pp 663-693 (USSR)

ABSTRACT: The authors give a survey of the present stage of the theory of hyper-nuclei, nuclear systems consisting of nucleons and hyperons. An investigation of these hyper-nuclei makes it possible to obtain data on elementary particles (Λ, Σ, K etc.) such as spin, parity, and the interaction between particles. The large amount of experimental material available in this respect makes it possible to deal in theory with hyper-nuclei both from the phenomenological point of view, and by means of the quantum field theory. The authors enumerate the most essential experimental factors and the most important theoretical investigations concerning hyperons. The experimental part of the paper begins with the discovery of hypernuclei in 1953 by the Polish physicists Danysz and Pniewsky (Ref 1) in nuclear emulsions (Fig 1); in the following, the authors discuss the identification of hyper-nuclei; a table shows a number of hypernucleus observations. It was found that whereas in the

Card 1/3

case of accelerator- and cosmic radiation experiments, the relative frequency with which hyper-nuclei are recorded is about 1.10^{-3} (cosmic rays only $0.2.10^{-3}$), it was found to be between 24 and 57.10^{-3} for the case of K-captures. In the following the question of the life time of hyper-nuclei is briefly discussed; their value is near the order of magnitude of 10^{-10} sec. Further, the frequency of hyper-nuclei as a function of the nuclear charge is discussed. Figures 3 and 4 show the Z-dependence of mesonic and non-mesonic decay. Finally, the binding energy of the Λ-particles in the hyper-nuclei is discussed according to the relation $B_\Lambda = M_\Lambda + M_A - \sum_i m_i - Q$ (Figure 5 shows B_Λ (A) - a straight line; A denotes the number of nucleons in the hypernucleus, m_i the masses of the reaction products, and Q - the sum of their kinetic energies), and also some anomalous cases observed. In the second part of the paper - the theoretical treatment of the hypernucleus problem - the most important properties of the hyperons and K-mesons are discussed (classification of interaction into strong, electromagnetic and weak interaction, the

theory of the former, special cases, some Σ - and Ξ -processes, after which the decay possibilities of hyper-nuclei (mesonic and nonmesonic decay), as well as the problem of the spin of the Λ-particles. In the following, the authors first mention some general questions of a phenomenological treatment of the hyper-nuclei with $A \leq 5$, followed by the special cases of the hyper-nuclei He^5_Λ, H^4_Λ, He^4_Λ and H^3_Λ. Finally, the treatment of light hyper-nuclei on the basis of the field theory and several questions related to the spins of the hyper-nuclei are discussed. The material (particularly that of the theoretical part) was mainly taken from Western papers. There are 5 figures, 5 tables, and 136 references, 12 of which are Soviet.

RYBNIKOV, K.A., prof., red.; SPASSKIY, B.I., dotsent, red.; GORDEYEV, D.I., prof., red.; IVANENKO, D.D., prof., red.; KUDRYAVTSEV, P.S., prof., red.; KUKARKIN, B.V., prof., red.; KULIKOVSKIY, P.G., dotsent, red.; MIKHAYLOV, G.K., starshiy nauchnyy sotrudnik, red.; KHRGIAN, A.Kh., prof., red.; SHEVTSOV, N.S., prof., red.; VERKHUNOV, V.M., assistent, red.; KONONKOV, A.F., red.; MALIKOVA, M.A., red.; SOROKINA, L.A., red.; YERMAKOV, M.S., tekhn.red.

[Summaries of papers and reports of the Interuniversity Conference on the History of Physics and Mathematics] Tezisy dokladov i soobshchenii Mezhvuzovskoi konferentsii po istorii fiziko-matematicheskikh nauk. Moskva, Izd-vo Mosk.univ., 1960. 187 p. (MIRA 13:6)

1. Mezhvuzovskaya konferentsiya po istorii fiziko-matematicheskikh nauk. 1960.
(Mathematics--Congresses) (Physics--Congresses)

82431
S/056/60/038/03/32/033
B006/B014

24.4200

AUTHORS: Braginskiy, V. B., Ivanenko, D. D., Rukman, G. I.

TITLE: The Possibility of Making Laboratory Tests for the Purpose of Measuring the Propagation Rate of Gravitational Interaction

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 3, pp. 1005-1007

TEXT: New experiments for investigating gravitational waves have been suggested repeatedly (observation of gravitational radiation, verification of effects of the general relativity theory, Eötvös experiments, etc.). Measurement of the propagation rate of gravitational interaction has been suggested only in Ref. 5. The difficulties involved are discussed in detail. According to Ref. 6, the amplitude of a field at a distance R from the emitter may be expressed by $E_R = 2p_o e^{i\omega t} R^{-3} \cos\theta\,(1+k^2R^2/2-ik^3R^3/2+\ldots)$, where $k = \omega/c_g$, and c_g is the propagation rate of the gravitational field,

Card 1/3

The Possibility of Making Laboratory Tests for the Purpose of Measuring the Propagation Rate of Gravitational Interaction

S/056/60/038/03/32/033
B006/B014

p_0 is the dipole moment (the dipole oscillates with the frequency ω). This holds for distances R, which are small as compared to the wavelength, where $kR \ll 1$. Thus, measurement of E_R permits the determination of c_g. The resulting effect is, however, extremely small ($\approx 10^{-17}$ rad if $c_g = 3 \cdot 10^{10}$ cm/sec; now it is possible to measure phase shifts up to 10^{-6} rad). When $\omega/2\pi = 200$ cps and R = 1 m, $k^2R^2/2 \approx 10^{-11}$. Such an amplitude change is measurable through codification of the frequency change of the oscillating dipole (~ 0.5 cps) and demodulation of the change in the field amplitude along with a change in the oscillator frequency. A piezotransmitter (Weber, Ref. 1) with an appropriate amplifier could be used to measure the field strength. It should be accurate to within 10^{-11} (constant temperature of 0.1^0C). A few other technical details are briefly described. Finally, the authors thank V. V. Migulin and M. S. Akulin for their discussions. Mention is also made of V. P. Kozyrev. There are 8 references, 5 of which are Soviet.

Card 2/3

82431

The Possibility of Making Laboratory Tests for the Purpose of Measuring the Propagation Rate of Gravitational Interaction

S/056/60/038/03/32/033
B006/B014

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: January 3, 1960

Card 3/3

S/053/60/072/004/005/006
B029/B056

AUTHORS: Ivanenko, D., Startsev, A.

TITLE: Classification of Elementary Particles

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol. 72, No. 4, pp. 765-798

TEXT: The present paper deals with attempts hitherto made to classify the elementary particles. All these attempts proceeded from the phenomenological scheme by Gell-Mann - Nishijima. However, both this scheme and the theory by D'Espagnat - Prentki cannot make a claim to finality. In several papers (among them by D. Ivanenko and M. Marianashvili; A. M. Brodskiy and A. Sokolov, and also by other authors) the properties of particles are dealt with within the ordinary four-dimensional space. Van Gan-chan (Ref. 13) discovered bosons with the parity $S = \pm 2$ at Dubna in 1959. Also the scheme by Gell-Mann - Nishijima contains weak spots. The first ideas of extending the three-dimensional isospace to a four-dimensional one are by A. Pais. The third chapter contains a dynamic treatment of the classification of particles. G. Sokolik suggested a similar classification of elementary particles. According to A.M.Brodskiy,

Card 1/3

Classification of Elementary Particles

S/053/60/072/004/005/006
B029/B056

it is possible to introduce an excellent direction into the isospace. Next, a detailed report is given on the global, fundamental, and general symmetry. According to Schwinger, also the interaction with the field of gravity may be included in this scheme. At present, there is no definite argument in favor of one or the other type of symmetry. Also the most general and most elegant general symmetry is in contradiction to various experimental data. The fourth chapter deals with the general spinors and bosons. In this direction, work was carried out, among others, by M. Marianashvili (Ref. 65), D. Ivanenko, A. M. Brodskiy, G. A. Sokolik, I. M. Gel'fand, Chzhou Guan-chzhao, and V. I. Gol'danskiy. Next, a report is given on the classification of particles in the non-linear spinor theory and in the unified geometrized theory. A. Sokolov and other authors further developed ideas by De Broglie. D. Ivanenko, A. Startsev, and A. M. Brodskiy pointed out non-linear additional terms. D. F. Kurdgelaidze and H. Mitter made suggestions concerning the propagator in the non-linear case. In the uniform geometrized theory, all elementary particles may be classified by the quantum numbers $J_3, J_N, I_N/2$, and $I_Q/2$. V. Fok and D. Ivanenko introduced coefficients, Γ_μ, of the parallel shift.

Card 2/3

Finally, a report is given on the hypothesis of compound particles (mentioning L. Okun', M. A. Markov, and I. Polubarinov) as well as on the problem of leptons (A. M. Brodskiy, Ref. 117, and Ya. P. Terletskiy, Ref. 118). According to the latest papers, also leptons may probably be included in the general classification of particles. There are 5 tables and 120 references: 28 Soviet, 35 US, 1 British, 3 German, 15 Dutch, 19 Italian, 2 International, 14 Japanese, and 2 French.

BELOV, D.V. [translator]; VAVILOV, B.T. [translator]; IVANENKO, D., D red.; LARIN, S.I., red.; DOTSENKO, V.A., tekhn. red.

[Recent problems in gravitation] Noveishie problemy gravitatsii; sbornik statei. Moskva, Izd-vo inostr. lit-ry, 1961. 488 p. (MIRA 14:7)
(Gravitation)

KUDRYAVTSEV, P.S., prof., otv. red.; FIGUROVSKIY, N.A., prof., red.; IVANENKO, D.D., prof., red.; SPASSKIY, B.I., dots., red.; YAKOVLEV, V.A., dots., red.; MINCHENKO, L.S., kand. fiz.-mat. nauk, red.; BRAUDE, M.V., kand. filos. nauk, red.; LEZHNEVA, O.A., kand. fiz.-mat. nauk, nauchn. red.

[Problems on the history of physics and its teaching; reports and materials] Voprosy istorii fiziki i ee prepodavaniia; doklady i materialy. Tambov. Tambovskii pedagog. in-t. 1961. 225 p. (MIRA 17:4)

1. Mezhvuzovskaya konferentsiya po istorii fiziki. 1st. Tambov.

IVANENKO, D.; KURDGELAIDZE, D.

Remarks on the quantum theory of a nonlinear meson field. Izv.vys. ucheb.zav.; fiz. no.3:109-121 '61. (MIRA 14:8)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Quantum field theory) (Mesons)

29192
S/029/61/000/011/004/004
D036/D113

11.1540 D.

AUTHOR: Ivanenko, D. I., Professor

TITLE: An open tribune for bold hypotheses. On the agenda - gravitation

PERIODICAL: Tekhnika molodezhi, no. 11, 1961, 23-25

TEXT: This article comprises a review by Professor D. I. Ivanenko of some of the hypotheses concerning the nature of gravity, and a summary of Paul Dirac's theory, according to which gravitation decreases with time. The article is presented in the light of recent work done in this field, including the First Soviet Conference on Gravity held in Moscow. Among the 90 reports heard at this conference, was one by Professor A. Z. Petrov, who suggested that quite unexpected types of gravitational fields may exist. Professor Ivanenko first outlines the theories of Newton and Einstein inasfar as they concern gravity. Einstein's theory that bodies and particles move less freely in a gravitational field because for them the course of time is slowed down, was confirmed only in 1960, and then only in a laboratory. Turning to current theories, Ivanenko mentions the Soviet physicists Braginskiy and Rukman, who proposed that gravitational radiation may be detected

Card 1/4

by observing large rotating flywheels. Soviet physicists have calculated that a great density of energy of neutrinos and antineutrinos must have accumulated in interstellar space during thousands of millions of years. During the total eclipse of the Sun on February 19, 1961, observations were made with highly accurate gravimeters in the zone of total eclipse in Rostov, the zone of partial eclipse in Moscow and also in North Italy, to find out whether the Moon had absorbed part of the Sun's gravitational field. The experiments were inconclusive, although the possible effects of temperature, pressure and magnetic field on the gravimeter readings should not be ignored. Possible "screening off" of gravity may be investigated using instruments aboard artificial Earth satellites. Paul Dirac's proposition, later developed by Jordan, that gravity is slowly decreasing in time, would mean that the Earth can slowly expand; this may clarify the origin of the gigantic cleft encircling the Earth. The fact that, according to astronomical data, the 24-hour cycle on Earth is decreasing by 0.001 seconds per 100 years may be confirmation of the gradual expansion of the earth. The presence of gravitational phenomena in the microworld has not yet been proved. The hypothesis developed by Ivanenko and his colleagues together with A. A. Sokolov and A. M. Brodskiy, and later with I. Piyr (Tartu), on the mutual conversions

between ordinary matter and gravitons, was recently supported by American theoreticians. If this hypothesis is true, development of a unified field theory would be furthered. Working along these lines, Japanese physicist S. Sakat and the Soviet Physicist M. A. Markov attempted to put a lambda-type proton and hyperon at the base of the system of particles and produced composite particles from them. Attempts are now being made to plot all particles on the base of a single non-linear spin field. Ivanenko, his colleagues and A. M. Brodskiy are engaged in such research. Wheeler tried to explain both gravity and electromagnetic fields purely geometrically. The existence of antigravity is suggested by the existence of anti-particles. Soviet physicists working at the Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research) at Dubna have suggested that the existence of possible antigravity could be shown by observing a vertical beam of K-mesons, which are particularly sensitive to mass. There may exist other worlds where positrons, not electrons, revolve about the nuclei of atoms. An "antiworld" with negative masses, and parts of the universe which will contract, and not expand, may exist. The theory developed by Leningrad mathematician Fridman in 1923, that our universe may be expanding, is confirmed by the fact that all extragalactic nebulae have been observed to be

An open tribune for bold hypotheses ...

moving away from our own galaxy. Gedel' [Abstracter's note: Russian transliteration] and Soviet astronomist Zel'manov recently began studying the possibility of the existence of contracting or pulsating universes, or universes expanding unequally in different directions. In conclusion, Ivanenko states that further experiments on Earth and in space, further astronomical observations and intense theoretical work should result in a deeper understanding of gravity in the next few years. The second part of the article consists in a summary of Paul Dirac's work; his hypothesis, propounded in 1959, that a graviton consists of a pair of neutrinos, and his discovery that the age of the universe expressed in nuclear units of time, viz. a unit expressing the time taken by light to pass through a nucleon across its diameter, i.e. 10^{-23} seconds, corresponds to the relationship between the electric force and the gravitational force of the interaction between two protons. As the electrical activity does not decrease with time, the gravitation must decrease, and the universe must expand with time. Expansion of the universe was confirmed by radioastronomist N. N. Pariyskiy in 1959, when he found, with the aid of the world's largest radiotelescope, a dense and massive cloud of ionized gas in the center of the Galaxy. Hungarian physicist Egyed and others found that the Earth's radius is increasing by about 0.5 mm annually. There are 6 figures and 1 Soviet reference.
Card 4/4

IVANENKO, D.D.; SAGITOV, M.U.

Hypothesis of the earth's expansion. Vest. Mosk. un. Ser. 3: Fiz., astron. 16 no.6:83-87 N-D '61. (MIRA 14:12)

1. Kafedra nebesnoy mekhaniki i gravimetrii i Kafedra statisticheskoy fiziki i mekhaniki Moskovskogo gosudarstvennogo universiteta.

(Geodesy)

30887
S/004/61/000/012/001/002
D254/D304

9.9867

AUTHOR: Ivanenko, D. D., Doctor of Physico-Mathematical Sciences

TITLE: On the threshold of new discoveries

PERIODICAL: Znaniye-sila, '36, no. 12, 1961, 7-10

TEXT: The author, asked to express an opinion about the existence of gravitational waves and the chances of gravi-communication ever becoming a reality, stated that the existence of gravitational waves is accepted by a majority of the world's eminent physicists. Only Infeld, the Polish physicist and Einstein's pupil, seems to doubt their existence. The author thinks that the quantum theory predicts a possible participation of gravitons in the transformation of matter, as that of all other particles. Computations of such transformations were carried out by the author together with A. A. Sokolov, A. M. Brodskiy and Yu. S. Vladimirov in Moscow and later by I. Piyr in Tartu (Estonia). The author states it is of interest to note that only recently Soviet physicists B. M. Ponte-

Card 1/2

30887
S/004/61/000/012/001/002
D254/D304

On the threshold of...

4

gorvo and Ya. A. Smorodinskiy in Dubno and V. M. Kharitonov in Yerevan, managed to evaluate the density in the whole universe of neutrons. The author mentions also the suggestion made by V. B. Braginskiy and G. I. Ruckman, Moscow, for detecting gravitational waves. Taking two groups of piezocrystals of cylindrical form, each being a thin plate of 1 m^2 cross section with 20,000 crystals in each group, they placed them close to each other, thoroughly insulated, so that neither electromagnetic nor acoustical waves should penetrate through the insulation. When both groups are then vibrated in phase, in accordance with the laws of resonance, the gravitational radiation output of the system would be four times as large as that of one groups of crystals only. The author agrees that so far all this is theoretical conjecture. There are 2 figures.

Card 2/2

IVANENKO, D.; KURDGELAIDZE, D.F.

Commutation function of a nonlinear meson field. Zhur. eksp. i teor. fiz. 40 no.4:1072-1075 Ap '61. (MIRA 14:7)

1. Moskovskiy gosudarstvennyy universitet.
(Mesons) (Electric fields)

BRODSKIY, A.M.; IVANENKO, D.; SOKOLIK, G.A.

New interpretation of the gravitational field. Zhur.eksp.i teor. fiz. 41 no.4:1307-1309 O '61. (MIRA 14:10)

1. Moskovskiy gosudarstvennyy universitet.
(Gravitation)

IVANENKO, D. D.

"A Compensating Treatment of Gravitation"

report submitted at the Intl. Conference on Relativistic Theories of Gravitation, Warsaw, Poland, 25-31 July 1962.

Faculty of Physics, Moscow University, USSR.

APPROVED FOR RELEASE: 08/10/2001 CIA-RDP86-00513R000618930008-6

BRODSKIY, A. M., IVANENKO, D. D., and SOKOLIK, H. A.

"A New Conception of the Gravitational Field"

report presented at the Intl. Conference on Relativistic Theories of Gravitation, Warsaw, Poland, 25-31 July 1962.

Faculty of Physics, Moscow, State University, Moscow, USSR.

UILER, Dzh.A.[Wheeler, John A.]; MITSKEVICH, N.V.[translator]; IVANENKO, D., red.; LARIN, S.I., red.; RYBKINA, V.P., tekhn. red.

[Gravitation, neutrinos, and the universe]Gravitatsiia, neitrino i Vselennaia. Pod red. D.Ivanenko. Moskva, Izd-vo inostr. lit-ry, 1962. 403 p. Translated from the English. (MIRA 15:12)
(Gravitation) (Neutrinos) (Cosmology)

BRODSKII, A.N. [Brodskiy, A.M.]; IVANENKO, D.; SOKOLIK, H.A. [Sokolik, G.A.]

A new conception of the gravitational field. Acta phys Hung 14 no.1: 21-25 '62.

1. Faculty of Physics, Moscow State University, Moscow, USSR.

IVANENKO, D.; STARTEV, A. [Startsev, A.]

Classification of elementary particles. Analele mat 16 no.1: 171-207 Ja-Mr '62.

I"ANENKO, D.D.; KURDGELAIDZE, D.F.

Classification of elementary particles. Part 1. Izv.vys.ucheb.zav.; fiz. no.3:153-165 '63. (MIRA 16:12)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

S/056/63/044/002/030/065
B102/B166

AUTHORS: Ivanenko, D. D., Kurdgelaidze, D. F.

TITLE: Classification of elementary particles

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 587-591

TEXT: The present paper represents a lecture read at a conference on theoretical problems at the OIYaI in May 1962. An attempt is made to classify the elementary particles and to calculate the mass spectrum of baryons, mesons and the resonance particles termed as "resonons". The calculations are made on the basis of Kurdgelaidze's nonlinear field theory (ZhETF, 38, 462, 1960) by applying the Lagrangian

$$\mathcal{L} = -\frac{1}{2}\left\{(\bar{\psi}\gamma_\mu \frac{\partial\psi}{\partial x_\mu} - \frac{\partial\bar{\psi}}{\partial x_\mu}\gamma_\mu\psi) + 1^\beta (\bar{\psi}\psi)^\beta\right\}$$, where 1 is a nonlinear parameter and β the degree of nonlinearity. Charge, spin and field energy are calculated by using the total wave functions $\psi = \chi(s)\exp(ik_\mu x_\mu)$,

Card 1/3

Classification of elementary ...

$\chi^*(s)\,\chi(s) = NL^3$ (for N = 1). $E_n = (k_0 l)^{\beta/(3\beta-4)} = \frac{1}{2}\,(4\pi\,\frac{n}{\beta})^{(3\beta-3)/(3\beta-4)}$,

$L = \frac{2\pi}{\omega}\,n = \frac{2\pi n}{k_0\beta}$; k_0 is the rest mass of the field per unit volume L^3, ω the frequency; for $\vec{k} = 0$ and N = 1, $\omega = \beta k_0$. When the resonons, characterized by the quantum number r, are considered, one obtains

$E_{n_0+q} = E_{n_0}\left[1 + q/n_0\right]^{(3\beta-3)/(3\beta-4)}$ and $E_{n_0} = \frac{1}{2}\,(4\pi n_0/\beta)^{(3\beta-3)/(3\beta-4)}$,

where q = p + r (p being the hyperon quantum number). Numerical calculations were made for $\beta = 7/2$. It is shown that the baryon masses as a function of q, ($E_g/E_n = f(q)$) or as a function of $J = (2r+1)/2$, ($E/E_n = f(J)$) lie on straight lines with almost the same inclination. In all cases the relation $E_n = 1+n/6$, where n = 2q, can be used to represent the empirical mass spectrum. The transitions are given by

Card 2/3

Classification of elementary ...

$$\omega_{p'-p;\,r'-r} = E_{p',r'} - E_{p,r} = E_\mu\{(70' + 2q')^{1/3} - (70 + 2q)^{1/3}\} \approx$$
$$\approx E_\pi\{7(0'-0) + 2(q'-q)\} = E_\pi\{70^* + 2q^*\},$$
$$0^* \equiv 0' - 0, \quad q^* = q' - q, \quad q^* = p^* + r^*, \quad p^* = p' - p, \quad r^* = r' - r, \tag{5}$$

$$E_\mu = E_{n_0} \cdot 7^{-1/3} \approx 0{,}106, \qquad E_\pi = {}^1/_7 E_{n_0} \approx 0{,}147, \qquad E_{n_0} \equiv E_{\text{нуклон}} = 1.$$

($\beta = 7/2$) and the energy $E^{(J)} = E_{n_0}\left[\frac{5+2p}{7} + \frac{4}{7}J\right]^{15/13} \approx E_\mu(5 + 2p + 4J)$.

The lepton group is obtained by setting $\Theta = 0$ in Eqs. (5). There are 2 figures and 2 tables.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: July 10, 1962 (initially)
November 1, 1962 (after revision)

Card 3/3

IVANENKO, D.D.; KURDGELAIDZE, D.F.

Classification of elementary particles. Zhur. eksp. i teor. fiz. 44 no.2:587-591 F '63. (MIRA 16:7)

1. Moskovskiy gosudarstvennyy universitet.

BRODSKIY, F.M.; IVANENKO, D.D.

Theory of nonrelativistic scattering of compound particles. Izv. vys. ucheb. zav.; fiz. 7 no.6:130-135 '64.

(MIRA 18:2)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.

IVANENKO, Dmitriy D.

"Gravitation and unified picture of matter."

Report to be submitted at an International Meeting on "General Relativity: Problems of Energy and Gravitational Waves", Florence, Italy, 9-12 Sep 64.

NIKOL'SKAYA, Ye.B.; DEN'GA, V.V.; IVANENKO, E.A.; POLOVA, L.I.

Effect of temperature on the activity of alkaline phosphatase irradiated with Co^{60} gamma rays. Radiobiologiia 5 no.3:464-465 '65. (MIRA 18:7)

1. Leningradskiy sanitarno gigiyenicheskiy meditsinskiy institut, i Leningradskaya klinicheskaya bol'nitsa imeni Mechnikova.

IVANENKO, G.D.

Separate-flow method of assembly. Stori. truboprov. 7 no.6:16 Je '62.
(MIRA 15:7)

1. Master stroitel'no-montazhnogo upravleniya No.11 tresta Ukrgazneftestroy, Kiyev.
(Gas, Natural--Pipelines)