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RECONSTRUCTION OF THE SCATTERING MATRIX OF A TWO-NUCLEON SYSTEM. L. Puzikov, E. Ryndin, and Ia. Smorodinskii (United Inst. for Nuclear Studies); Soviet Phys. JETP 5, 489-95(1957) Oct.

The types of experiments needed for determination of all elements of the scattering matrix are investigated. It is shown that because of the unitarity condition the required number of experiments equals the number of complex functions entering into the scattering matrix. For nucleon-nucleon scattering, the inelastic scattering matrix can be determined on the basis of five experiments measuring the cross section, polarization, normal components of the polarization correlation tensor and of the triple scattering tensors (for the scattered and recoil particles). It is shown that experiments involving spin rotation by a magnetic field are not necessary for a phase shift analysis. (auth)

Distr: 4E3d

AUTHOR: PUZIKOV, L., RYNDIN, R., SMORODINSKIY, YA. PA - 2976

TITLE: The Setting up of a Scattering Matrix in a System of Two Nucleons.

PERIODICAL: (Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 32, Nr 3, pp 592-600 (U.S.S.R.)

Received: 6 / 1957 Reviewed: 7 / 1957

ABSTRACT: The present paper is destined to show what experiments are necessary for the determination of all elements of the scattering matrix. It is further shown which of these experiments are independent in the sense that in the case of known experimental results the matrix can be completely constructed. For the reasons of better illustration the authors begin with the two most simple cases: scattering of particles with spin zero in a central field, and of particles with spin 1/2 on spinless nuclei. The scattering of nucleons on nucleons is then examined. The case with any spin and the scattering of photons are examined in later reports. The present paper is confined to the examination of the scattering matri in the case of an assumed energy. Also the problem of the energy dependence of the matrix elements require additional investigations.

The scattering of spin-less particles: Measuring of the scattering cross section in the case of an assumed energy is at all angles a complete test in the sense that the complete construction of the scattering amplitude is made possible (perhaps apart from the

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The Setting up of a Scattering Matrix in a System of Two Nucleons.

fact that two signs are possible).

The scattering of a particle with spin 1/2: In this case a complete test consists of measuring the cross section and of polarization. The ambiguity in the determination of the phases due to the existence of a certain transformation can be eliminated for small energies by the examination of the energy dependence of the cross section. Ambiguity may, by the way, be eliminated by the investigation of the triple scattering.

The scattering of nucleons by nucleons: The tests necessary in this case are described in short. An unpolarized nucleon bundle is assumed here. In this case the first scattering determines the differential cross section. On the occasion of the second scattering polarization is measured on hydrogen. Ba means of a third target it is also possible to measure polarization of the particle after the second scattering. Thus, two orders of magnitude are obtained for the particles participating in the second scattering. This determination of the scattering matrix does not necessitate the measuring of four-fold scattering acts or the introduction of a magnetic field. (1 table).

RYNDIN, R. M.

AUTHOR RYNDIN, R.M., SMORODINSKIY, Ya.A. 56-5-33/55

TITLE The Minami Transformations for the Scattering of Nucleons by Nucleons.
(Preobrazovaniya Minami dlya rasseyaniya nuklonov nuklonami-Russian)

PERIODICAL Zhurnal Eksperim,i Teoret.Fiziki,1957,Vol 32,Nr 5,pp 1200-1205 (U.S.S.R.)

ABSTRACT The paper under review shows the following: The transformation of phases which leaves the scattering cross section invariant- this transformation having been demonstrated for the case of scattering of pions by nucleons-has no analogue for the case of scattering of nucleons by nucleons .Although such a transformation exists it is not sufficient in the light of thephysical conditions of the problem. As a matter of fact,the symmetry of the system requires that the phases do not dpend on m(the magnetic quantum number of the system).But the phases obtained by the transformations investigated here do depend on |m|.Unlike earlier expectations,there thus does not exist any ambiguity of phases imilar to that in a system with the total spin 1/2.Furthermore,the authors of the paper limit their investigations to the examination of the scattering of protons by protons, because the more general case of the scattering of neutrons by protons does not bring out any essentially new aspects of the problem.
The amplitudes and the differential cross section of scattering: This chapter contains a brief discussion of a methodfor the description of collisions between particles of the same kind having the spin 1/2.This chapter also contains the amplitudes of the

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The Minami Transformations for the Scattering of 56-5-33/55
Nucleons by Nucleons.

scattering ofprotons by protons in a form which can be used for the investigation of the behavior of the amplitudes at reversal of the spins.It is possible with the aid of the usual methods for the investigation of the asymptotic behavior of the wave functions to express without difficulty the amplitudes by the elements of the scattering matrix S.For the scattering amplitudes $F_{00}(\nu)$,$F_{1,1}(\nu)$ $F_{1,0}(\nu)$,$F_{1,-1}(\nu)$ explicit expressions are given. The second chapter of the paper under review deals with the transformations of the scattering amplitudes $Fs_m(\nu)$ at reversal of the total spin of the system and of the spin of the different protons. This chapter furthermore contains substitutions for the elements of the scattering matrix which lead to the same transformations of the amplitudes.In the case of nonrelativistic particles the reversal of the spin leads to ambiguity of the phases only in a system with the total spin 1/2 if the data on the scattering of unpolarized particles are analyzed.(No reproductions).

ASSOCIATION Joint Institute for Nuclear Research.
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Card 2/2

AUTHOR RYNDIN, R.M., SMORODINSKIY, Ya. A. 56-6-49/56

TITLE On the Unitarity Relations for the Elastic Collisions of Particles with Arbitrary Spins.
(O sootnosheniyakh unitarnosti dlya uprugikh stolknoveniy chastits s proizvol'nymi spinami. (Russian)

PERIODICAL Zhurnal Eksperim. i Teoret. Fiziki 1957, Vol 32, Nr 6, pp 1584-1585.

ABSTRACT The authors first study collisions of particles without spin. The energy of the impinging particle is assumed to be such that only elastic scattering is possible. In that case the scattering amplitude $f(\vartheta)$ according to R. GLAUBER and V. SCHOMAKER (Phys. Rev., Vol 89, p 667, 1953) satisfied an integral equation. The present paper generalized this integral relation for elastic collisions of particles with the random spins s_1 and s_2 and proves the following: Besides the optical theorem there exists a number or relations which connect the elements of the scattering matrix which do not vanish at $\vec{k}' \longrightarrow \vec{k}$ with the various spin characteristics. The unitarity of the S-matrix causes the wave functions Ψ_k of the scattered wave to satisfy the same orthogonality- and

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On the Unitarity Relations for the Elastic Collisions of Particles with Arbitrary Spins. 56-6-19/56

normalization functions as the functions of the inciding wave. At $r \to \infty$ they form a complete system of functions with respect to the angle variables. After some computing the required integral relation for the scattering matrix is obtained. He reform there follow integral relations for the coefficients of the development according to the invariant spin matrices. Also a generalization of the optical theorem for particles with a spin that is different from zero is obtained:

$$4\pi \operatorname{Im} \operatorname{Sp} M(\vec{k}, \vec{k}) = k (2s_1 + 1)(2s_2 + 1)\sigma.$$

(No Illustrations)

ASSOCIATION: United Institute for Nuclear Research.
(Ob "yedinennyy institut yadernykh issledovaniy.- Russian)

PRESENTED BY: -
SUBMITTED: 20.3. 1957.
AVAILABLE: Library of Congress.

CARD 2/2

RYNDIN, R. M. , Zastavenko L. G. and CHOU, Kuang-chao

"On Non-Uniqueness of Nucleon-Nucleon Scattering Phase Shifts."

Nuclear Physics, Vol. 6, No. 5, p. 669, 1958. No. Holland Publ. Co.

Joint Inst. of Nuclear Research.

BILENKIY, S. M., LAPIDUS, L. I., PUZIKOV, L. D. and RYNDIN, R. M.

"Phenomenological Analysis of Reactions of the $a + a \rightarrow b + b'$ Type"
Nuclear Physics, vol. 7, No. 6, p. 646-654, 1958, No. Halland Publ. Co.

Abstract: Conditions for the construction from experimental data of the matrix for reactions of the $a + a' \rightarrow b + b'$ type are considered on basis of general principles of quantum mechanics. The reaction matrix M is expanded in a complete set of irreducible tensor operators $T^{jm}(j_b j_a)$ and the number of complex scalar functions which determine it is computed for the case when invariance under space rotatiaons and reflections is taken into account. Time reversal invariance of the interaction leads to relations between polarization effects in the direct and inverse reactions. The number of experiments required for complete construction of the reaction matrix in the presence of several channels can be determined on basis of unitarity of the S matrix.

The general form of the azimuthal dependence of the angular distribution of the reaction products (for arbitrary spins) is derived in the appendix.

Joint Inst. of Nuclear Research, Lab. of Theoretical Physics, Dubna, USSR.

Ryndin R. M.

56-2-45/51

AUTHORS: Zastavenko, L. G. , Ryndin, R. M. , Chzhou Guan-chzhao

TITLE: The Non-Uniquenesses of Phases in the Scattering of Nucleons by Nucleons (O neodnoznachnostyakh faz v rasseyanii nuklonov nuklonami)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 2, pp. 526 - 527 (USSR)

ABSTRACT: The cross section of the scattering of mesons by nucleons remains unchanged in the ansatz shown by Minami (reference 1). Two sets of phases by means of this ansatz originate from each other can be distinguished either by polarization experiments or by the investigation of the energy dependence of the cross section with small energies. The authors discuss analogous transformations for the case of the scattering of nucleons by nucleons. The elastic scattering of nucleons by nucleons is completely described by the matrix $M(\vec{k}, \vec{k}_0; \vec{\sigma}_1, \vec{\sigma}_2)\chi_i$. Here $\vec{\sigma}_1$ and $\vec{\sigma}_2$ denote the Pauli matrices of the two nucleons and $\vec{k}_0$ and $\vec{k}_1$ respectively, denote the unit-vectors in the directions of motion of enter-

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The Non-Uniquenesses of Phases in the Scattering of Nucleons by Nucleons

ing and scattered nucleons. The cross section of the scattering of non-polarized nucleons $\sigma_0 = (1/4)\,\mathrm{Sp}MM^+$ is invariant in relation to the substitution of $M(\vec{k}, \vec{k}_0, \vec{\sigma}_1, \vec{\sigma}_2)$ by one of the three matrices mentioned here. M is then expanded into spherical harmonics $Y_{ls}^{jm}(\vec{k})$, which describe the states with certain values of the total angular momentum j, its projection m, the orbital momentum l and the spin s. The values l and s are determined by the addition law of angular momentum and with s = 0 (singulet) l = j, and with s = 1 (triplet) are $l = j, j \pm 1$). Then the authors investigate one of the above-mentioned transformations, namely $M_1=(\vec{\sigma}_1\vec{k})M(\vec{\sigma}_1\vec{k}_0)$, and mention the expansion of this matrix into spherical harmonics. The matrices occurring in this development are discussed more detailed and are mentioned explicitly. The matrices $M_1=(\vec{\sigma}_1\vec{k})M(\vec{\sigma}_1\vec{k}_0)$ and $M_2=(\vec{\sigma}_2\vec{k})M(\vec{\sigma}_2\vec{k}_0)$ lead to singulet-triplet transitions. Therefore the first two transformations cannot take place in the case of a collision of nucleons of the same type where the singulet-triplet transitions are excluded by the Pauli principle. This also applies to the (n-p)-scattering, if the hypothesis of the isotopic

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The Non-Uniquenesses of Phases in the Scattering of Nucleons by Nucleons

invariance is correct. There are 3 references, 1 of which is Slavic.

ASSOCIATION: United Institute for Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy)

SUBMITTED: November 26, 1957

AVAILABLE: Library of Congress

1. Mesons-Scattering 2. Nucleons-Applications

Card 3/3

21(7)

AUTHORS: Bilen'kiy, S. M., Ryndin, R. M. SOV/56-35-3-60/61

TITLE: A Possible Method for the Determination of the Polarization of a Hyperon in the Reaction $\pi+p \rightarrow Y+K$ (Vozmozhnyy metod opredeleniya polyarizatsii giperona v reaktsii $\pi+p \rightarrow Y+K$)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 3, pp 827 - 828 (USSR)

ABSTRACT: One of the most important characteristics of interactions leading to the production of strange particles is the polarization of hyperons. The present paper suggests a method of determining the polarization of hyperons in the reactions $\pi+ p \rightarrow (\Sigma, \Lambda) + K$, $K + p \rightarrow (\Sigma, \Lambda) + \pi$. This method is based on measuring the asymmetry of K-mesons and pions with the polarized proton target in the aforementioned reactions. The matrix of a reaction of the above-mentioned type can be written down in the general form $M = a + \vec{b}\vec{\sigma}$ (spin of the hyperon = 1/2, spin of the K-meson = 0). For the density matrix of the initial state it applies that $\rho_0 = (1+ \vec{P}_0\vec{\sigma})/2$, where $\vec{P}_0$ denotes the polarization of the target-protons. An expression for the differential cross-

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section is given, and the polarization of the hyperon for the case of an unpolarized proton-target is calculated. According to the internal polarity of the particles participating in the reaction two cases may be distinguished: 1) Internal polarity does not change, i.e. it applies that $I_\pi I_p = I_Y I_K$. In this case the aforementioned matrix is a scalar. The corresponding expressions for $\vec{\sigma}$ and $\vec{P}$ are written down. 2) Internal polarity changes, i.e. it applies that $I_\pi I_p = I_Y I_K$. In this case the matrix is a pseudoscalar. Measurement of the asymmetry of the initially mentioned reactions in the case of a polarized target would permit the determination of the polarization P of the hyperon in a reaction with an unpolarized target. If the parity (KY) with respect to (πp) were known, thi. experiment would, at the same time, make it possible to determine the sign of polarization. If, on the other hand, the sign of polarization is determined from the decay of the hyperon, the experiment suggested would make it possible to determine the relative parity (KY). There are 2 references.

A Possible Method for the Determination of the Polarization of a Hyperon in the Reaction $\pi+p \rightarrow Y+K$

SOV/56-35-3-60/61

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute of Nuclear Research)

SUBMITTED: July 26, 1958

Card 3/3

24(5), 16(0)
AUTHORS: Bilen'kiy, S. M., Lapidus, L. I., Puzikov, L. D., Ryndin, R. M. SOV/56-35-4-18/52

TITLE: On the Determination of the Matrix for the Reaction a+a' → b+b' (Ob opredelenii matritsy reaktsii a+a' → b+b')

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 4, pp 959 - 961 (USSR)

ABSTRACT: Wolfenstein (Vol'fenshteyn) and Ashkin set up a general expression for the scattering amplitudes of particles with spin 0 and 1/2 on particles with spin 1/2 on the basis of the invariance conditions in space revolutions and reflections and time reversal. Proceeding from these expressions, and by using the unity of the S-matrix, Puzikov, Ryndin and Smorodinskiy (Ref 2, investigated the question as to how many experiments are necessary in order to obtain a complete determination of the scattering amplitudes in these cases. The authors of the present paper investigate the general case of a reaction of the scheme a+a' → b+b'.

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On the Determination of the Matrix for the Reaction $a+a' \rightarrow b+b'$ SOV/56-39-4-18/52

The number of complex scalar functions defining the reaction matrix M is determined with the aid of the conditions of invariance with respect to space rotations and reflections. Time reversal invariance leads to relations between polarization effects in direct and inverse reactions. An expression for the amplitude of the process and another for the ratio between the matrices of direct and inverse direction is first given. On the basis of an example of 2 channels the number of experiments is determined that is necessary for a complete determination of the reaction matrix. In conclusion the authors thank Ya.A.Smorodinskiy for discussing the problem dealt with. There are 3 references, 2 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

Card 2/3

Ryndin, R.M.

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.

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24(5)
AUTHORS: Bilen'kiy, S. M., Ryndin, R. M. SOV/56-36-5-72/76

TITLE: On the Relativistic Relation "Polarization - Asymmetry"
(O relyativistskom sootnoshenii "polyarizatsiya - asimmetriya")

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 5, pp 1609-1610 (USSR)

ABSTRACT: The usual method of determining the polarization of particles consists in measuring the azimuthal asymmetry of the scattering of polarized particles and is based upon the equality of the azimuthal asymmetry of the polarization of the incident particles and that occurring in the scattering of unpolarized particles. For the nonrelativistic case Wolfenstein and Askin (Refs 1, 2) already investigated conditions, and in the present "Letter to the Editor" the authors give a short report on the case of the scattering of relativistic particles. The case of the elastic scattering of particles with spin 1/2 on spinless particles is investigated: The density matrix is given by $\rho = \frac{1}{2}(1 + i\gamma_5\gamma_\mu\xi_\mu)\Lambda_p$, where $\Lambda_p = (\gamma_\mu p_\mu + im)/2im$ is

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the projecting operator, m - the rest mass of the particle, $\xi_\mu = iSp\gamma\gamma_5\gamma_\mu\rho$, a space-like pseudovector orthogonal to p_μ ($\xi_\mu p_\mu = 0$). The degree of polarization is $P = \sqrt{\xi_\mu \xi_\mu}$. This matrix for the final state has the form $\rho_{scatt} = \Lambda_{p'} M \rho_{inc} \beta M^+ \beta \Lambda_{p'}$. Herefrom a formula is derived for the scattering cross section of the polarized beam, and for the polarization - asymmetry relation $\sigma = \sigma_0(1 + \xi_\mu^{inc} \xi_\mu^0)$ is obtained; σ_0 is the scattering cross section of the unpolarized particles, ξ_μ^0 - the vector of the polarization occurring in the case of the scattering of unpolarized particles, and ξ_μ^{inc} - the corresponding vector in the scattering of polarized particles. This equation applies also to the case of a reaction of the type $1/2 + 0 \rightarrow 1/2 + 0$ if the internal parity of all particles is + 1; if it is - 1, also the sign of the product of the polarization coefficients changes. The asymmetry ξ is thus

On the Relativistic Relation "Polarization - Asymmetry" SOV/56-36-5-72/76

$\xi^0_\mu \xi^0_\mu$, i. e. equal to the square of the invariant degree of polarization. There are 3 references.

SUBMITTED: February 27, 1959

Card 3/3

Kyndin, R.M.

21(7) SOV/56-36-6-4/66

AUTHORS: Azhgirey, L. S., Vzorov, I. K., Zrelov, V. P., Meshcheryakov, M. G., Neganov, B. S., Ryndin, R. M., Shabudin, A. F.

TITLE: Interaction Between Protons and Atomic Nuclei at Energies of 660 Mev and the Intra-nuclear Distribution of the Nucleon Momenta (Vzaimodeystviye protonov s atomnymi yadrami pri energii 660 MeV i vnutriyadernoye raspredeleniye impul'sov nuklonov)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 6, pp 1631 - 1649 (USSR)

ABSTRACT: Apart from theoretical discussions, this very detailed paper above all deals with the momentum distribution in quasi-elastic proton-nucleon collisions, and gives a detailed description of the experiments carried out as well as a great number of experimental data concerning the angular distributions and energy spectra of secondary particles (mainly protons with energies of $\gtrsim 60$ Mev) emitted at angles of 7, 12.2, 18, 24 and 30° in reactions between 660 Mev protons and nuclei of Be, C, Cu and U. Table 3 gives for all 4 elements the $d\sigma/d\omega$ measured for 8 different emission angles φ between 7 and 40°.

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Thus, the following was found for $\varphi = 7°$: $d\sigma/d\omega = (1.100 \pm 0.055) \cdot 10^{-24} cm^2$/steradian, for 40° $(0.074 \pm 0.004) \cdot 10^{-24} cm^2$/steradian. Figure 2 shows these results in form of a diagram. It is found that in the general sense, the dependence of $d\sigma/d\omega$ on A decreases with a decrease of φ. The 4 diagrams in figure 3 show the energy spectra of the charged secondary particles at 7°, the following figures each show (in 4 diagrams) the energy spectra for the other angles. At 7° the characteristic peak ($d^2\sigma/d\omega dE$ in $10^{-27} cm^2$/steradian.Mev is the ordinate) is narrow and is practically near 660 Mev; a second maximum is only vaguely discernible and a weak minimum can be observed only in the case of Cu at about 500 Mev. At 12.2° the peak is already broader and shifted somewhat towards lower energies; the minima are more marked and are at energy values of somewhat below 500 Mev. At 18° these peaks are still broader and are found already at energies of < 600 Mev; the minima are especially low in the case of Cu and U at about 400 Mev. At 24° the broad maxima (especially in the case of U)

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are at about 500 Mev, the minima are distinctly observable at about 400 Mev; in the case of U the ordinate values are about E < 200 Mev above the maximum at ~ 300 Mev. At 30° this development is more marked; the maxima are flat and are at about 400 Mev; Cu and U have very high ordinate values at low energies, which decrease to a minimum at about 300 Mev, after which they again increase somewhat and again decrease sharply towards zero with increasing energies. In general, the cross sections for the emission of such secondary particles increase with a decrease of the angle. Passing from high to low energies, the spectral regions of the investigated elements correspond to diffractional scattering of protons on nuclei (small angle region), single quasi-elastic proton-nucleon collisions, pion production on bound nucleons and intranuclear cascade processes, respectively. In chapter 5 of this paper the authors compare the experimental energy spectra for quasi-elastic proton-nucleon scattering with the calculated spectra (in momentum approximation under various assumptions with respect to the momentum distributions of the nucleons in the nucleus) (Figs 8 and 9). In the case of p-Be- and p-C-scattering agreement is found (between experiment and theory) when using a Gaussian momentum distribution having a 1/e-value at about 20 Mev, which is in keeping with the results obtained in Berkeley. The authors finally thank R. N. Fedorova and I. V. Popova for programming and carrying out calculations, and further also S. M. Bilen'kiy, N. P. Klepikov, L. I. Soroko and Ya. A. Chernikov for valuable discussions. There are 9 figures, 3 tables, and 25 references, 6 of which are Soviet.

Card 3/4

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: December 20, 1958

Card 4/4

16.8100, 16.8300, 24.6000

76992
SOV/56-37-6-32/55

AUTHORS: Bilen'kiy, S. M., Ryndin, R. M., Smorodinskiy, Ya. A., Khe Tso-syu

TITLE: Theory of β-Decay of the Neutron

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 6, pp 1758-1763 (USSR)

ABSTRACT: Calculations were performed for corrections to various effects in β-decay of the neutron. The corrections originated from the account of terms for the electron and nucleon masses $\sim m/M$. These terms are due to the "weak Gell-Mann magnetism" and proton recoil. It was shown that for electron-neutrino correlation and the up-down symmetry of electrons, these corrections may reach several percent. Thus, the correction for the $(e-\nu)$-correlation for the total energy of electron of 0.71, 0.91, 1.11, 1.29 mev,

Theory of β-Decay of the Neutron

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as compensated for "weak magnetism" and the recoil, was, respectively, as follows: 0.4, 1.4, 2.4, 3.3%, and 1.9, 2.7, 3.5, 4.2%. The correction to the asymmetry of electrons for the total energy of electron 0.71, 0.91, 1.11, 1.29 mev, as compensated for "weak magnetism" and the proton recoil, was found to be, respectively: 1.3, 1.8, 2.4, 3.0%, and 0.3, 0.5, 0.6, 0.8%. Corrections for the polarization were found to be small and at energies of 0.71, 0.91, and 1.11 mev were, respectively: 0.14, 0.08, and 0.07%, V. Telegdi participated in the discussion of this work. There are 2 tables; and 12 references, 1 Soviet, 1 Italian, 10 U.S. The 5 most recent U.S. references are: R. P. Feynman, M. Gell-Mann, Phys. Rev., 109, 193, 1958; M. Gell-Mann, Phys. Rev., 111, 362, 1958; J. Bernstein, R. R. Lewis, Phys. Rev., 112, 232, 1958; M. Morita, Bull. Am. Phys. Soc., 4, 230 D11, 1959; S. Weinberg, Phys. Rev., 112, 1375, 1958.

ASSOCIATION: Joint Inst. Nuclear Research, USSR (Ob'edinennyy institut
Card 2/3

Theory of β-Decay of the Neutron

76992
SOV/56-37-6-32/55

yadernykh issledovaniy, SSSR)

SUBMITTED: July 3, 1959

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21(1)

AUTHORS: Bilen'kiy, S. M., Ryndin, R. M.

SOV/20-124-1-17/69

TITLE: On Determining the Parity of Hyperons and K-Mesons (Ob opredelenii chetnosti giperonov i K-mezonov)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 1, pp 63-65 (USSR)

ABSTRACT: The present paper investigates a possibility of determining the parity of hyperons and K-mesons that is not connected with any condition concerning the spins of hypernuclei and K-mesons. Besides, in the case of this procedure, the reactions must not be investigated near the threshold value. The authors suggest investigating the reaction $p + He^4 \longrightarrow He^4 + Y + K$ with a polarized proton beam. The matrix of this polarization has the form $M = a + \vec{\sigma} \cdot \vec{b}$, where the quantities a and $\vec{b}$ depend on the momenta of the initial- and final states. Next, the expressions for the differential cross section of the above-mentioned reaction and the polarization of the hyperons produced by the reaction are given. The product of the internal parities of the proton, hyperon, and K-meson may assume the two values $I_p I_Y I_K = \pm 1$. In the case $I_p I_Y I_K = +1$ the matrix M is a

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scalar and $\vec{b}$ is then a pseudovector. At $I_p I_Y I_K = -1$, M is a pseudoscalar and $\vec{b}$ a vector. The formulae are then also specialized for the special case in which the momenta of the proton, K-meson, and hyperon are in one plane. The polarized proton beams are produced by the scattering of unpolarized beams by nuclei, and their polarization is orthogonal with respect to the momentum of the scattered protons. By measuring azimuthal asymmetry in the above-mentioned reaction with polarized protons, the sign of $I_p I_Y I_K$ can be uniquely determined if the sign of the polarization occurring in the reaction with unpolarized protons is known. When determining asymmetry it is necessary to select such cases in which all particles are in one plane. The authors thank Yu. A. Shcherbakov for an interesting discussion of the problems dealt with by the present paper. There are 8 references, 4 of which are Soviet.

On Determining the Parity of Hyperons and K-Mesons SOV/20-124-1-17/69

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

PRESENTED: August 27, 1958, by N. N. Bogolyubov, Academician

SUBMITTED: August 9, 1958

Card 3/3

RYNDIN, R. M., BILENKIY, S. M.,

"Emission of -Ray Quantum in Electron-Proton Scattering"

paper presented at the Intl Conference on High Energy Physics, Rochester, N. Y. and/or Berkly California, 24 Aug - 16 Sep 1960.

22134
S/056/61/040/003/014/031
B112/B214

24.6520

AUTHORS: Bilen'kiy, S. M., Ryndin, R. M.

TITLE: Emission of soft gamma quanta in electron proton scattering

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 3, 1961, 819-825

TEXT: The bremsstrahlung of soft gamma quanta in elastic electron proton scattering is considered in this paper. The amplitude of the process is calculated approximately and then the differential scattering cross section. The approximations are in each case limited to the first two terms of a series expansion in powers of the exchange momentum k, that is, the momentum of the gamma quantum. The amplitude of the scattering process is determined by a method proposed by F. E. Low (Ref.3: Phys. Rev., 110, 974, 1958) for the soft gamma radiation. This method requires a special treatment of the part of the amplitude possessing a pole for $k \to 0$ (renormalization). The amplitudes T^{I}_{μ} and T^{II}_{μ} appear in the S matrix: $S(p', q', k, p, q) = -(2\pi)^4 i(M^2 m^2/2k_o p'_o p_o q'_o q_o)^{1/2} \varepsilon_\mu (T^{I}_{\mu} + T^{II}_{\mu}) \delta(p' + q' + k - p - q)$. M is

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the mass of the proton, m the mass of the electron; p,p' and q,q' are the four-momenta of the proton and the electron, respectively, before and after collision; ε_μ is the polarization vector of the emitted gamma quantum ($p_0 = ip_4$, $q_0 = iq_4$). The amplitude T^I_μ is expressed by the anomalous magnetic moment μ_p and the electromagnetic form factors F_1 and F_2 of the proton.

$$T^I_\mu = \bar{u}(q')\left[ie\gamma_\mu \frac{1}{i\gamma(q'+k)+m} ie\gamma_\nu + ie\gamma_\nu \frac{1}{i\gamma(q-k)+m} ie\gamma_\mu\right] u(q) \times$$
$$\times \bar{v}(p')\, ie\,[F_1((p'-p)^2)\gamma_\nu - \tfrac{1}{2}\mu_p M^{-1} F_2((p'-p)^2)\sigma_{\nu\rho}(p'-p)_\rho]\, v(p)\,(p'-p)^{-2}. \quad (2)$$

The amplitude T^{II}_μ contains operators which may be expanded in powers of the exchange momentum k.

$$T^{II}_\mu = -\bar{u}(q')\, ie\gamma_\nu u(q)\,[T^A_{\nu\mu} + T^B_{\nu\mu}]\,(q'-q)^{-2}. \quad (3)$$

$$T^A_{\nu\mu} = \bar{v}(p')\,[ie\Gamma_\mu(p', p'+k)\,S(p'+k)\,ie\Gamma_\nu(p'+k, p) +$$
$$+ ie\Gamma_\nu(p', p-k)\,s(p-k)\,ie\Gamma_\mu(p-k, p)]\,v(p). \quad (4)$$

In each case, the first two terms of the expansions are substituted into

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Emission of soft gamma...

T_μ^{II} and a formula for T_μ^{II} is thus obtained, which is accurate up to the terms of order 1/k and contains only the electromagnetic form factors of the proton.

$$T^A_{\nu\mu} = \bar{v}(p')\Big[ie\Gamma^0_\nu(p', p-k)\frac{1}{i\gamma(p-k)+M}\Big(ie\gamma_\mu+\frac{ie}{2M}\mu_p\sigma_{\mu\rho}k_\rho\Big)+$$
$$+\Big(ie\gamma_\mu+\frac{ie}{2M}\mu_p\sigma_{\mu\rho}k_\rho\Big)\frac{1}{i\gamma(p'+k)+M}ie\Gamma_\nu(p'+k, p)\Big]v(p)+$$
$$+\bar{v}(p')\{[ie\Gamma_\nu(p', p-k)-ie\Gamma^0_\nu(p', p-k)]ie\gamma_\mu/2M\}v(p)+$$
$$+\bar{v}(p')\{(ie\gamma_\mu/2M)[ie\Gamma_\nu(p'+k, p)-ie\Gamma^0_\nu(p'+k, p)]\}v(p), \quad (18)$$

$$\Gamma^0_\nu(l', l) = a\gamma_\nu + b\sigma_{\nu\rho}(l'-l)_\rho + c\sigma_{\nu\rho}(l'+l)_\rho. \quad (19)$$

$$T^{II}_\mu = -\varkappa^{-2}\bar{u}(q')ie\gamma_\nu u(q)\bar{v}(p')\Big\{\Big[ieF_1(\varkappa^2)\gamma_\nu-$$
$$-\frac{ie}{2M}\mu_p F_2(\varkappa^2)\sigma_{\nu\rho}\varkappa_\rho\Big]\frac{1}{i\gamma(p-k)+M}\Big(ie\gamma_\mu+\frac{ie}{2M}\mu_p\sigma_{\mu\rho}k_\rho\Big)+$$
$$+\Big(ie\gamma_\mu+\frac{ie}{2M}\mu_p\sigma_{\mu\rho}k_\rho\Big)\frac{1}{i\gamma(p'+k)+M}\Big[ieF_1(\varkappa^2)\gamma_\nu-\frac{ie}{2M}\mu_p\sigma_{\nu\rho}\varkappa_\rho F_2(\varkappa^2)\Big]\Big\}v(p). \quad (25)$$

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Emission of soft gamma....

Finally, with the help of the expressions for T_μ^I and T_μ^{II} the differential scattering cross section $d\sigma = d\sigma_0/\omega + d\sigma_1$ is calculated where $d\sigma_0$ and $d\sigma_1$ correspond to the first and the second approximation, respectively.

$$d\sigma_0 = \omega d\sigma\Big|_{\omega=0} = \alpha\,(2\pi)^{-2}\omega^2\left[\left(\frac{q'}{q'k}-\frac{q}{qk}\right)-\left(\frac{p'}{p'k}-\frac{p}{pk}\right)\right]^2\Big|_{\omega=0} d\Omega_k d\omega d\sigma_p. \quad (27)$$

where $d\sigma_p$ is the elastic ep-scattering cross section for an electron energy q_0, $\alpha = e^2/4\pi = 1/137$. $d\sigma_1$ is given by:

$$d\sigma_1 = \frac{\alpha^3}{(2\pi)^2}\left\{A_q^2 \varkappa k\left[f_1\left(2M^2+\frac{1}{2}\varkappa^2\right)-2f^2\varkappa^2\right]-\frac{1}{2}A_p^2\varkappa k f_1\varkappa^2 -\right.$$
$$-2A_qA_p(\varkappa k)\,(f_1M^2-f^2\varkappa^2)+f_1\,(pq+pq')\,(A_q-A_p)\left[\left(\frac{q'}{q'k}+\frac{q}{qk}\right)(p'k+pk)-\right.$$
$$\left.-\left(\frac{p'}{p'k}+\frac{p}{pk}\right)(qk+q'k)-4\,(p-q')\right]-2\,(A_q-A_p)^2 f_1\left[(pq)\,(kq')+\right.$$
$$+(pq')\,(kq)+\frac{1}{2}(pk)\,\varkappa^2\Big]-2(\varkappa k)\,(A_q-A_p)A_q\left[4\left(2F_1F_1'+2\left(\frac{\mu_p}{2M}\right)^2F_2F_2'\varkappa^2+\right.\right.$$
$$\left.\left.+\left(\frac{\mu_p}{2M}F_2\right)^2\right)(pq)\,(pq')\cos^2\frac{\theta_1}{2}+f f'\varkappa^2\right]+(A_q-A_p)^2\left[4\left(2F_1F'_1\varkappa^2+\right.\right.$$

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$$+2\left(\frac{\mu_p}{2M}\right)^2 F_2 F_2' \varkappa^4 + \left(\frac{\mu_p}{2M} F_2\right)^2 \varkappa^2 + f_1\Big)(pq)(pq')\cos^2\frac{\theta_1}{2} +$$

$$+ f\varkappa^4 (f'\varkappa^2 + f)\Big]\frac{dq_0'}{d\omega}\frac{1}{q_0'}\omega\Big\} q_0'\omega\left[\varkappa^4 q_0 M^2\left(1+\frac{2q_0}{M}\sin^2\frac{\theta_1}{2}\right)\right]^{-1}\Big|_{\omega=0} d\Omega_k d\omega d\Omega_{q'} +$$

$$+\frac{\alpha}{(2\pi)^2}\left[\frac{4\varkappa k}{\varkappa^2}(A_q - A_p)A_q\omega + (A_q - A_p)^2\frac{1}{q_0}\left(1+\frac{2q_0}{M}\sin^2\frac{\theta}{2}\right)\omega^2 +\right.$$

$$\left. + \frac{2}{p'k}\omega\right]\Big|_{\omega=0} d\omega\, d\Omega_k\, d\sigma_p +$$

$$+\frac{2\alpha}{(2\pi)^2}\left[\left(1+\frac{m^2\omega}{q_0' q' k}\cos\theta'\right)\left(\frac{m^2}{(q'k)^2} - \frac{p'q'}{(p'k)^2} + \frac{(p'q)(q'k)}{(p'k)^2 qk}\right) +\right.$$

$$+\frac{m^2\omega\cos\theta'}{(q'k)^2 q_0'}\left(\frac{qq'}{qk} + \frac{p'q'}{p'k} - \frac{pq'}{pk}\right) - \frac{M^2 q'k}{(p'k)^3} + \frac{pq'}{(pk)(p'k)} -$$

$$\left. - \frac{(pp')(q'k)}{(pk)(p'k)^2} + \frac{m^2}{(q'k)(p'k)} - \frac{qq'}{(p'k)(qk)}\right]\frac{dq_0'}{d\omega}\frac{1}{q_0'}\omega^2\Big|_{\omega=0} d\omega d\Omega_k d\sigma_p.$$

Здесь

$$A_q = q'/(q'k) - q/(qk), \quad A_p = p'/(p'k) - p/(pk),$$

$$f = F_1 + \mu_p F_2, \quad f_1 = F_1^2 + (\mu_p F_2/2M)^2\varkappa^2;$$

$$\frac{dq_0'}{d\omega}\frac{1}{q_0'}\Big|_{\omega=0} = 2\left[M\left(1+\frac{2q_0}{M}\sin^2\frac{\theta_1}{2}\right)\right]^{-1}\sin^2\frac{\theta'}{2} - \frac{1}{q_0}\left(1+\frac{2q_0}{M}\sin^2\frac{\theta}{2}\right),$$

Card 5/6 $F_1' = \frac{dF_1}{d\varkappa^2}$, и т. д.

Emission of soft gamma...

S. S. Gershteyn, P. S. Isayev, A. A. Logunov, and Ya. A. Smorodinskiy are thanked for discussions. There are 2 figures and 7 references: 1 Soviet-bloc and 7 non-Soviet-bloc.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: September 1, 1960

Card 6/6

RYNDIN, R. M., and BILENKIY, S. M.

"Production of Slow π Mesons in Pion-Nucleon and Nucleon-Nucleon Collisions"

report presented at the Intl. Conference on High Energy Physics, Geneva, 4-11 July 1962

Joint Inst. for Nuclear Research
Laboratory of Theoretical Physics, Dubna, 1962

BILEN'KIY, S.M.; RYNDIN, R.M.; SARANTSEVA, V.R., tekhn. red.

[Determining the spin of K*]Ob opredelenii spina K*. Dubna, Ob"edinennyi in-t iadernykh issl., 1962. 4 p. (MIRA 15:10)
(Mesons) (Nuclear spin)

BILEN'KIY, S.M.; RYNDIN, R.M.; ZARUBINA, I.S.[translator];
SARAITSEVA, V.R., tekhn. red.

On the production of "Soft" π mesons in pion-nucleon and nucleon-nucleon collisions. Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1962. 5 p.
(No subject heading)

S/056/62/043/006/041/067
B183/B102

AUTHORS: Bilen'kiy, S. M., Ryndin, R. M.

TITLE: Production of slow pions in pion-nucleon and nucleon-nucleon collisions

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 6(12), 1962, 2204 - 2207

TEXT: How invariance of the S matrix under time reversal affects the pion production in πN and NN collisions is studied for cases where the energy of the pions produced is negligibly small. Strictly, this study only holds for the limiting case where the four-momentum of the resulting meson vanishes. The conclusions drawn from the T-invariance requirement concerning the amplitudes of the process are investigated for each process involved. The production of slow π^0 mesons in the process $\pi + p \rightarrow \pi + p + \pi^0$ is studied first. Information on particle polarization is derived from the amplitude of this process. The polarization of recoil nucleons, for instance, is zero at all angles if the protons are unpolarized. The following holds for π^0 production in pp scattering: If both protons are

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Production of slow pions... S/056/62/043/006/041/067
B183/B102

unpolarized, polarization (ξ) occurs after the collision. If the incident proton is polarized (ξ_0), the π^0 production cross section $\sigma = \sigma_0[1 + (\xi_0 \xi)]$. The production of charged pions in processes of the type $\pi^{\pm} + N \rightarrow \pi^+ + \pi^- + N$ is studied in a similar manner.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: June 30, 1962

Card 2/2

S/056/63/044/001/054/067
B187/B102

AUTHORS: Bilen'kiy, S. M., Ryndin, R. M.

TITLE: Spin determination of the K^+-meson

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 1, 1963, 326-328

TEXT: When the K^+-meson had been detected (M. Alston, et al. Phys. Rev. Lett., 6, 300, 1961), and its mass 885 Mev and its isospin T = 1/2 determined, several methods were suggested for the determination of the spin of these elementary particles (e.g. M. Schwartz, Phys. Rev. Lett., 6, 556, 1961; D.O. Caldwell, Phys. Rev. Lett., 7, 259, 1961). In the present paper, a method is discussed for determining the spin of the K^+-meson (0 or 1). It is based on a study of the $(K,\bar{K}^*)$ or $(\bar{K},K^*)$ pair production on collision of electron-positron beams moving in opposite directions. N. Cabibbo and R. Gatto (Phys. Rev., 124, 1577, 1961) discussed the possibility of conducting such experiments. The matrix element of the process $e^+ + e^- \to \bar{K} + K^*$ $(K + \bar{K}^*)$ is studied in single-photon approximation. An estimation of the total pair production cross

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S/056/63/044/001/054/067
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Spin determination of the ...

section showed that K^0 has spin 1 if a peak exists in the spectrum of the K-meson (regardless of whether it is neutral or not). Studies by W. Chinowsky, G. Goldhaber et al. (Phys. Rev. Lett., 9, 330, 1962) also indicated that K^0 has spin 1. There is 1 figure.

ASSOCIATION: Ob"yedinennyy institut yaderaykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: August 4, 1962

Card 2/2

BILEN'KIY, S.M.; RYNDIN, R.M.

Relation between the total cross sections for the $1/2+1/2 \rightarrow 0+0$ reactions and the internal parities of particles. Zhur. eksp. i teor. fiz. 45 no.4:1192-1195 O '63. (MIRA 16:11)

1. Ob"yedinennyy institut yadernykh issledovaniy.

BILEN'KIY, S.M.; IAPIDUS, L.I.; RYNDIN, R.M.

Polarized proton target in experiments involving high-energy particles. Usp. fiz. nauk 84 no.2:243-301 O '64.
(MIRA 17:11)

BILEN'KIY, S. M.; NGUYEN VAN KH'YEU; RYNDIN, R. M.

Asymptotic relations between polarizations in crossed reactions. Zhur. eksp. i teor. fiz. 46 no. 3:1098-1105 Mr '64. (MIRA 17:5)

1. Ob"yedinennyy institut yadernykh issledovaniy.

L 16169-65 EWT(m)/T/EWA(m)-2 ESD(t)/ESD(gs)/SSD/AFWL/ASD(a)-5/AFETR

ACCESSION NR: AP5000369 S/0053/64/084/002/0243/0301

AUTHOR: Bilen'kiy, S. M.; Lapidus, L. I.; Ry*ndin, R. M.

TITLE: Polarized proton target in experiments with high energy particles

SOURCE: Uspekhi fizicheskikh nauk, v. 84, no. 2, 1964, 243-301

TOPIC TAGS: polarization, strong interaction, particle scattering, proton polarization, proton scattering, nucleon scattering, meson scattering, photoproduction, pi meson, k meson

ABSTRACT: The authors review the possible applications of polarized proton targets in high-energy physics. The possible additional data that can be extracted from such experiments are described, with emphasis on the possibility of reconstituting the elements of the scattering matrices of various elementary particle scattering processes. The analysis is based only on the general requirements of invariance under space rotation or reflection and under time reversal. The main theorems used in the study of polarization phenomena in strong interaction are deduced on the basis of these invariance requirements. The

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ACCESSION NR: AP5000369

section headings are: 1. Introduction. 2. The "polarization-asymmetry" relation in the case of polarization perpendicular to the reaction plane. The Bohr rule. 3. Symmetry principles and limitations on the form of the reaction amplitude. 4. Spin density matrix. 5. "Polarization-asymmetry" ratio in the case of arbitrary polarization directions. 6. Possible methods of determining the parities of strange particles in experiments with polarized targets. 7. Nucleon-nucleon scattering. 8. Meson-nucleon scattering. 9. Pion and kaon photoproduction. 10. Scattering of gamma quanta and electrons by nucleons. Orig. art. has: 4 figures, 265 formulas, and 2 tables.

ASSOCIATION: None

SUBMITTED: 00 ENCL: 00

SUB CODE: NP NR REF SOV: 028 OTHER: 057

Card 2/2

BILEN'KIY, S.M.; RYNDIN, R.M.

The $\bar{p} + p \rightarrow \bar{l} + l$ reaction with polarized particles. IAd. fiz. 1 no.1: 84-88 Ja '65. (MIRA 18:7)

1. Ob"yedinennyy institut yadernykh issledovaniy.

L 15155-66 EWT(m)/T

ACC NR: AP6000227 SOURCE CODE: UR/0056/65/049/005/1653/1663

AUTHORS: Bilen'kiy, S. M.; Lapidus, L. I.; Ryndin, R. M. 54 50 B

ORG: Joint Institute of Nuclear Research (Ob''yedinennyy institut yadernykh issledovaniy)

TITLE: Double NN scattering with a polarized beam and a polarized target 19,55

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 5, 1965, 1653-1663

TOPIC TAGS: nuclear scattering, scattering matrix, scattering cross section, light polarization, particle beam

ABSTRACT: The article discusses possible experiments involving the measurement of nucleon polarization arising as a result of scattering of a polarized beam by a polarized target. Measurement of such complicated polarization characteristics should help eliminate the ambiguities still remaining in phase-shift analysis and make it possible to determine for the first time the components of the third-rank polarization tensor. The structure of this tensor is analyzed and

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ACC NR: AP6000227 4

expressions are presented for its components and for the differential cross section for the scattering of an unpolarized beam by an unpolarized target. The polarization correlation is considered for the case of scattering of a polarized beam by an unpolarized target, or an unpolarized beam by a polarized target. The relations between the measured and calculated quantities are derived, and the question of reconstruction of the scattering matrix discussed. Authors are grateful to F. Legar and Z. Yanout for calculating the plots in the figure, and to Yu. M. Kazarinov and Ya. A. Smorodinskiy for useful discussions of the questions considered in the article. Orig. art. has: 1 figure and 55 formulas.

SUB CODE: 20/ SUBM DATE: 28Jun65/ ORIG REF: 006/ OTH REF: 011

Card 2/2 vmb

ACC NR: AP7011379 SOURCE CODE: UR/0367/66/004/005/1063/1066

AUTHOR: Bilen'kiy, S. M. -- Bilenky, S. M.; Lapidus, L. I.; Ryndin, R. M.; Shekhter, L. Sh.

ORG: Joint Institute for Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy)

TITLE: Isospin conservation and polarization effects

SOURCE: Yadernaya fizika, v. 4, no. 5, 1966, 1063-1066

TOPIC TAGS: electron spin, strong nuclear interaction, particle interaction

SUB CODE: 20

ABSTRACT: The reactions $a + a' \rightarrow b + b'$ are treated, where the particles a and a' (or b and b') belong to the same isotopic multiplet, and the total isotopic spin of the final (or initial) particles may take only one value. Relationships have been obtained between polarization characteristics of such reactions at the angles θ and $\pi - \theta$ (θ is the c.m.s. angle). These relationships are based only on isotopic invariance and invariance under rotations and reflections. Their experimental verification would be a detailed test of the isotopic invariance of strong interactions.

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0537 1223

ACC NR: AP7011379

Two of the authors (Bilen'kiy and Lapidus) thank G. M. Osetinskiy for useful discussion of the questions considered here. Orig. art. has: 24 formulas. [Based on authors' Eng. Abst.] [JPRS: 40,393]

Card 2/2

RYNDIN, Stanislav Dmitriyevich, kand. sel'khoz.nauk; BORODKINA, L.A., red.

[Fertilizers for orchards and soil micro-organisms] Udobrenie sadov i mikroorganizmy pochvy. Moskva, Rossel'khozizdat, 1964. 72 p. (MIRA 18:3)

ACC NR: AR7000942 SOURCE CODE: UR/0273/66/000/010/0037/0038

AUTHOR: Ryndin, V. V.

TITLE: Use of fabrics for filtering diesel fuel

SOURCE: Ref. zh. Dvigateli vnutrennego sgoraniya, Abs. 10.39.271

REF SOURCE: Tr. Gos. Vses. n.-i tekhnol. in-ta remonta i ekspluat. mash.-trakt. parka, no. 7, 1965(1966), 114-125

TOPIC TAGS: diesel fuel, filtration, impurity level, caprone

ABSTRACT: The most effective way of extending the service life of fine filters in diesel engines lays in the filtration of the fuel during the machine refueling. Fuel filled into tractor tanks should have an impurity level not exceeding 50 grams per ton. Fabrics are the most suitable material for filtration purposes. Among them, caprone has particularly valuable physicomechanical characteristics. The purification efficiency of a fine fabric can be increased by using it folded in several layers. Thick fabrics should not be used in folded form, since the fabric's resistance also increases proportionally to the number of layers while its purification efficiency

Card 1/2 UDC: 621.436-634.2:66.067.12

ACC NR: AR7000942

increases very little. The rate of increase in the fabric's hydraulic resistance during the filtration of impure fuel is directly related to the initial resistance, purification degree, fineness of filtration, and the concentration of mechanical impurities. A high smoothness and electrifiability of caprone fiber promote rapid separation of the sediment and helps in restoring the hydraulic permeability of the fabric. The nappy surface of cotton fabrics hampers the cleaning process. While caprone fabrics maintain their filtration efficiency after five uses, cotton fabrics can be used only 2—3 times. The art. 23008, caprone fabric with low hydraulic resistance and 92% purification efficiency, is highly recommended for the filtration of diesel fuels. Also, unwoven filter materials having low-hydraulic-resistance characteristics and a high purification efficiency may be used on a larger scale. A further investigation and search for the most efficient filtration fabrics for diesel fuels is necessary. [KP]

SUB CODE: 11, 21/

Card 2/2

OLEYNICHENKO, V.I.; RYNDIN, V.A.; MARKELOV, G.A., aspirant

Economic effectiveness of herbicides in winter wheat fields; from the practices used on the Lenin Collective Farm. Zashch. rast. ot vred. i bol. 4 no.2:10-12 Mr-Ap '59. (MIRA. 16:5)

1. Predsedatel' kolkhoza imeni Lenina Nevinnomysskiy rayon, Stavropol'skogo kraya,(for Oleynichenko). 2. Starshiy agronom kolkhoza imeni Lenina, Nevinnomysskiy rayon, Stavropol'skogo kraya, (for Ryndin). 3. Vsesoyuznyy institut zashchity rasteniy (for Markelov).

(Herbicides wheat)

IGOSHIN, S.G., inzh.; RYNDIN, V.P., inzh.

Suspended NKU-1 support setting equipment. Shakht.stroi. no.4:19-21 Ap '59. (MIRA 12:5)
(Mine timbering--Equipment and supplies)

RYNKIN, S.D., Cand Agr Sci -- (diss) "~~Ways~~ Methods of ~~application~~ administering of ~~the alimentary~~ food pellets and mixtures in ~~cul~~ the cultivation ~~growing~~ of wildings in the central zone of the RSFSR." Michurinsk, 1957, 24 pp with illustrations (Min of Agr USSR. Fruit and Vegetable Inst im I.V. Michurin) 100 copies (KL, 50-58, 127)

Country : USSR
CATEGORY :

ABS. JOUR. : RZBiol., No. 19, 1958, No. 87193

AUTH. : [illegible], L. D.
INST. : —
TITLE : Ways of Raising Output and Quality of Pomeceous Stock Plants

ORIG. PUB. : Sad i ogorod, 1957, No 8, 47-49

ABSTRACT : The experiments were conducted at the Institute of Orchard Growing (Michurinsk). Apple stock plants are best grown with the use application of an organo-mineral mixture which is placed in a furrow. The furrows are made by using a horse-drawn hiller at 70 cm from one another , which makes it possible to mechanize the cutting of furrows, application of mixture, and the digging up of stock plants. For pears it is best to grow stock plants in nutrient mixture pots, which eliminates picking-off, since 83-95% of the stock plants have branched roots. It is advantageous to plant 2-3 seeds in each pot, which increases the output by 37.3%. Stock plants grown in pots and with application of the mixture in

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N-8

COUNTRY : USSR
CATEGORY :

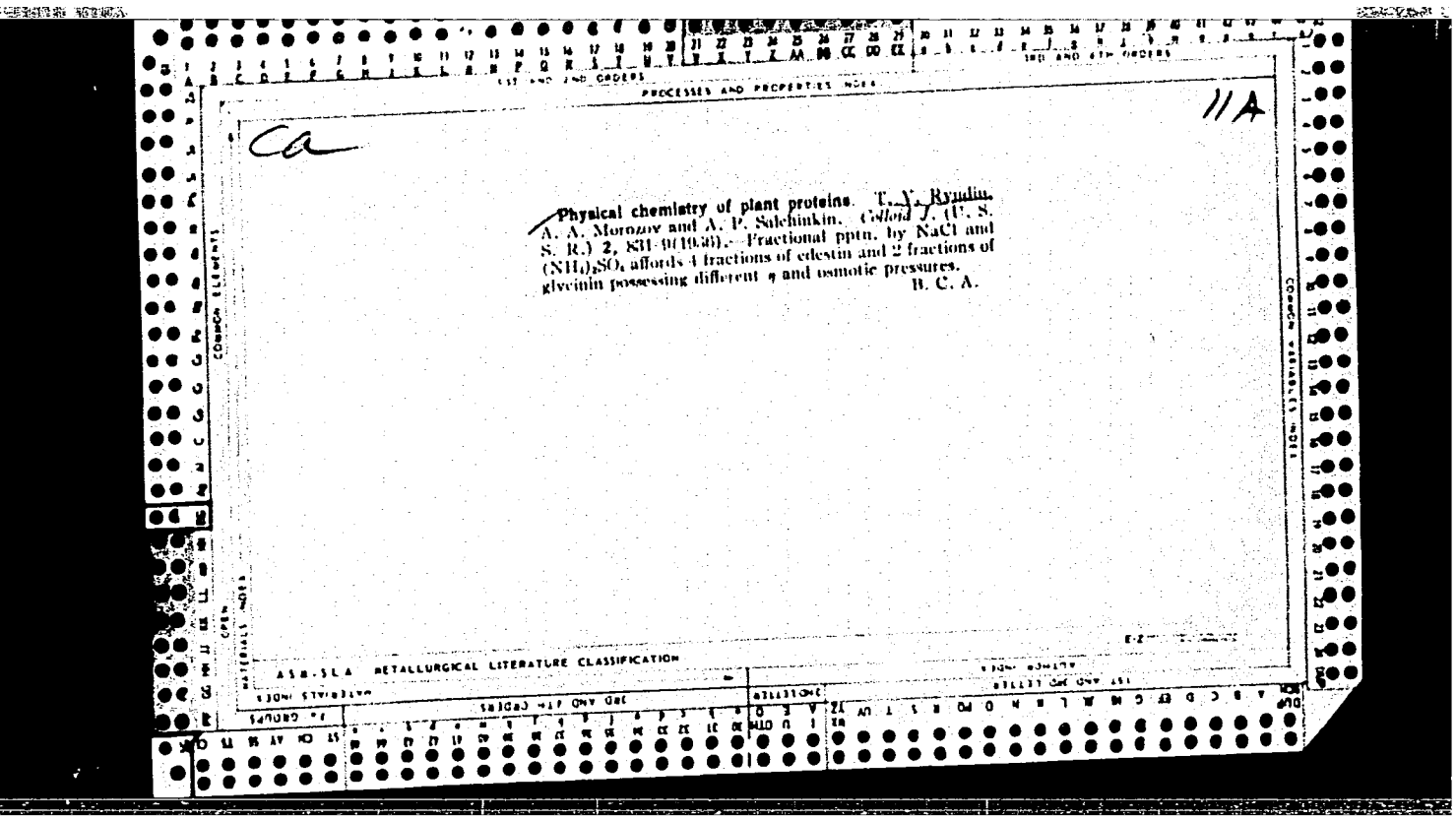
REF. JOUR. : RZBiol., No. 19, 1958, No. 87193

AUTHOR :
INST. :
TITLE :

ORIG. PUB. :

ABSTRACT : furrows, develop roots that are more frost-resistant. They become more readily adapted on transplanting in the field. Plants one year old, grown in pots were on the average 15 cm higher than those grown in the usual manner. -- V. V. Vastrebova.

CARD: 2/2

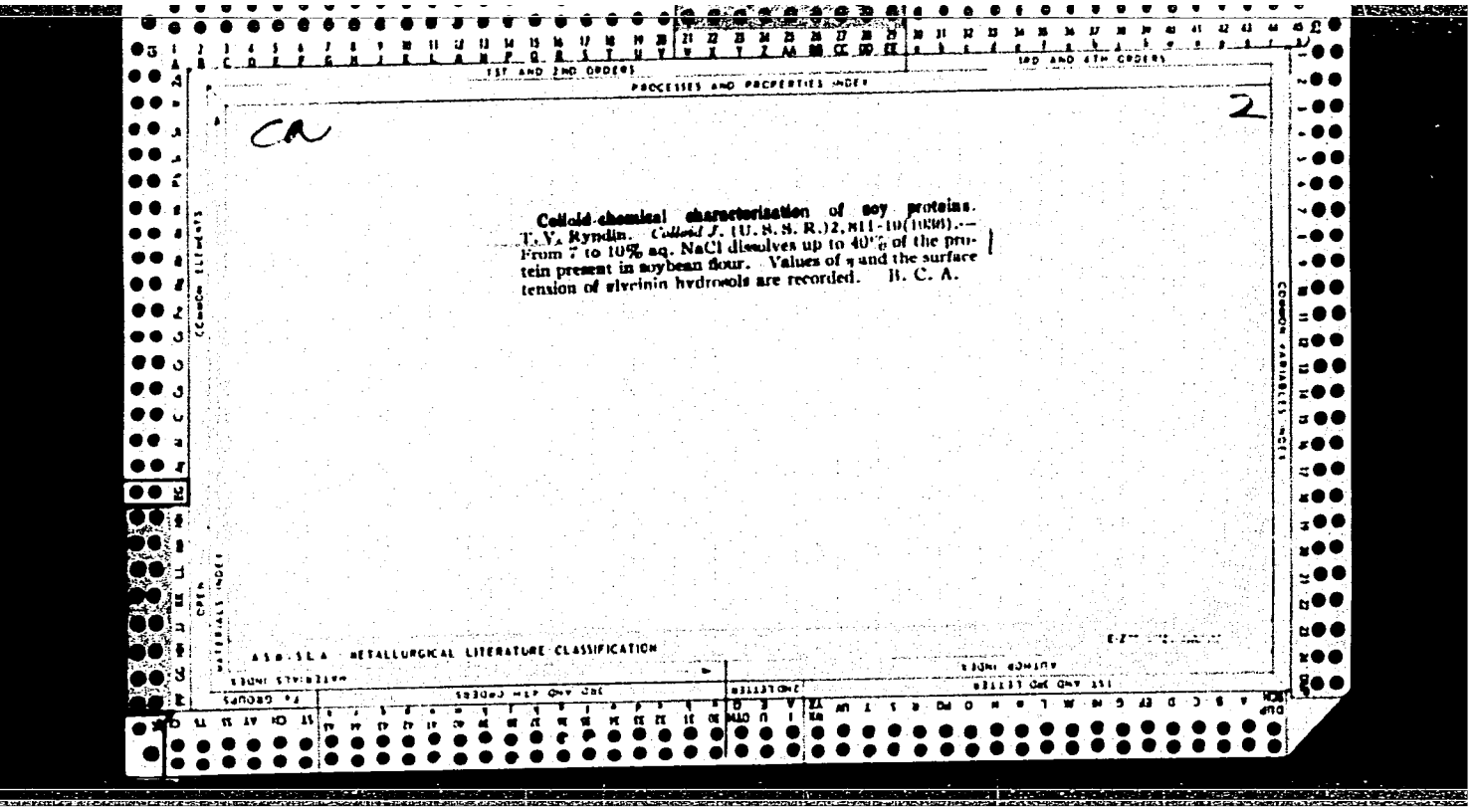


11A

Ca

Physical chemistry of plant proteins. T. V. Ryndin, A. A. Morozov and A. P. Salchinkin. *Colloid J.* (U. S. S. R.) **2**, 831-9(1936).—Fractional pptn. by NaCl and $(NH_4)_2SO_4$ affords 4 fractions of edestin and 2 fractions of glycinin possessing different η and osmotic pressures. B. C. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



PROCESSES AND PROPERTIES INDEX

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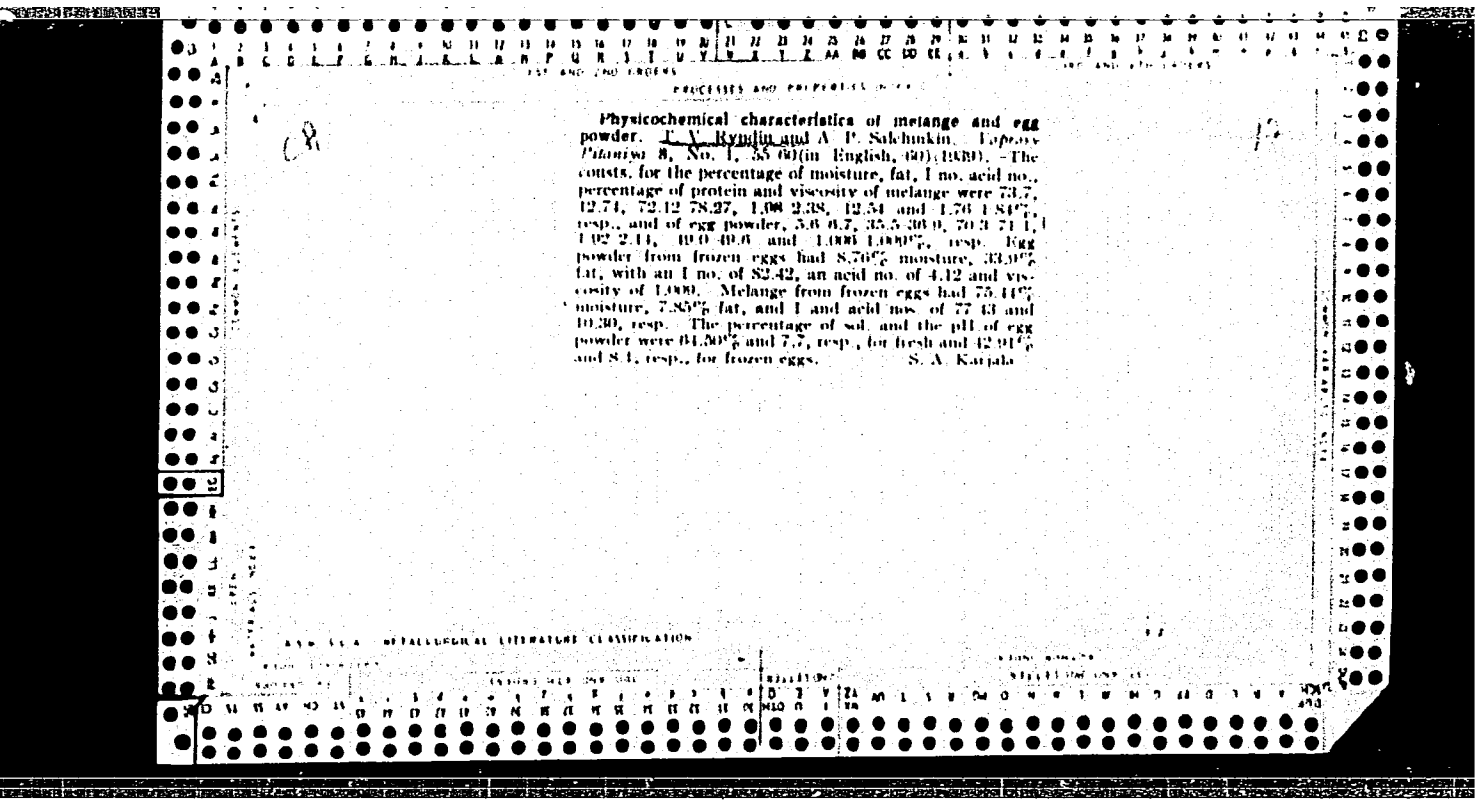
2

Colloid-chemical characterization of soy proteins. T. V. Ryndin. *Colloid J. (U.S.S.R.)* 2, 811-19(1936).—From 7 to 10% aq. NaCl dissolves up to 40% of the protein present in soybean flour. Values of η and the surface tension of glycinin hydrosols are recorded. B. C. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



Physicochemical characteristics of melange and egg powder. T. V. Ryndin and A. P. Sukhinkin. *Tsyplenok Ptitsevod.* 8, No. 1, 35-6(in English, 60)(1953). —The consts. for the percentage of moisture, fat, I no. acid no., percentage of protein and viscosity of melange were 73.7, 12.74, 72.12 78.27, 1.08 2.38, 12.54 and 1.76 1.84%, resp., and of egg powder, 5.6 6.7, 35.5 39.9, 70.3 71.1, 1.02 2.11, 49.0 49.6 and 1.085 1.089%, resp. Egg powder from frozen eggs had 8.76% moisture, 33.0% fat, with an I no. of 82.42, an acid no. of 4.12 and viscosity of 1.089. Melange from frozen eggs had 75.44% moisture, 7.85% fat, and I and acid nos. of 77.43 and 10.30, resp. The percentage of sol. and the pH of egg powder were 84.50% and 7.7, resp., for fresh and 42.91% and 8.4, resp., for frozen eggs. S. A. Karjala

LAZAREVICH, N.D., inzh.; RYNDIN, V.P., inzh.

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1. Nauchno-issledovatel'skiy institut stroitel'stva ugol'nykh i gornorudnykh predpriyatiy, Kemerovo.

MOROZOV, V.G., inzh.; RYNDIN, Yu.Yu., inzh.

Study of heat emission during boiling in annular channels and intertube space. Teploenergetika 11 no.7:64-67 Jl '64.
(MIRA 17:8)

1. Moskovskoye otdeleniye TSentral'nogo kotloturbinnogo instituta.

PEVZNER, L.M.; Prinimali uchastiye: IVANOVA, A.K.; PALIADIYEVA, M.V.; RYNDINA, A.A.; ROGOVSKIY, N.M., otv. red.; LYSYY, A., otv. za vypusk; MALEK, Z., tekhn. red.

[Excursions around Moscow, its suburbs and museums]Ekskursii po Moskva, prigorodam i muzeiam. Moskva, Profizdat, 1947. 103 p. (MIRA 15:12)

1. Vsesoyuznyy tsentral'nyy sovet professional'nykh soyuzov. Turistsko-ekskursionnoye upravleniye.
(Moscow--Guidebooks)

YEFIMOV, A.I.; BELORUKOVA, L.P.; RYNDINA, A.M.

Complex compounds of the $Me_2^1 MoCl_6$ type. Zhur.neorg.khim. 8 no.5:1168-1171 My '63. (MIRA 16:5)
(Molybdenum chlorides) (Alkali metal chlorides) (Thermal analysis)

RYNDINA, A.M., kand. med. nauk

Distortions in "vertical writing" in stimulation and diseases of the labyrinth. Vest. oto-rin. 25 no.4:68-72 Jl-Ag '63. (MIRA 17:1)

1. Iz kafedry bolezney ukha, nosa i gorla (zav. - chlen-korrespondent AMN SSSR prof. V.F. Undrits [deceased]) I Leningradskogo meditsinskogo instituta.

RYNDINA, A. M.

RYNDINA, A. M. --"Study of the Function of the Vestibular Analyzer with the Aid of a Dermal-Galvanic Reflex."* (Dissertation For Degrees In Science and Engineering Defended at USSR, Higher Educational Institutions). First Leningrad Med Inst imeni Academician I. P. Pavlov, Chair of Ear, Nasal, and Laryngeal Diseases, Leningrad, 1955

SO: Knizhnaya Letopis' No. 34, 20 August 1955

* For the Degree of Doctor of Medical Sciences

KUSHNIRUK, V.F.; RYNDINA, E.Z.; SOLOV'YEV, S.M.; CHUBURKOVA, I.I.

Usability of large-area semiconductor detectors for α-spectrometry. Atom. energ. 15 no.4:324 O '63. (MIRA 16:10)

MANOYLOV, S.Ye.; SHVEDOVA, V.N.; RYNDINA, I.L.

Use of ion exchange resins for producing trypsin. Bioknimiia 27 no.4:698-701 Jl-Ag '62. (MIRA 15:11)

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KARATAYEV, Nikolay Konstantinovich; RYNDINA, M.

[History of economic ideas (from the rise of Marxism to the Great October Revolution); a course of lectures] Istoriia ekonomicheskikh uchenii (ot vozniknoveniia marksizma do Velikoi Oktiabr'skoi revoliutsii); kurs lektsii. Moskva, Izd-vo sots.-ekon.lit-ry, 1961. 742 p. (MIRA 14:11)
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Ryndina, Mariya Nikolayevna

BAGRAMOV, Leon Aleksandrovich, kand. ekon. nauk,; BREGEL', Enokh Yakovlevich, doktor ekon. nauk,; DVORKIN, Il'ya Naumovich, doktor ekon. nauk,; RYNDINA, Mariya Nikolayevna, dots.; KHAFIZOV, Rafael' Khatynovich, kand. ekon. nauk,; KURINA, Ye. A., red.; BERLOV, A.P., tekhn. red.

[Criticism of present-day bourgeois economic theory; a collection] Kritika sovremennykh burzhuaznykh ekonomicheskikh teorii; sbornik. Moskva, Izd-vo "Znanie," 1958. 95 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser. 3, nos. 27/28/29). (MIRA 11:12)

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ABRAMOV, V.A.; ALEKSEYEV, A.M.; AL'TER, L.B.; ARAKELYAN, A.A.; BAKLANOV, G.I.; BASOVA, I.A.; BLYUMIN, I.G.; BOGOMOLOV, O.T.; BOR, M.Z.; BREGEL', E.Ya.; VEYTSMAN, N.R.; VIKENT'YEV, A.I.; GAL'TSOV, A.D.; GERTSOVSKAYA, B.R.; GLADKOV, I.A.; DVORKIN, I.N.; DRAGILEV, M.S.; YEFIMOV, A.N.; ZHAMIN, V.A.; ZHUK, I.N.; ZAMYATNIN, V.N.; IGNAT'YEV, D.I.; IL'IN, M.A.; IL'IN, S.S.; IOFFE, Ya.A.; KAYE, V.A.; KAMENITSER, S.Ye.; KATS, A.I.; KLIMOV, A.G.; KOZLOV, G.A.; KOLGANOV, M.V.; KONTOROVICH, V.G.; KRAYEV, M.A.; KRONROD, Ya.A.; LAKHMAN, I.L.; LIVANSKAYA, F.V.; LOGOVINSKAYA, R.L.; LYUBOSHITS, L.I.; MALYSH, A.I.; MENZHINSKIY, Ye.A.; MIKHAYLOVA, P.Ya.; MOISEYEV, M.I.; MOSKVIN, P.M.; NOTKIN, A.I.; PARTIGUL, S.P.; PERVUSHIN, S.P.; PETROV, A.I.; PETRUSHOV, A.M.; PODGORNOVA, V.M.; RABINOVICH, M.A.; RYVKIN, S.S.; RYNDINA, M.N.; SAKSAGANSKIY, T.D.; SAMSONOV, L.N.; SMEKHOV, B.M.; SOKOLIKHIN, S.I.; SOLLERTINSKAYA, Ye.I.; SUDARIKOV, A.A.; TATAR, S.K.; TERENT'YEV, P.V.; TYAGAY, Ye.Ya.; FEYGIN, Ya.G.; FIGURNOV, P.K.; FRUMKIN, A.B.; TSYRLIN, L.M.; SHAMBERG, V.M.; SHAPIRO, A.I.; SHCHENKOV, S.A.; EYDEL'MAN, B.I.; EKHIN, P.E.; MITROFANOVA, S., red.; TROYANOVSKAYA, N., tekhn.red.

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[Curriculum for the course "History of economic theory"; for economic institutions of higher learning and faculties] Programma kursa "Istoriia ekonomicheskikh uchenii" dlia ekonomicheskikh vysshikh uchebnykh zavedenii i fakul'tetov. Moskva, Izd-vo sotsial'no-ekon.lit-ry, 1960. 48 p.

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1. Russia (1923- U.S.S.R.) Upravleniye prepodavaniya obshchestvennykh nauk. 2. Komissiya Upravleniya prepodavaniya obshchestvennykh nauk Ministerstva vysshego i srednego spetsial'nogo obrazovaniya SSSR (for all, except Bakovetskiy, Chigina).
(Economics--Study and teaching)

RYNDINA, Mariya Nikolayevna; VORONINA, N.V., red.; NAUMOV, K.M., tekhn.red.

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(Economics)

TOKMALAYEV, S.F., dotsent [deceased]; KUZHELEV, N.S., dotsent; OSTROVITYANOV, K.V., akademik; ALEKSEYEV, A.M., dotsent; KUDROV, V.M.; LEONT'YEV, L.A. Prinimali uchastiye: BELYAYEVA, Z.N., kand.ekon. nauk; MRACHKOVSKAYA, I.M., kand.ekonom.nauk; RYNDINA, M.N., kand.ekonom.nauk; SHIRINSKIY, I.D., kand.ekonom.nauk; red.; YUMASHEV, A.I., kand.ekonom.nauk; PROKOP'YEV, S.P., red.; NAUMOV, K.M., tekhn.red.

[Capitalist production method] Kapitalisticheskii sposob proizvodstva. Moskva. Pt.2. 1960. 357 p. (MIRA 13:10)

1. Kommunisticheskaya partiya Sovetskogo Soyuza. Vysshaya partiynaya shkola. 2. Chlen-korrespondent Akademii nauk SSSR (for Leont'yev).

(Economics)

AL'TER, L.B., doktor ekon. nauk; BLYUMIN, I.G., doktor ekon. nauk [deceased]; KARATAYEV, N.K., prof.; REUEL', A.L., doktor ekon. nauk; STEPANOV, I.G., doktor ekon. nauk; SHTEYN, V.M., doktor ekon. nauk; POLYANSKIY, F.Ya., doktorist. nauk; BOBKOV, K.I., kand. ekon. nauk; VASILEVSKIY, Ye.G., kand. ekon. nauk; MOROZOV, F.M., kand. ekon. nauk; PONOMAREV, Ye.I., kand. ekon. nauk; RYNDINA, M.N., kand. ekon. nauk; FIRSOVA, S.M., kand. ekon. nauk; TSAGA, V.F., kand. ekon. nauk; ZHUK, I., red.; VOSKRESENSKAYA, T., red.; NEZNANOV, V., red.; ULANOVA, L., tekhn. red.

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RYNDINA, T.I., agronom (Serpukhovskiy rayon)

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(Weed control)

RYNDINA, T.I.

Practices in the use of fertilizers and herbicides for vegetable crops on the "Bol'shevik" State Farm. Izv. TSKHA no.1:131-135 '64. (MIRA 17:4)

1. Zaveduyushchaya agrokhimicheskoy laboratoriyey sovkhoza "Bol'shevik", Moskovskoy oblasti.

1. KOROSTINA, A.: RYNDINA, V.

2. USSR (600)

4. Pepsin

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RYNDINA V.

BELEN'KIY, N., akademik; KUZENKO, Ye.; POZHARSKAYA, L., kandidat biologicheskikh nauk; RYNDINA, V.

Separating blood plasma in medium and small meat combines. Mias. ind.SSSR. 27 no.2:10-11 '56. (MLRA 9:8)
(BLOOD PLASMA) (SEPARATORS (MACHINERY))

KUKHARKOVA, L.L., starshiy nauchnyy sotrudnik; LAVROVA, L.P., kand. tekhn. nauk; SOLOV'YEV, V.I., kand. khim. nauk; FREYDLIN, Ye.M., kand. veter. nauk; PEROVA, P.V., kand. veter. nauk; SADIKOVA, I.A., kand. biol. nauk; KRYLOVA, V.V., starshiy nauchnyy sotrudnik; BUSHKOVA, L.A., starshiy nauchnyy sotrudnik; RYNDINA, V.P., starshiy nauchnyy sotrudnik; TRUDOLYUBOVA, G.B., starshiy nauchnyy sotrudnik; KARGAL'TSEV, I.I., assistent; MIKHAYLOVA, A.Ye., mladshiy nauchnyy sotrudnik; KARPOVA, V.I., mladshiy nauchnyy sotrudnik; POLETAYEV, T.N., mladshiy nauchnyy sotrudnik; MERKULOVA, V.K., mladshiy nauchnyy sotrudnik

Directed use of microorganisms for the improvement of the quality of sausage products. Report No. 1. Trudy VNIIMP no.16: 64-75 '64. (MIRA 18:11)

1. Kafedra tekhnologii Moskovskogo tekhnologicheskogo instituta myasnoy i molochnoy promyshlennosti (for Kargal'tsev).

LAVROVA, A.P., kand. tekhn. nauk; GNOYEVOY, P.S., inzh.; KALENOVA, M.S., starshiy nauchnyy sotrudnik; GUSEVA, A.N., mladshiy nauchnyy sotrudnik; MOROZOVA, L.I., mladshiy nauchnyy sotrudnik; KHARITONOV, V.A., inzh.; KANAREVSKIY, A.A., inzh.; MAZYAKIN, A.V., inzh.; LISHFAY, V.M., inzh.; IL'YASHENKO, M.A., kand. veter. nauk; RYNDINA, V.P., inzh.; LOGINOVA, M.M., mladshiy nauchnyy sotrudnik; CHUDINA, S.A., mladshiy nauchnyy sotrudnik; TRUDOLYUBOVA, G.B., starshiy nauchnyy sotrudnik; KARGAL'TSEV, I.I., assistent; MIKHAYLOVA, A.Ye., mladshiy nauchnyy sotrudnik; KARPOVA, V.I., mladshiy nauchnyy sotrudnik; MERKULOVA, V.K., mladshiy nauchnyy sotrudnik; POLETAYEV, T.N., mladshiy nauchnyy sotrudnik

Study of the heat treatment conditions of smoked and cooked sausage. Trudy VNIIMP no.16:24-63 '64. (MIRA 18:11)

1. Kafedra tekhnologii Moskovskogo tekhnologicheskogo instituta myasnoy i molochnoy promyshlennosti (for Kargal'tsev).

KUKHARKOVA, L.L., starshiy nauchnyy sotrudnik; LAVROVA, L.P., kand. tekhn. nauk; SOLOV'YEV, V.I., kand. khim. nauk; FREYDLIN, Ye.M., kand. veter. nauk; PEROVA, P.V., kand. veter. nauk; SADIKOVA, I.A., kand. biol. nauk; KRYLOVA, V.V., starshiy nauchnyy sotrudnik; BUSHKOVA, L.A., starshiy nauchnyy sotrudnik; RYNDINA, V.P., starshiy nauchnyy sotrudnik

Directed use of microorganisms for the improvement of the quality of sausage products. Report No. 2. Trudy VNIIMP no.16: 76-109 '64. (MIRA 18:11)

KASAVINA, B.S.; LAUFER, A.L.; POZHARITYSKAYA, L.S.; RYNDINA, V.P.

Occurrence of collagenase in animal tissues. Dokl. AN SSSR 142 no.3:706-708 Ja '62. (MIRA 15:1)

1. TSentral'nyy institut travmatologii i ortopedii i Vsesoyuznyy nauchno-issledovatel'skiy institut myasnoy promyshlennosti. Predstavleno akademikom A.I.Oparinym.

(COLLAGENASE)

RYNDINA, V.V.

Completeness of systems of analytic functions composed of solutions to second-order differential equations. Dokl. AN SSSR 143 no.2:282-285 Mr '62. (MIRA 15:3)

1. Matematicheskiy institut im. V.A.Steklova AN SSSR. Predstavleno akademikom I.M.Vinogradovym.
(Functions, Analytic)
(Differential equations)

RYNDINA, V.V.

Approximation by Laguerre polynomials in a comples region. Izv. AN SSSR. Ser. mat. 26 no.1:143-160 Ja-F '62. (MIRA 15:2)
(Polynomials)

33630
S/038/62/026/001/003/003
B112/B108

16.3000

AUTHOR: Ryndina, V. V.

TITLE: Approximation by Laguerre polynomials in the complex domain

PERIODICAL: Akadimiya nauk SSSR. Izvestiya seriya Matematicheskaya, v. 26, no. 1, 1962, 143-160

TEXT: A domain of completeness of the Laguerre polynomial system $\left\{L_{n_j}^{(\alpha)}(z)\right\}$ with $\lim_{j\to\infty}(j/\sqrt{n_j}) = \tau < \infty$ is determined, and sequences of linear aggregates

$$\sum_{j=1}^{p_n} \alpha_j^{(n)} L_{n_j}^{(\alpha)}(z) \qquad (n = 1,2,\ldots)$$

are investigated under the assumption that they converge in a domain which is not the domain of completeness of the system $\left\{L_{n_j}^{(\alpha)}(z)\right\}$. The domain of

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Approximation by Laguerre...

completeness of the system $\left\{L_{n_j}^{(\alpha)}(z)\right\}$ is found to be a parabolic region whose focus is the origin and whose vertex is the point $\pi^2\tau^2/4$ of the real axis (the interval $[0,\pi^2\tau^2/4]$ is excepted). A. F. Leont'yev (Doklady Ak. nauk SSSR, 126, No. 5 (1959), 939-942, Trudy Matem. in-ta im. V. A. Steklova Ak. nauk SSSR, XXXIX, 1951), Yu. A. Kaz'min (Vestn. MGU, No. 2 (1960), 3-9), and B. Ya. Levin (Raspredeleniye korney tselykh funktsiy - Distribution of the roots of integral functions, M., GITTL, 1956) are referred to. A. F. Leont'yev is thanked for advice. There are 9 references: 8 Soviet and 1 non-Soviet.

SUBMITTED: July 4, 1960

Card 2/2

35722
S/020/62/143/002/004/022
B112/B108

16.3400

AUTHOR: Ryndina, V. V.

TITLE: Completeness of systems of analytic functions composed of the solutions of second-order differential equations

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 2, 1962, 282-285

TEXT: For given sequences of positive numbers λ_n with $\lim_{n\to\infty}(n/\lambda_n) < \infty$, the system $\{y(\lambda_n, z)\}$ of solutions of the initial value problem

$$P_0(z)y'' + P_1(z)y' + P_2(z)y = \lambda^2 y,$$
$$y(\lambda, z_0) = \gamma_0(\lambda),\ y'(\lambda, z_0) = \gamma_1(\lambda)$$

is shown to be complete in a certain domain E^*. In addition, it is demonstrated that a certain sequence of linear combinations

$$q_n(z) = \sum_{j=1}^{q_n} \alpha_j^{(n)} y(\lambda_j, z)$$

Card 1/2

Completeness of systems of...

converges uniformely in a domain g. There are 5 Soviet references.

ASSOCIATION: Matematicheskiy institut im. V. A. Steklova Akademii nauk SSSR (Mathematical Institute imeni V. A. Steklov of the Academy of Sciences USSR)

PRESENTED: October 31, 1961, by I. M. Vinogradov, Academician

SUBMITTED: October 23, 1961

Card 2/2

KYSHIMA, Ye. K.

Balmer decrement in spectra of planetary nebulae. Uch.zap. GU no.190:18-29 '57. (MLRA 10:7)

(Nebulae--Spectra)

RYNDOVA, A.

Be proud of your occupation. Mast. ugl. 5 no.8:7 Ag '56.
(MLRA 9:11)

1. Mashinist pod"yema shakhty "Krasnaya gornyachka" kombinata Chelyabinskugol'.
(Coal mines and mining)