

YEMEL'YANOV, A.A.; ROZENTAL', I.I.

Role of nucleons in multiple particle production processes. Zhur.
eksp. i teor. fiz. 33 no.3:808-809 S '57. (MLBA 10:11)

1. Fizicheskiy institut im. P.N. Lebedeva AN SSSR.
(Particles, Elementary)

Кочетков, И. А.

AUTHOR: MILEKHIN, G.A., ROZENTAL', I.L. 56-7-28/66
TITLE: Hydrodynamical Interpretation of a Characteristic of Large Showers Recorded in Photographic Emulsions. (Gidrodinamicheskaya interpretatsiya odnoy kharakteristiki bolshikh livney, zaregistrirovannykh v fotoemul'sii., Russian)
PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 33, Nr 7, pp 197-199 (U.S.S.R.)
ABSTRACT: The experimental distribution of the transverse components of the momenta of secondary particles is compared with the predictions of the hydrodynamic theory of the multiple formation of particles. It was shown that the conclusions of the onedimensional variety of this theory agree well with experimental data if a final temperature of $T_E = mc^2/k$ (m = mass of the π -meson) is assumed. This agreement makes it possible to make statements concerning the character of $\mathcal{N} - \pi$ -interaction. (With 1 Illustration and 5 Slavic References).
ASSOCIATION: Physical Institute "P.N.LEBEDEV" of the Academy of Sciences of the U.S.S.R. (Fizicheskiy institut im. P.N.Lebedeva Akademii nauk SSSR)
PRESENTED BY:
SUBMITTED: 11.1.1957
AVAILABLE: Library of Congress
Card 1/1

AUTHOR: BELEN'KIY, S.Z., MAKSIMENKO, V.M., NIKISHOV, A.I., 53-2-1/9
ROZENTAI, I.L.

TITLE: Statistical Theory of the Multiple Production of Particles.
(Statisticheskaya teoriya mnozhestvennogo obrasovaniya
chastits, Russian)

PERIODICAL: Uspekhi Fiz. Nauk, 1957, Vol 62, Nr 2, pp 1 - 36 (U.S.S.R.)

ABSTRACT: Lately, the fact that on the occasion of the collision of two
high-energy particles always several mesons are produced, has
been more and more experimentally confirmed. A logical inter-
pretation of the phenomenon is lacking. The various experiments
to set up a theory of multiple production of particles are based
upon more or less good fundamental conditions, the accuracy of
which can be confirmed only theoretically.

A theory promising a special success was proposed by FERMI, who,
includes the statistical course in his theory. In the present
paper this theory is derived, explained, and extended.

The following individual problems are solved theoretically:

- 1) Interaction between particles. Selection of the "volume".
- 2) Isotopic spin, equality of particles, distribution of the
charge states.
- 3) The phase-"volume"

Card 1/2

GEIGOROV, N.I.; KOZOV, Ya.S.; ROZENTAL', I.L.

Origin of high-energy pions, muons, and protons. Izv. AN
USSR. Ser. fiz. 26 no.11:1815-1820 N '64. (MIRA 17:12)

1. Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo
gosudarstvennogo universiteta i Moskovskiy inzhenerno-fizicheskiy
institut.

KOIOV, Yu.D., ROZENTAL, I.I.

Accuracy of computations of energy losses by fast neutrons.

Izv. AN SSSR. Ser. fiz. 28 no.11:1866-1869 N '64.

(MIRA 27:12)

1. Moskovskiy inzhenerno-fizicheskiy institut.

L 0034/-0/ EW/UM/ GP

ACC NR: AT6032306

SOURCE CODE: UR/0000/66/000/000/0059/0068

AUTHOR: Borog, V. V.; Kirillov-Ugryumov, V. G.; Petrukhin, A. A.; Rozental', I. L.; Shestakov, V. V.

ORG: none

55
13+1

TITLE: Ionization calorimeter for the investigation of high energy cosmic muons at large zenith angles

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Fizika elementarnykh chastits (Physics of elementary particles). Moscow, Atomizdat, 1966, 59-68

TOPIC TAGS: muon, calorimeter, bremsstrahlung, cosmic ray measurement, angular distribution, ionization chamber, waveguide

ABSTRACT: A study of high energy muons, using the horizontal flux zenith angles $\geq 60^\circ$ of cosmic rays at sea level was made and an ionization calorimeter developed for this purpose is described. Such a study is feasible because the horizontal flux at large zenith angles θ consist almost exclusively of muons and the intensity of muons for energies $>10^{11}$ ev increases with θ . The apparatus uses muon flux to study high energy muon interactions with matter and measures the characteristics of the horizontal muon flux to determine the angular and energy distributions. The ionization calorimeter enables one to study both of these areas by observing the showers produced by the muons due primarily to bremsstrahlung and nuclear interactions. It detects muons

Card 1/2

ACC NR: AP7007080

SOURCE CODE: UR/0048/66/039/010/1669/1673

AUTHOR: Borog, V. V.; Kirillov-Ugryumov, V. G.; Petrukhin, A. A.;
Rozental', I. L.; Shestakov, V. V.

ORG: none

TITLE: Study of the energy spectrum of cosmic-ray muons on the basis of
electron-photon showers [Paper presented at the All-Union Conference on Cosmic
Radiation Physics, Moscow, 15-20 Nov 1965]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 10, 1966,
1669-1673

TOPIC TAGS: calorimeter, cosmic ray, muon

SUB CODE: 20

ABSTRACT: At present, outer space is the only accelerator of particles with
superhigh energies. The energy spectrum of electromagnetic cascades produced by
superhigh-energy muons ($E_{\mu} \gg 10^{11}$ ev) impinging at angles $\geq 55^{\circ}$ was studied
at sea level on an ionization calorimeter consisting of six rows of Ar-filled
ionization chambers, 25 in each row, with an iron interlayer between the cham-
bers acting as an absorber. The majority of the cascades recorded were due to
the interaction of muons with the absorber. A small number of showers ($< 1\%$)
was produced by nucleus-reactive particles. The energy spectrum of the muons
was determined on the basis of the recorded showers due to high-energy photons
and electrons formed by interaction of the muons with atoms of the absorber.
Mathematical equations expressing the experimentally determined energy spectrum

The authors thank G. G. Bunatyan for help in carrying out the numerical compu-
tations on the ETsVM. Orig. art. has: 4 figures and 6 formulas. [JPRS: 39,658]

Card 1/1

ACC NR: A07007078

SOURCE CODE: UR/0048/66/030/010/1662/1665

AUTHOR: Bezus, V. A.; Gedovanishvili, L. D.; Kazarov, R. Ye.; Kirillov-Ugryumov, V. G.; Kotov, Yu. D.; Kuridze, R. V.; Rozental', I. L.; Sakvarelidze, I. I.

ORG: Institute of Physics, AN GruzSSR (Institut fiziki AN GruzSSR); Moscow Engineering Physics Institute (MOSkoviskiy inzhenerno-fizicheskij institut); Tbilisi State University (Tbilisskiy gosudarstvennyy universitet)

TITLE: Study of high-energy muons at a complex installation [Paper presented at the All-Union Conference on Cosmic Radiation Physics, Moscow, 15-20 Nov 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 10, 1966, 1662-1665

TOPIC TAGS: muon, cosmic radiation, calorimeter

SUB CODE: 20

ABSTRACT: A study of high-energy cosmic radiation muons was carried out at an installation consisting of an ionization calorimeter located in a tunnel at a depth of 130 m from the surface and five groups of hodoscopic counters on the surface which recorded showers accompanying the muons. The experimentally determined ionization burst spectrum of the muons could be described by the equation $T(>k) = T_0 k^{-\gamma}$, where k is the magnitude of the burst expressed in an equivalent number of relativistic particles. γ was 2.0 at $k = 1000-4000$, which corresponded to $\gamma = 2.5$ for the vertical flux of muons. The principal contribution to the bursts recorded was made by muons with a energy of 3×10^{11}

Card 1/2

ACC NR: AP3007078

$\sim 2 \times 10^{12}$ ev. At a projection angle $\leq 70^\circ$, at which no more than two adjacent ionization chambers in the six vertically arranged rows in the ionization calorimeter operated, γ was 2.2. During 765 hours of operations, corresponding to 1100 recorded bursts, the latter were accompanied by broad showers

($N_e = 5 \times 10^4 - 5 \times 10^5$) in nine cases. From a statistical standpoint, this result was insufficient for definite conclusions with regard to the correlation between muons and showers. The authors thank E. L. Andronikashvili and G. Ye. Chikovani for their interest and discussions, which greatly helped in the research. Orig. art. has: 4 figures and 1 formula. (JPRS: 39,658)

Card 2/2

ACC NR: AP6019593

SOURCE CODE: UR/0293/66/004/003/0404/0407

AUTHOR: Rozental', I. L.

ORG: none

TITLE: Subcosmic electrons

SOURCE: Kosmicheskiye issledovaniya, v. 4, no. 3, 1966, 404-407

TOPIC TAGS: primary cosmic radiation, artificial satellite, cosmic rocket, cosmic ray, primary proton, photon, bremsstrahlung, supernova, radiation belt

ABSTRACT: Investigation of primary cosmic radiation has been initiated, using artificial satellites and cosmic rockets, resulting in the discovery of cosmic and galactic x-rays. A natural mechanism consisting of the appearance of a large number of electrons with energies from 0.01—10 Mev is assumed in the form of δ -electron formation by fast cosmic-ray protons. Formulas are developed for the probability of δ -electron formation by photons and for the differential spectrum of primary protons. The probability of δ -electron formation is great compared with the formation of electrons at $\pi \rightarrow \mu + e$ decomposition. The probability of bremsstrahlung of a photon with the energy w emitted

Card 1/2

UDC: 532.165:537.591

79
77
B

ACC NR: AP6019593

2

by an electron is assumed to be $\frac{8 \cdot 10^{-3}}{w}$. The flux of bremsstrahlung photons caused by the δ process of nucleons with energies > 500 Mev is equal to 10^{-3} quanta/cm² · sec · sterad. Although this flux is very small compared with that observed, it is nearer to the real flux than the fluxes obtained by other mechanical models. The total energy of cosmic radiation, as well as of radiative sources and the Galaxy is greater than that found by the authors. Under such conditions, it is difficult to consider supernovae as the basic source of cosmic rays. The δ process plays some role in the formation of slow electrons in the radiation belts. The author expresses his gratitude to N. L. Grigorov and S. I. Syrovatskiy for their discussions. Orig. art. has: 15 formulas. [EG]

SUB CODE: 04/ SUBM DATE: 17Aug65/ ORIG REF: 002/ OTH REF: 003/
ATD PRESS: 5020

Card 2/2

90

L 32032-66 EWT(1)/EWT(m)/FCC/T IJP(c) GW

ACC NR: AP6020644

SOURCE CODE: UR/0033/65/043/002/0332/0339

AUTHOR: Rozenthal, I. L.

ORG: Moscow Engineering Physics Institute (Moskovskiy inzhenerno-fizicheskiy institut)

TITLE: Energy balance of cosmic rays

SOURCE: Astronomicheskij zhurnal, v. 43, no. 2, 1966, 332-339

TOPIC TAGS: cosmic ray, cosmic ray particle, ionization, electron energy, secondary electron, x ray, photon, galaxy

ABSTRACT: An analysis has been made of the channels for dissipation of the energy of the nuclear and electron components of cosmic rays in the Galaxy and Metagalaxy. This paper considers the specific forms of transfer of energy expended on ionization. In the last analysis the ionization energy consists of the energy of slow electrons (~ 10-100 eV). Most (~75%) of the energy of slow electrons is expended on the excitation of interstellar hydrogen (for the most part the transition $1s-2p$, which then is luminescent). The author formulates the problem of the subsequent fate of the ultraviolet. Some part of the energy is expended on the formation of decelerating photons by slow secondary electrons. A relatively greater part of the energy in this intermediate mechanism is expended on the formation of X-rays. The author expresses gratitude to L. A. Vayshteyn, V. L. Ginzburg, S. G. Pikel'ner and S. I. Syrovatskiy for useful discussions. Orig. art. has: 4 tables and 20 formulas. [JPRS]

SUB CODE: 04, 03, 20 / SUBM DATE: 22Nov65 / ORIG REF: 013 / OTH REF: 001
Card 1/1 90 UDC: 523.165

71
B

L 4472-65 EWI(1)/EWI(m)/FCC/T/EWA(h) IJP(c) GW

ACC NR: AP5024652

SOURCE CODE: UR/0048/65/029/009/1751/1753

AUTHOR: Rozental', I.L.; Shestakov, V.V.

25
03

ORG: none

TITLE: Some remarks on cosmic ray energy spectra /Report, All-Union Conference on Cosmic Ray Physics held at Apatity 24-31 August 1964/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 9, 1965, 1751-1753

TOPIC TAGS: cosmic ray particle, spectral energy distribution, error, mathematic method

17

ABSTRACT: This paper is concerned with the errors in the experimentally determined power law spectra of cosmic ray particles due to statistical errors in the measurement of the energies of individual particles. The experimental energy spectrum $F'(E')$ is given in terms of the true spectrum $F(E)$ by $F'(E') = \int F(E) dE P(E, E')$, where $P(E, E')$ is the probability of finding the value E' for the energy of a particle whose true energy is E . The experimental spectrum $F'(E')$ corresponding to a true spectrum of the form $F(E) = AE^{-(\gamma+1)}$ is calculated with several different assumptions concerning the functions P , and in some cases formulas are derived for calculating the true spectrum from the experimental spectrum. The cases discussed include that in which P is constant when $(E - E')^2 < a^2$ and vanishes otherwise, and those in which $E - E'$ is Gaus-

Card 1/2

09010386

L 4472-66

ACC NR: AP5024652

sianly distributed with a dispersion that depends in certain different ways on E. According to Landau's hydrodynamic theory of multiple production, the function P for the usual method of determining the energies of nuclear-active particles represents a Gaussian distribution of $\log E - \log E'$ with a dispersion that depends on the multiplicity. It is shown that in this case an experimental value of the spectrum index γ as large as 3.5 may be found if the true value is 1.8. The proper choice of the energy intervals over which to average the data is discussed briefly. When determining the spectral index γ one should employ the method of maximum likelihood and not that of least squares. Orig. art. has: 19 formulas.

SUB CODE: NP/ SUBM DATE: 00/ ORIG REF: 005/ OTH REF: 002

PC
Card 2/2

ROZENTAL', I.L.

"Origin of cosmic rays" by V.L. Ginzburg, S.I. Syrovatskii.
Reviewed by I.L. Rozental'. Usp. fiz. nauk 82 no.1:169-170
Ja'64. (MIRA 17:2)

KOTOV, Yu. D.; PETRUKHIN, A. A.; ROZENTAL, I. L.

Some problems due to the angular distribution of cosmic ray muons under thick filters.

Report submitted for the 8th Intl. Conf. on Cosmic Rays (IUPAP), Jaipur, India, 2-14 Dec 1963

TRILOROV, N. L.; KOTOV, Yu. D.; ROZENTAL, I. L.

On the origin of High Energy Pions, Muons and Photons

Report submitted for the 8th Intl. Conf. on Cosmic Rays (IUPAP), Jaipur, India,

2-14 Dec 1963

PETRUKHIN, A.A.; ROZENTAL', I.L.

Angular distribution of cosmic ray muons under thick filters.
Zhur.eksp.i teor.fiz. 44 no.5:1618-1621 My '63. (MIRA 16:6)

1. Moskovskiy inzhenerno-fizicheskiy institut.
(Cosmic rays) (Mesons)

S/053/63/079/003/003/003
B117/B186

AUTHORS: Birger, N. G., Mikhaylov, V. D., Rozental', I.L., Sarycheva, L. I.

TITLE: Strong interactions at high energies

PERIODICAL: Uspekhi fizicheskikh nauk, v. 79, no. 3, 1963, 523 - 544

TEXT: In this survey of papers by western and Soviet authors, published from 1949 through 1962, experimental data on the interaction of high-energy particles are compared with the theory. The following problems are handled: (1) Main theoretical results; (a) polar approximation; (b) method of complex orbital momenta; (c) relationship between the cross sections (nuclear cross sections); theorem of Pomeranchuk (I. Ya. Pomeranchuk, ZhETF 34, 725 (1958)). (2) Interaction cross section of pions and nucleons of energies of 2 to 28 Bev with nucleons; (a) total interaction cross section of particles and antiparticles with protons; (b) elastic scattering of protons and pions. (3) Interaction cross section of high-energy pions and nucleons with atomic nuclei; (a) particularities in the measurement of the interaction cross sections of cosmic particles; (b)

Card 1/2

Strong interactions at ...

S/053/63/079/003/003/003
B117/B186

determination of the interaction cross sections in air which is based on the measurement of the absorption of the nucleon component; (c) determination of the interaction cross sections of particles of ultra high energy, $> 10^4$ Bev. There are 12 figures, 5 tables, and 83 references.

Card 2/2

L 10211-63

EPF(n)-2/EWT(m)/BDS/ES(b)--AFFTC/

ASD/APGC/SSD--Pu-4--AR/K
ACCESSION NR: AP3000058

S/0056/63/044/005/1618/1621

AUTHOR: Petrukhin, A. A.; Rozental', I. I.

63

TITLE: Angular distribution of cosmic ray muons under thick absorbers.

SOURCE: Zhurnal eksper. i teoret. fiziki, v. 44, no. 5, 1963, 1618-1621

TOPIC TAGS: cosmic-ray muons, underground angular distribution

ABSTRACT: The angular distribution of cosmic-ray muons under thick layers or rock is calculated. A general formula is first deduced for the angular distribution at large depths, and the error due to fluctuations in the energy loss of the fast muons and their scattering in the rock is estimated. The calculations are then compared with the experimental data on the angular distribution at large depths underground, and the theoretical and experimental results are found to be in agreement. This seems to indicate that the cross sections for elementary interaction processes involving fast muons (with energy 1000 - 10000 Bev) are satisfactorily described by present-day theory. Orig. art. has: 17 formulas and 2 figures.

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy institut (Moscow Engineering Physics Institute)

SUBMITTED: 08Dec62

DATE ACQ: 12Jun63

ENCL: 00

SUB CODE: PH

NR REF SOV: 003

OTHER: 006

Card 1/1 *Mad*

ROZENTAL, I. L.

95

S/089/62/013/006/019/027
B102/B186

AUTHORS: G. N. T. and M. R.

TITLE: Nauchnaya konferentsiya Moskovskogo inzhenerno-fizicheskogo instituta (Scientific Conference of the Moscow Engineering Physics Institute) 1962

PERIODICAL: Atomnaya energiya, v. 13, no. 6, 1962, 603 - 606

TEXT: The annual conference took place in May 1962 with more than 400 delegates participating. A review is given of these lectures that are assumed to be of interest for the readers of Atomnaya energiya. They are following: A. I. Leypunskiy, future of fast reactors; A. A. Vasil'yev, design of accelerators for superhigh energies; I. Ya. Pomeranchuk, analyticity, unitarity, and asymptotic behavior of strong interactions at high energies; A. B. Migdal, phenomenological theory for the many-body problem; Yu. D. Fizevskiy, deceleration of medium-energy antiprotons in matter; Yu. M. Kogan, Ya. A. Iosilevskiy, theory of the Mössbauer effect; M. I. Ryazanov, theory of ionisation losses in nonhomogeneous medium; Yu. B. Ivanov, A. A. Rukhadse, h-f conductivity of subcritical plasma;

Card 1/4

Nauchnaya konferentsiya...

S/089/62/013/006/019/027
B102/B186

Ye. Ye. Lovetskiy, A. A. Rukhadze, electromagnetic waves in nonhomogeneous plasma; Yu. D. Kotov, I. L. Rozental', the origin of fast cosmic muons; Yu. M. Ivanov, muon depolarization in solids; V. G. Varlamov, Yu. M. Grashin, B. A. Dolgoshein, V. G. Kirillov-Ugryumov, V. S. Roganov, A. V. Samoylov, μ^- capture by various nuclei; V. S. Demidov, V. G. Kirillov-Ugryumov, A. K. Ponosov, V. P. Protasov, F. M. Sergeyev, scattering of π^- mesons at 5 - 15 Mev in a propane bubble chamber; S. Ya. Nikitin, M. S. Aynutdinov, Ya. M. Selektor, S. M. Zombkovskiy, A. F. Grashin, muon production in π^-p interactions; B. A. Dolgoshein, spark chambers; N. G. Volkov, V. K. Lyapidevskiy, I. M. Obodovskiy, study of operation of a convection chamber; K. G. Finogenov, production of square voltage pulses of high amplitudes; G. N. Aleksakov, problems of color vision; V. K. Lyapidevskiy, relation between number of receivers and number of independent colors; Ye. M. Kudryavtsev, N. N. Sobolev, N. I. Tizengauzen, L. N. Tunitskiy, F. S. Fayzulov, determination of the moment of electron transition of oscillator forces and the widths of the Schuhman-Runge bands of molecular oxygen; B. Ye. Gavrilov, A. V. Zharikov, V. I. Rayko, decomposition of the volume charge of intense ion beams; Ye. A. Kramer-Ageyev, V. S. Troshin, measurement of neutron spectra; G. G. Doroshenko, new methods of fast-neutron recording; V. I. Ivanov, dosimetry terminology; R. M. Voronkov, Card 2/4

KOTOV, Yu.D.; ROZENTAL', I.L.

Origin of high-energy cosmic muons and photons and the hyperon hypothesis. Zhur. eksp. i teor. fiz. 43 no.4:1411-1418 0 '62.
(MIRA 15:11)

1. Moskovskiy inzhenerno-fizicheskiy institut.
(Mesons) (Photons) (Hyperons)

ROZENTAL, I. L.

"On the Role of Complex Nuclei in the Origin of Development
of Extensive Air Showers"

Report presented at the International Conference on Cosmic Rays
and Earth Storm, 4-15 September 1961, Kyoto, Japan.

P. N. Lebedev Institute of Physics, Moscow, U.S.S.R.

YEMEL'YANOV, A. A. and ROZENTAL, I. L.

"Interpretation of the Two-Centre Model within the Hydrodynamical Theory"

Report presented at the International Conference on Cosmic Rays and Earth Storm, 4-15 Sep 1961, Kyoto, Japan.

P. N. Lebedev Physical Institute, Academy of Sciences of the USSR

ROZENTAL, I. L., NIKISHOV, A. I. and GERASIMOVA, N. M.

"Interaction of Nuclei and Photons of High Energies with a
Thermal Radiation in the Universe"

Report presented at the International Conference on Cosmic Rays
and Earth Storm, 4-15 September 1961, Kyoto, Japan.

S/823/62/000/000/003/007
B125/B102

24.7600

AUTHORS: Kirillov-Ugryumov, V. G., Petrukhin, A. A., Prokhorova, L. A.,
Rozenal', I. L.

TITLE: Evaluation of the possibility of using cosmic rays for
examining the muon structure

SOURCE: Nekotoryye voprosy fiziki elementarnykh chastits i atomnogo
yadra. Ed. by V. D. Mikhaylov and I. L. Rozenal'. Mosk.
inzh.-fiz. inst. Moscow, Gosatomizdat, 1962, 77-82

TEXT: The nature of electromagnetic interaction at distances of $\sim 10^{-13}$ cm
may perhaps be revealed by investigating the muon-electron scattering at
electron energies of 10-100 Bev. Cosmic radiation is suggested as a source
of high-energy muons. Table 1 contains the probabilities

$$w(E) = \int_{E_0 \text{ мин}}^{\infty} \frac{2Cm}{E^2} \left[1 - \frac{E}{E_{\text{макс}}} + \frac{1}{2} \left(\frac{E}{E_0} \right)^2 \right] \frac{(\gamma - 1) \cdot E_k^{\gamma-1}}{(E_k + E_0)^\gamma} dE_0, \quad (8)$$

Card 1/3

S/823/62/000/000/003/007
B125/B102

Evaluation of the possibility...

that δ -electrons of energy E may be produced by cosmic-ray muons of any energy, the total production probabilities for electrons of energies above a given value, and the root-mean-square values of the transverse momentum transferred by electrons of energy E . The total number $N(E) = W(E)\Omega \cdot l \cdot t j_0$ of δ -electrons with energies greater than E , recorded by an ionization calorimeter, is $N \approx 60 t$ for $E = 10$ Bev (t is given in days). Here, μ -e scattering occurs in a target with a thickness of $l = 20$ g/cm²; $\Omega = 5.5 \cdot 10^4$ cm²·sterad is the aperture ratio of the measuring apparatus, and $j_0 = 0.5 \mu$ (cm²·sterad·min)⁻¹ is the muon flux at sea level. The effect of the form factor of the muon-electron system is characterized by probability deviations $\Delta w/w = ((w(E) - w_1(E))/w(E)) = a^2 p^{-2/3}$ of some per cent at most. The integral probability w_1 is

JB

$$w_1(E) = \int_{E_{min}}^E X(E, E_0) \left(1 - \frac{E_0^2}{3}\right) dE_0 \quad (16)$$

Card 2/3

Evaluation of the possibility...

S/823/62/000/000/003/007
B125/B102

and (8) can be reduced to $w(E) = (Cm/E^2)(E_k/E_0 \min)^{\gamma-1}$, where $C = 0.15 \text{ Z/A}$.

There are 2 tables.

Таблица 1

<i>E, Бэв</i>	<i>w (E)</i>	<i>W (E)</i>	<i>p₁, Мэв/с</i>
10	1,5 · 10 ⁻⁸	7,91 · 10 ⁻⁸	80
20	0,183 · 10 ⁻⁸	1,61 · 10 ⁻⁸	110
30	0,0518 · 10 ⁻⁸	0,63 · 10 ⁻⁸	130
40	0,0211 · 10 ⁻⁸	0,333 · 10 ⁻⁸	140
50	0,0103 · 10 ⁻⁸	0,2 · 10 ⁻⁸	160
70	0,0035 · 10 ⁻⁸	0,09 · 10 ⁻⁸	190
100	0,0011 · 10 ⁻⁸	0,039 · 10 ⁻⁸	220

Table 1

Card 3/3

S/823/62/000/000/005/007
B125/B102

AUTHOR: Rozental', I. L.

TITLE: The role played by complex nuclei in the formation and development of extensive air showers

SOURCE: Nekotoryye voprosy fiziki elementarnykh chastits i atomnogo yadra. Ed. by V. D. Mikhaylov and I. L. Rozental'. Mosk. inzh.-fiz. inst. Moscow, Gosatomizdat, 1962, 97-106

TEXT: Consideration is given to the possibility that the fluctuations which occur in extensive air showers may be related to characteristic differences in what happens when nucleons, and the heavier nuclei of primary cosmic radiation, collide with atomic nuclei of air. For this purpose, particle fluxes of different charges but equal total energies are compared with one another. These qualitative or semi-qualitative comparisons are based on the hydrodynamic theory of multiple production of particles. G. A. Milekhin's relevant ideas are taken into consideration. The primary high-energy component is believed to contain a large amount of complex nuclei. According to the simplified pattern first considered, this

Card 1/3

S/823/62/000/000/005/007
B125/B102

The role played by complex nuclei...

component contains only nucleons (case a) or only nitrogen nuclei (case b).
The total number of particles is $N = k \cdot E_0^{1/4} A^{1/4}$ in case a, and

$N_c = k \cdot E_0^{1/4} A^{3/4}$ in case b. The constant k is approximately equal to 2;
 E_0 is the total energy of the primary particle in terms of the nucleon

mass M , and $A = 14$ is the atomic weight of an 'air nucleus'. The average
depth at which a shower originates is $t_0 \sim 1/(d + (\psi/s)\Lambda)$. For nucleons,

$d = 0.45$, and for complex nuclei, $d = 1.4$. Λ and s are slowly varying
functions of the cascade theory. The primary spectrum exerts a considerable

effect on the formation of showers by nucleons and on their development.
The actual number of collisions, and consequently the error in determining
the total energy E_0 of a primary particle from the given energy of the

shower core, differ greatly for cases a and b. The distribution of
particles emitted at an angle ψ is given by

$$d\rho_{\psi}(R) \sim \exp \left\{ - \left[t_0 \rho e^{-\frac{R}{\partial k}} + \frac{R}{\partial k} \right] \right\} dR, \quad (23)$$

Card 2/3

The role played by complex nuclei...

S/823/62/000/000/005/007
B125/B102

when $l_0 \sim 15$ and $k = 8000$. R is given in meters. Nucleons are likely to produce many more showers than do complex nuclei. If nucleons and complex nuclei contribute about equally to a shower, then this ratio will be about the same in shower apparatus. When energy-measuring instruments are used, the proportion of showers produced by nucleons increases by one order of magnitude. With the use of large-area apparatus, it increases even more. Showers produced by complex nuclei have several cores and are believed to contain more penetrating particles than showers generated by nucleons. There is 1 table.



Card 3/3

S/823/62/000/000/001/007
B125/B102

AUTHORS: Nikishov, A. I., Rozental', I. L.
TITLE: The interaction and the hypothetical structure of muons
SOURCE: Nekotoryye voprosy fiziki elementarnykh chastits i atomnogo yadra. Ed. by V. D. Mikhaylov and I. L. Rozental'. Mosk. inzh.-fiz. inst. Moscow, Gosatomizdat, 1962, 48-71.

TEXT: This is a review of papers published since 1939 on the interaction of muons and on hypotheses as to muon structure. The following are the most essential facts: Muons have spin $1/2$. The first radiative correction to the magnetic moment is consistent with experimental data. Accelerator experiments showed no scattering anomalies greater than 10^{-29} cm² per nucleon in the transfer of momenta less than 400 Mev. Muons can be described by Dirac's equation. It is still unknown why muons and electrons have different masses. The production of muons at very high energies ($\sim 10^{16}$ ev) should be studied and the following experiments are recommended: more precise measurement of the magnetic moment, investigation into the production of muon pairs with transfer of large momenta, determination of

Card 1/2

S/823/62/000/000/001/007
B125/B102

The interaction and the...

the form factors of protons and muons from μp scattering, experiments with oppositely directed beams of electrons and positrons, scattering of muons from electrons with transfer of a large transverse momentum, investigation of secondary-particle interaction ranges in nuclear collisions with

$E_0 \approx 10^{15}$ ev, search for anomalously scattered muons having an energy of more than 1 Bev and a cross section of 10^{-31} cm² per nucleon, underground precision measurements of bursts in ionization chambers at great depths. There are 6 figures.

Card 2/2

h1134

S/056/62/043/004/039/061

B104/B186

3.24/10

AUTHORS: Kotov, Yu. D., Rozental', I. L.

TITLE: The hyperon hypothesis and the production of high-energy cosmic muons and photons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 45, no. 4(10), 1962, 1411 - 1418

TEXT: The differential spectrum of cosmic muons with energies between 10^{11} and 10^{14} ev is calculated on the basis of the hyperon hypothesis by P. Babu and Y. Pal (Preprint 1961). On this hypothesis the particles which carry away the greater part (0.7 - 0.8) of the energy borne by the initial particle in a reaction are hyperons. It was assumed that the hyperons Λ , Σ^+ , Σ^0 , Σ^- are formed with equal probability, and that the decay scheme is as follows:

- a) $\Lambda^0 \rightarrow p + \pi^-$, $\omega = 1$, $E_\pi = 0.17$ BeV;
 b) $\Sigma^+ \rightarrow p + \pi^0$, $\omega = 1/2$, $E_\pi = 0.23$ BeV;
 $\Sigma^+ \rightarrow n + \pi^+$ $\omega = 1/2$;
 b) $\Sigma^0 \rightarrow \Lambda + \gamma$, $\omega = 1$;
 r) $\Sigma^- \rightarrow n + \pi^-$, $\omega = 1$, $E_\pi = 0.23$ BeV.

Card 1/5

S/056/62/043/004/039/061
 B104/B186

The hyperon hypothesis and...

E_π is the mean energy of a pion in the hyperon reference system. The probability W for the formation of muons with the energy E_μ is

$$W = u_1 u_\pi / (u_r + 1) (u_\pi + 1) \quad (2)$$

if $x_0 \gg 1$ and if it is assumed that both the muon in the pion reference system, and the pion in the hyperon reference system fly off with a mean constant energy. The indices Γ and π refer to the hyperon and to the pion respectively. For a decay of hyperons produced in the first event, X

$$n_1(E_\pi) dE_\pi = 10^{-1} E_\pi^{-2.65} dE_\pi \quad (3)$$

is obtained for the number of pions with energies between E_π and $E_\pi + dE_\pi$; and

$$N_1(E_\mu) = \frac{6 \cdot 10^{-2} E_\mu^{-2.65} dE_\mu}{(1 + E_\mu/100)(1 + 4E_\mu/100000)} \quad (6)$$

for the number of muons in the same energy range. Assuming that in the i -th collision the energy $a^i E_0$ is released if $a = 1 - k \sim 0.6 - 0.7$, and that the collision probability of a particle of the i -th generation in the depth between x and $x+dx$ is equal to $\{e^{-x} x^{i-1} / (i-1)\} dx$, the particles subsequent to the first generation can easily be considered:

Card 2/5

S/056/62/043/004/039/061
B104/B156

The hyperon hypothesis and...

$$W_i(E_\mu) dE_\mu = \frac{u_\pi u_\Gamma}{(i-1)!} \int_0^{x_0} x^{u_\Gamma+i-1} dx \int_x^{x_0} y^{u_\pi-u_\Gamma-1} dy \int_y^{x_0} e^{-z} z^{-(u_\pi+1)} dz =$$

$$= u_\pi u_\Gamma / (u_\pi + i) (u_\Gamma + i) \text{ (при } x_0 \gg 1); \quad (7)$$

$$N_i(E_\mu) dE_\mu = C (\alpha')^i \cdot 1,3 \cdot 10^{-1} E_\mu^{-2,65} dE_\mu / (1 + iE_\mu/100) (1 + 4iE_\mu/100\,000) \quad (8).$$

For $\alpha = 0.7$ and $C = 7/8$ holds

$$N_i(E_\mu) dE_\mu = (0.5)^i \cdot 1,1 \cdot 10^{-1} E_\mu^{-2,65} dE_\mu / (1 + iE_\mu/100) (1 + 4iE_\mu/100\,000).$$

Assuming that $\bar{n} = a \bar{n}_0^{1/4}$, where $a = 3$, is valid for the multiplicity in one event, and that the secondary pions possess equal energy, the number of muons produced by ionization in the first event can be found from the equation

$$N'(E_\mu) dE_\mu = 3 \cdot 10^{-2} E_\mu^{-2,87} dE_\mu / (1 + E_\mu/100). \quad (9).$$

Results agree well with the experimental data by Babu and Pal. From the energy spectra

Card 3/5

S/056/62/043/004/039/061
 B104/B186

The hyperon hypothesis and...

$$N^+(E_\mu) dE_\mu = 1.6 \cdot 10^{-2} E_\mu^{-2.65} dE_\mu \sum_{i=1}^{\infty} \frac{a^{i\gamma}}{(1 + iE_\mu/100)(1 + 4iE_\mu/100000)} + \frac{1.5 \cdot 10^{-2} E_\mu^{-2.87} dE_\mu}{1 + E_\mu/100} \quad (10)$$

$$N^-(E_\mu) dE_\mu = 10^{-1} E_\mu^{-2.65} dE_\mu \sum_{i=1}^{\infty} \frac{a^{i\gamma}}{(1 + iE_\mu/100)(1 + 4iE_\mu/100000)} + \frac{1.5 \cdot 10^{-2} E_\mu^{-2.87} dE_\mu}{1 + E_\mu/100} \quad (11)$$

for positive and negative muons a negative excess of $(N^- - N^+) / (N^- + N^+) \sim 0.6$ for $E_\mu \sim 50 - 100$ Bev is obtained. On the basis of the hyperon hypothesis this value is difficult to explain. The discrepancy can be eliminated only by assuming that the distribution of the nascent hyperons with respect to the sign of charge is conditioned by a statistical weight in the isotopic space. Finally, the energy spectrum of the photons is calculated assuming that all hyperons are produced with equal probability. The number

$$N_\gamma(E_\gamma) dE_\gamma = (1 - e^{-x}) 0,001 E_\gamma^{-2.65} dE_\gamma$$

Card 4/5

S/056/62/043/004/039/061.
B104/B186

The hyperon hypothesis and...

arises in a π^0 -meson decay ; the number

$$N_1(E_\gamma) dE_\gamma = (1 - e^{-x}) 0,008 E_\gamma^{-2,07} dE_\gamma;$$

in a $\Sigma^0 \rightarrow \Lambda + \gamma$ decay, the number

$$N_2(E_\gamma) dE_\gamma = (1 - e^{-x}) 0,01 E_\gamma^{-2,08} \frac{dE_\gamma}{1 + 6E_\gamma/100000}.$$

in a $\Sigma^+ \rightarrow p + \pi^0 \rightarrow p + 2\gamma$ decay. There are 4 figures.

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy Institut (Moscow Engineering Physics Institute)

SUBMITTED: April 25, 1962

MIKHAYLOV, V.D., otv. red.; ROZENTAL', I.L., otv. red.; PCHELINTSEVA, G.M., red.; VINOGRADOVA, Ye.M., red.; VLASOVA, N.A., tekhn. red.

[Some problems in the physics of elementary particles and of the atomic nucleus] Nekotorye voprosy fiziki elementarnykh chastits i atomnogo iadra. Otvet. red. V.D.Mikhailov i I.L. Rozental'. Moskva, Gosatomizdat, 1962. 134 p.

(MIRA 15:7)

1. Moscow. Inzhenerno-fizicheskiy institut.
(Particles (Nuclear physics)) (Nuclei, Atomic)

YEMEL'YANOV, A.A.; ROZENTAL', I.L.

Two-center model and the hydrodynamic theory of multiple particle generation. Zhur. eksp. i teor. fiz. 38 no.1:194-197 Jan '60. (MIRA 14:9)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR. (Nuclear models) (Collisions (Nuclear physics))

S/058/61/000/010/019/100
A001/A101

3,2410

AUTHORS: Nikishov, A.I., Rozental', I.L., Slavatinskiy, S.A.

TITLE: On energy determination of fast particles from angular distribution of their interaction products

PERIODICAL: Referativnyy zhurnal, Fizika, no. 10, 1961, 96, abstract 10B503 ("Tr. Mezhdunar. konferentsii po kosmich. lucham, 1959, v. 1", Moscow, AN SSSR, 1960, 157 - 160)

TEXT: To determine energies of fast particles, a method is employed which is based on the analysis of angular distribution of secondary particles and very simple relations of the relativistic kinematics. Two assumptions are made in the method: 1) velocities of secondary particles are close to velocity of light; 2) dispersion of particles in the system connected with the gravity center, proceeds symmetrically relative to the plane perpendicular to the line of motion. A possible effect of non-symmetric showers on energy determination is estimated, and collision of a nucleon with a heavy nucleus is considered in detail.

✓
R

L. Norman

[Abstracter's note: Complete translation]

Card 1/1

27194

S/056/61/041/002/016/028
B111/B112

3,2410

AUTHORS: Gerasimova, N. M., Rozental', I. L.

TITLE: Influence of the nuclear photoelectric effect on the spectrum
of primary cosmic radiationPERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41,
no. 2, 1961, 488 - 490

TEXT: It was demonstrated in earlier papers that the photoelectric effect in heavy nuclei changes the spectrum of cosmic radiation only in a range of high energies. The authors assume that in high-energy cosmic radiation, heavy nuclei occur and that if the photoelectric effect is neglected the cosmic radiation spectrum can be represented by an exponential function

$T_{\text{nucl}} Q(E) \approx K \cdot E^{-\alpha}$. $Q(E)$ - term of source. When taking account of the nuclear photoelectric effect the author obtains the following form of the spectrum: $N(E)dE = K \cdot E^{-\alpha} dE (1 + T_{\text{nucl}}/T_{\text{photo}}(E))^{-1}$.

Card 1/3

1719b

S/056/61/041/002/016/028
B111/B112

Influence of the nuclear ...

$$\frac{T_n}{T_\phi(E)} \approx \frac{cT_n c_g \bar{n}}{1,2} \left(\frac{e_g}{2\gamma kT} \right)^2 \frac{\exp(-e_g/2\gamma kT)}{(a_g + e_g/2\gamma kT)^2} \left[1 + \frac{2}{a_g + e_g/2\gamma kT} \right]$$

holds for T_{nucl}/T_{photo} , where $T_n \equiv T_{nucl}$, $T_\phi(E) = T_{photo}(E)$, c_g , a_g , e_g are parameters, \bar{n} the mean photon density in the galaxy, $\bar{n} \sim 10^7$. 0.8 is the maximum value of T_{nucl}/T_{photo} for iron atoms which is attained at E-6.10¹⁷ ev. The mean free time in the galaxy is $\sim 10^{10}$ years. Since the galaxy exists only since $\sim 10^{10}$ years, the authors conclude that the nuclei practically do not collide in the metagalactic space. Finally, it is said that the existence of 10¹⁸ ev nuclei of intergalactic origin is very improbable and that cosmic radiation from the intergalactic space does not contribute to the corresponding part of the spectrum which is observed on the earth. Ye. L. Feynberg, V. L. Ginzburg, S. I. Syrovatskiy (Ref. 3: UFN, 71, 411, 1960), A. A. Korchak, S. B. Pikel'ner and I. S. Shkovskiy are mentioned. There are 1 figure and 5 references: 3 Soviet and 2

Card 2/3

27194

Influence of the nuclear...

S/056/61/041/002/016/028
B111/B112

non-Soviet. The reference to English-language publication reads as follows: Ref. 5: C. W. Allen, Astrophysical Quantities, University of London, The Athlone Press, 1955. X

ASSOCIATION: Fizicheskiy institut im P. N. Lebedeva Akademii nauk SSSR
(Physics Institute imeni P. N. Lebedev of the Academy of Sciences USSR)

SUBMITTED: February 25, 1961

Card 3/3

MAKSIMENKO, V.M.; ROZENTAL', I.L.

Covariant statistical theories of multiple production. Zhur. eksp.
i teor. fiz. 39 no.3:754-756 S '60. (MIRA 13:10)

1. Fizicheskiy institut imeni P.N. Lebedeva Akademii nauk SSSR.
(Particles (Nuclear physics))

S/056/60/039/003/028/045
B006/B063

AUTHORS: Maksimenko, V. M., Rozental', I. I.

TITLE: The Covariant Statistical Theories of Multiple Production
of Particles 19

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 39, No. 3(9), pp. 754-756

TEXT: The present paper gives an analysis of the possible covariant theories of multiple production of particles when assuming that the matrix element can be factorized. The authors studied the invariant function $\Phi(K_0, k_1, \dots, k_j)$ from the equation holding for the production probability W_N of N particles in the collision of two particles:

$$W_N = \int \dots \int \Phi(K_0, k_1, \dots, k_N) \delta^4(K_0 - \sum_{j=1}^N k_j) \prod_{j=1}^N \delta(k_j^2 - m_j^2) d^4k_j.$$
 This function depends on the character of interaction. The interaction of particles is assumed to be so small that correlations may be neglected;

Card 1/3

The Covariant Statistical Theories of Multiple Production of Particles S/056/60/039/003/028/045
B006/B063

then, $\Phi(K_0, k_1, \dots, k_N) = \prod_{j=1}^N \Phi_j(K_0, k_j)$. The authors restrict themselves to functions of a class for which $\Phi_j(K_0, k_j) = C(K_0, k_j) / (\sqrt{K_0, k_j})^s$ holds, where C is independent of K_0 and k_j , and is determined by coupling constants, masses, spins, and isotopic spins of the particles; q and s are integers. The two special cases $\Phi_j(K_0, k_j) = C(K_0, k_j) / (K_0, k_j)$ and $\Phi_j(K_0, k_j) = C$ are considered. The former corresponds to Fermi's statistical theory, and the latter to the theory by Srivastava and Sudarshan. Several formulas are derived for W_N . Finally, a further expression is obtained for W_N by assuming that the matrix element be a power function of the energy of the particles involved in the process. The authors thank Ye. L. Feynberg for his remarks. L. G. Yakovlev is mentioned. There are 7 references: 2 Soviet, 1 Japanese, and 3 US. ✓

Card 2/3

The Covariant Statistical Theories of Multiple S/056/60/039/003/028/045
Production of Particles B006/B063

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Institute of Physics imeni P. N. Lebedev of the Academy
of Sciences USSR)

SUBMITTED: April 13, 1960

Card 3/3

VIL'SON, Dzh. [Wilson, J.G.], red.; BAYYER, V.N. [translator]; MAKSIMENKO,
V.M. [translator]; SARYCHEVA, L.I. [translator]; BIRGER, N.G.,
red.; ROZENTAL', I.L., red.; NAKHIMSON, I.G., red.; KHAR'KOVSKAYA,
L.M., tekhn.red.

[Physics of cosmic rays; modern achievements] Fizika kosmicheskikh
luchei; sovremennye dostizheniia. Sost. gruppoi avtorov. Pod red.
Dzh.Vil'sona. Moskva, Izd-vo inostr.lit-ry. Vol.3. 1958. 444 p.
Translated from the English. (MIRA 13:6)
(Cosmic rays)

BALDIN, Aleksandr Mikhaylovich; GOL'DANSKIY, Vitaliy Iosifovich;
ROZENTAL', Iosif Leonidovich; ZHABOTINSKIY, Ye.Ye., red.;
GAVRILOV, S.S., tekhn.red.

[Kinematics of nuclear reactions] Kinematika iadernykh
reaktsii. Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1959.
226 p. (MIRA 13:1)

(Nuclear reactions)

ROZENTAL, I. L.

2(7)

PHASE I BOOK EXPLOITATION

SOV/3108

Baldin, Aleksandr Mikhaylovich, Vitaliy Iosifovich Gol'danskiy, and Iosif Leonidovich Rozental'

Kinematika yadernykh reaktsiy (Kinematics of Nuclear Reactions) Moscow, Fizmatgiz, 1959. 296 p. 8,000 copies printed.

Ed.: Ye. Ye. Zhabotinskiy; Tech. Ed.: S. S. Gavrilov.

PURPOSE: This book is intended for physicists exploring the atomic nucleus and elementary particles.

COVERAGE: The book consists of two parts. The first part describes characteristics of motion with relativistic velocities giving relativistic transformations and utilizing two main coordinate systems. It also describes the classical kinematics of interactions producing two or more particles, as well as cases of nonrelativistic interactions and conversions with the participation of photons. The second part analyzes the scattering matrix and on the basis of the latter and the Dirac theory introduces Clebsch-Gordan, Racah, Z, and X coefficients in vector addition. It also analyzes the emergence of polarized particles in nuclear reactions and the regularities of this emergence. In general the book describes one of the chief methods of processing experimental data in modern nuclear physics and

Card 1/5

SOV/3108

Kinematics of Nuclear Reactions

systematizes the data on the kinematics of nuclear reactions. V. A. Petrun'kin and A. I. Lebedev are responsible for the material in appendix II. The authors thank V. B. Berestetskiy and G. N. Kopylov for their constructive criticism. There are 73 references: 33 Soviet, 35 English, 3 Italian, and 2 German.

TABLE OF CONTENTS:

Foreword

5

PART I. CLASSICAL THEORY

Ch. I. General Principles of Relativistic Kinematics

9

1. Integrals of motion. Conservation laws

9

2. Basic systems of coordinates

11

3. Some formulas of relativistic mechanics

12

4. Relativistic transformations of angles and pulses

15

5. Calculating the γ coefficient of relativistic transformations in the relative conversion from the C-system to the L-system

17

Card 2/5

Kinematics of Nuclear Reactions

SOV/3108

Ch. II. Effective Cross Sections and Their Transformation on Changing the Coordinate System	19
6. Integral and differential cross sections	19
7. Relativistic transformation of angular and pulse distributions (of phase space elements)	20
Ch. III. Kinematics of Interactions Producing Two Particles	28
8. Interaction in a general relativistic case	28
9. Basic formulas for a nonrelativistic case	40
10. Graphical representation of kinematic correlations	44
11. Disintegration into two particles	63
12. Relationship of angular and power distributions in C- and L-systems of particles produced during disintegration	72
Ch. IV. Interactions Producing Three Particles	81
13. Extremal correlations	81
14. Power spectrum of secondary particles	85
Ch. V. Multiple Processes	90
15. Maximum correlations	90
16. Power and angular distributions in multiple processes	96

Card 3/5

Kinematics of Nuclear Reactions

SOV/3108

17. Determining the energy of fast nucleons 103

PART II. QUANTUM THEORY

- Ch. VI. Scattering Matrix and Its Properties 111
- 18. S-matrix 111
 - 19. Unity of the S-matrix 114
 - 20. Integrals of motion 116
 - 21. Time reversal 118
 - 22. Transformation functions 124
 - 23. Relationship of the S-matrix and the effective cross section 127
- Ch. VII. Applications of the General Theory of the S-matrix 132
- 24. Relationship between effective cross sections of elastic and non-elastic processes 132
 - 25. Relationship between effective cross sections of direct and reverse reactions 141
- Ch. VIII. Collisions of Particles With Spin 144
- 26. Stating the problem. Examples. Parameters of the S-matrix 144
 - 27. Vector addition factors 150

Card 4/5

Kinematics of Nuclear Reactions	SOV/3108
28. Some examples	154
29. W, X, Z, and Z_y coefficients	158
30. Angular distributions in nuclear reactions (when the particles have a rest mass, other than zero)	166
Ch. IX. Polarization of Particles in Nuclear Reactions	173
31. General formula	173
32. Basic rules of the emergence of polarized particles in nuclear reactions	178
Ch. X. Reactions With the Participation of Photons	181
33. General formulas	181
34. Relationship between photoproduction, π -meson scattering, and the Compton effect on the nucleon	188
Appendix I (for the first part)	193
Appendix II (for the second part)	221
Bibliography	295
AVAILABLE: Library of Congress	

Card 5/5

TM/sfm
2-10-60

ROZENTAL', I. L., Doc of Phys-Math Sci -- (diss) "On nuclear interaction
of particles of great energy." Moscow, 1957, 13 pp (Physics Institute
Im P. N. Lebedev), 125 copies (KL, 35-57, 105)

ROZENTAL', I.L.; STREL'TSOV, V.N.

Passage of high-energy μ -mesons through a substance [with
summary in English]. Zhur. eksp. i teor. fiz. 35 no.6:1440-1446
D '58. (MIRA 12:3)

1. Fizicheskiy institut imeni P.N. Lebedeva AN SSSR.
(Mesons)

ROZENTAL I. I.

21 (O), 24 (O) Tyagunov, G. A. SOV/89-7-2-18/24
AUTHOR: Scientific conference of the IIFI (Sovetskaya konferentsiya IIFI)
TITLE: Atomnaya energiya, 1959, Vol. 1, No. 2, pp 176-177 (USSR)

PERIODICAL: The early scientific meeting was held from 17 April to 15 May 1959 in the Neokovskiy Inzhenerno-Fizicheskiy Institut (Moscow Physical Engineering Institute). More than 600 participants from 100 different institutes attended the 2 plenary and 8 sectional conferences. A total of 148 lectures were held. The following lectures are specially mentioned: I. I. Rozental on the physical foundations of neutron detectors and amplifiers, I. I. Rozental on the theory of a fast reactor, I. I. Rozental on the theory of the peripheral collision of neutrons and neutrons, A. B. Mizil on superfluidity and neutron of inertia of the nuclei, A. G. Komarova on strong electromagnetic waves, V. I. Goffman on levels which are excited within the nucleus shell and methods of comprehending them, I. I. Rozental and L. A. Prokhorova on the analysis of the possible experiments for the determination of the measurements of the β -resonance, V. A. Dikun-Floker on the spectrum of liquid and instrument for measuring the absorption curves, I. I. Rozental for measuring the absorption curves, I. I. Rozental for linear electron accelerators with stationary waves, P. A. Buzin, A. B. Mizil and I. I. Rozental on the theory of the electron beam, V. A. Dikun-Floker on optimum search for a generator, P. A. Buzin and G. A. Tyagunov on magnetic focusing in a linear electron accelerator, O. A. Yalovskiy, P. A. Buzin, V. A. Dikun-Floker, N. V. Ustin on the new linear accelerators of the IIFI, and V. Kuznetsov, O. A. Yalovskiy, V. I. Kozlov and V. I. Chasovskiy on examination of the electron movement in the system of the electron with consideration of the scattering fields, O. A. Erzer on impulse method for measuring the heat conduction capacity of liquids and the theory of this method, Ya. G. Chabakshin, M. V. Il'in and S. A. Chiriz on heat transmission to the surface heat which flows in a circular space, V. I. Rozental on heat transmission to circulating mercury, I. I. Rozental on special conditions when working with a fast track in the impulse technique, G. S. Fetisov on calculation methods and construction of an impulse transformer, Er instruments with semi-conductor elements, I. A. Matkovskiy on a possibility judge the characteristics of separate recording of pulses, A. B. Mizil on the theory of the electron beam, I. I. Rozental on multiple control of the parameters of technical processes, P. I. Ponomarev on analysis of several systems with which physical energy apparatus can be automatically started, I. I. Rozental on a method to examine the quality of a reactor control when the reactivity changes stepwise or linearly, G. A. Leonov and A. I. Yevseyevich on examination of the iodine method of refining niobium and characteristics of the metal obtained, P. L. Gravit and G. G. Ryabova on examination of the micro-distribution of carbon, tungsten, iron and other elements in zirconium and its alloys by use of autoradiography, E. B. Fedorov on determination of the sublimation heat of zirconium and niobium by using radioactive indicators, A. B. Mizil and A. G. Komarova on the analysis of the structure of the metal of chromium, nickel, iron and other metal steels. The literature for all these lectures will be published by the IIFI in a symposium.

Card 1/3

Card 2/3

Card 3/3

3(1)

AUTHOR:

Rozental', I.L.

SOV/33-36-3-26/29

TITLE:

Review of W.Galbraith "Extensive Air Showers" London 1958

PERIODICAL:

Astronomicheskii zhurnal, 1959, Vol 36, Nr 3, pp 552-553 (USSR)

ABSTRACT:

This is a favourable criticism of the above mentioned book. The two last chapters are denoted to be the most interesting ones for the Soviet reader since only few Soviet publications are devoted to this subject. The book is recommended for specialists for cosmic radiation and magnetic fields in the interplanetary medium.

SUBMITTED: April 6, 1959

Card 1/1

ROZENTAL, I. L.

DETERMINING THE ENERGY OF PAST PARTICLES THROUGH
ANGULAR DISTRIBUTION OF THE REACTION PRODUCTS

A. I. Nikishov, I. L. Rozental, and S. A. Slavatinskiy

In this paper an analysis is made of errors in determinations of the energy of the primary particle from the angular distribution of secondary particles. Due to fluctuations in the number of generated particles and in their angles of emergence and the sharp decrease in the spectrum of primary particles $\frac{dN(\theta)}{dE \cdot E^2}$, the energy value may be systematically overestimated. The extent of this overestimation depends on the law of fluctuations in the number of particles and angles (at a given energy), which at present can be estimated only in a very approximate manner. From an analysis of experimental data on shower energy determined from the angular distribution of secondary particles and measured directly, an attempt is made to determine the dispersion of distribution that characterizes the elementary act.

The error in the determination of the energy of showers produced on heavy nuclei is also considered. This error arises due to indeterminacy in the length of the nuclear tube with which the collision occurs.

Report presented at the International Cosmic Ray Conference, Moscow, 6-11 July 1959

ROZENTAL, I. L.
Rosental, I. L.

HIGH ENERGY

 μ -MESON SHOWERS

A. A. Yemelyanov, I. L. Rosental

Experimental data on μ -meson showers observed under heavy layers of the Earth are analyzed (mainly the data obtained by Barret, Bollinger, Kokkoni, Eisenberg and Greizen). Calculations made on the basis of different models show that at small distances the observed showers cannot be explained by the usual mechanisms of π -meson production when π -mesons decay in the air. Analysis of possible local processes shows that the showers observed at great depths cannot be due to pairs of μ -mesons produced by photons, μ -mesons originating when π -mesons decay in rock, γ -processes or radiation.

The calculated value for the appearance of μ -meson trident (direct production of μ -pairs in rock) is closer to the experimental shower frequency. However, in this case, too, the experimental value is somewhat greater than the theoretical one.

If this difference is of real significance, one should conclude that additional sources of μ -meson production exist for high energy particle interactions.

Calculated curves for the space distribution of high energy μ -mesons close to the extensive shower axis are presented.

The calculations are based upon the most probable models of the elementary process and in particular upon the Landau theory.

Report presented at the International Cosmic Ray Conference, Moscow, 6-11 July 1959

ROZENTAL', I.L.

Possible multiple production of Λ -mesons. Zhur.eksp. 1
teor.fiz. 36 no.3:943-945 Mr '59. (MIRA 12:5)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR.
(Mesons)

24(5)

AUTHORS:

Rozental', I. L., Strel'tsov, V. N.

SOV/56-35-6-18/44

TITLE:

On the Passage of μ -Mesons With High Energies Through Matter
(O prokhozhdenii μ -mezonov bol'shikh energiy cherez veshchestvo)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,
Vol 35, Nr 6, pp 1440-1446 (USSR)

ABSTRACT:

The authors first shortly discuss the papers hitherto published on this subject (Refs 1-5). In the present paper the passage of muons of high as well as of low energy through matter is investigated, in which connection all known forms of muon-interaction and also the fluctuations of energy losses are taken into account. The interaction processes of relativistic muons are divided into such as lead to continuous energy losses and into such as lead to rare losses in large portions. Among the processes of the first kind, ionization losses (including Cherenkov radiation), and among those of the second kind bremsstrahlung, the direct formation of electron-positron pairs, as well as collisions leading to the formation of nuclear-active particles are classed. In the approximation used, the distribution of energy losses is taken into account

Card 1/3

SOV/56-35-6-18/44

On the Passage of μ -Mesons With High Energies Through Matter

only in processes of the second kind. A mean value is assumed for ionization losses. For the range $E > 10^4$ the mean value of energy losses is $-dE_r/dx = 2.2 \cdot 10^{-6} g^{-1} \text{cm}^2$. A table shows the energy losses for energies of from $6 \cdot 10^4$ to 10^6 . Also a number of formulae for the determination of the differential cross sections is given. The equation of motion is set up for the purpose of describing the passage of muons through the medium. If results obtained by taking meson intensity fluctuations in various depths as well as the distribution function into account are compared with the data calculated on the basis of the mean value of energy losses, it is found, that N/N_s (particle numbers in the depth t with- / particle numbers without consideration of the distribution function) depends only slightly on t (Table 2). The muon flux calculated on the basis of an average distribution of energy losses is reduced by taking the distribution function into account. The authors finally thank G. T. Zatsepin for discussions and Z. S. Maksimova for carrying out numerical computations. There are 2 tables and 13 references, 5 of which are Soviet.

Card 2/3

SOV/56-35-6-18/44

On the Passage of μ -Mesons With High Energies Through Matter

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Physics Institute imeni P. N. Lebedev of the Academy of
Sciences, USSR)

SUBMITTED: June 14, 1958

Card 3/3

SOV/56-36-3-57/71

21(7)
AUTHOR:

Rozental', I. L.

TITLE:

On the Possibility of a Multiple Production of μ -Mesons
(O vozmozhnoy mnozhestvennoy generatsii μ -mezonov)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959,
Vol 36, Nr 3, pp 943 - 945 (USSR)

ABSTRACT:

When investigating the expansion curve of shower muons of very high energies ($\sim 10^{12}$ ev) Barret et al. (Ref 1) discovered a distinct salient point in this curve in the case of short distances ($\sim 1-2$ m) between the counter systems with which measurements were carried out. The authors gave an explanation for the occurrence of this salient point, which is discussed in short by the present paper. It was, however, found that further investigations are necessary in order to obtain a satisfactory explanation, especially with respect to the multiple production of muons in matter. In the present "Letter to the Editor" the author makes a contribution to the discussion of this problem. Local showers in great depths may be caused 1) by muon pairs produced by photons, 2) by muons produced by pion decay, and 3) by secondary

Card 1/2

On the Possibility of a Multiple Production of μ -Mesons

SOV/56-36-3-57/71

particles accompanying high-energy muons. Whereas the first two processes are discussed only in short, the author investigates the third more thoroughly μ -mesons may cause; a) δ -showers or radiation showers, b) electron-nucleon showers, c) muon pair production. The last case is again discussed, compared with the theoretical and experimental results obtained by other authors, and existing details are discussed. In conclusion, the author expresses the opinion that, for the purpose of clarifying conditions, still more accurate investigations of high-energy muon showers and of their electron component are necessary. He thanks N. A. Dobrotin for some valuable advice. There are 9 references, 4 of which are Soviet.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Physics Institute imeni P. N. Lebedev of the Academy of Sciences, USSR)

SUBMITTED: November 26, 1958

Card 2/2

AUTHOR: Nikishov, A. I., Rozental', I. L. SOV/56-35-1-23/59

TITLE: On the Determination of the Energy of Fast Particles According to the Angular Distribution of Reaction Products (Ob opredelenii energii bystrykh chastits po uglovomu raspredeleniyu produktov reaktsii)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 35, Nr 1, pp. 165 - 169 (USSR)

ABSTRACT: The present paper aims at investigating possible errors when determining the energy from the angular distribution of particles produced by the collision. The authors worked in accordance with Landau's hydrodynamic theory of the multiple production of particles (Ref 2), which was extended for the case of a collision between a nucleon and a heavy particle; for this purpose the "tube model" ("trubochnaya" model') according to Rozental', Belen'kiy et al. (Refs 3,4) was used. If the connection between the angular distribution η and the energy E is not known, the ratio of the total number of observed star tracks (N) and E must be used for the determination of E. If η and N are

Card 1/3

On the Determination of the Energy of Fast Particles SOV/56-35-1-23/59
According to the Angular Distribution of Reaction Products

given, the dispersion of energy values as well as the position of the maximum of the distribution function depends essentially on the ratio between η and N ; (figures 1-3 show the course taken by the curves $p(E|\eta, N)$ in dependence on E for different values of N and η). The distribution of probability is also influenced by the parameters of the collision model. In conclusion the authors thank G.B.Zhdanov for discussing several problems, and Z.S.Maksimova and R.M.Povarova for carrying out numerical computations. There are 3 figures and 8 references, 5 of which are Soviet.

ASSOCIATION: Fizicheskiy institut im. P.N.Lebedeva Akademii nauk SSSR.
(Physics Institute imeni P.N.Lebedev, AS USSR)

SUBMITTED: February 8, 1958
Card 2/3

ROZENTAL, I. L.

AUTHOR: None Given

30-58-4-30/44

TITLE: Dissertations (Dissertatsii).
Branch of Physico-Mathematical Sciences
(Otdeleniye fiziko-matematicheskikh nauk).
July-December 1957 (Iyul'-Dekabr' 1957)

PERIODICAL: Vestnik Akademii Nauk SSSR, 1958, Nr 4,
pp. 116-116 (USSR)

ABSTRACT: 6) At the Institute for Physics imeni P. N. Lebedev
(Fizicheskiy Institut imeni P. N. Lebedeva) the following
dissertations were defended:
a) for the degree of a Doctor of Physico-Mathematical
Sciences: B. M. Kozyrev - Experimental Investigations
in the Field of Paramagnetic Resonance. (Eksperimental'nyye
issledovaniya v oblasti paramagnitnogo rezonansa).
I. L. Rozental' - On Nuclear Interactions of Particles
With High Energy. (O yadernom vzaimodeystvii chastits
bol'shoy energii).
b) for the degree of a Candidate of Physico-Mathemati-
cal Sciences:

Card 1/2

Dissertations. Branch of Physico-Mathematical
Sciences, July-December 1957

30-58-4-30/44

A. V. Antonov - Investigation of Diffusion Processes and
of Neutron Retardation in Different Milieus and of the
Multiplication of Neutrons in Heterogeneous Uranium-
Graphite Systems by Means of the Impulse Method.

(Issledovaniye protsessov diffuzii i zamedleniya neytronov
v razlichnykh sredakh i mul'tiplikatsii neytronov v uran-
grafitovykh geterogennykh sistemakh s pomoshch'yu impul'-
snogo metoda).

T. A. Sidorov - Infrared Spectra and the Structure of Some
Vitrifying Oxides. (Infrakrasnyye spektry i struktura ne-
kotorykh stekloobrazuyushchikh okislov).

M. I. Tret'yakova - Determination of the Mass of Slow
Charged Particles in Photographic Plates. (Opredeleniye
massy medlennykh zaryazhennykh chastits v fotoplastinkakh),

1. Physics--Bibliography 2. Bibliography--Physics

Card 2/2

ROZENTAL, I. L.

19

539.13

Distr: 4E3d

2458. ON THE ROLE OF NUCLEONS IN THE PROCESS OF MULTIPLE PRODUCTION OF PARTICLES

A. A. Emel'yanov and I. L. Rozental. Zh. eksper. teor. Fiz. Vol. 33, No. 3(9), 808-9 (1957). In Russian. A hydrodynamic treatment to determine the fraction, E_k/E_0 , of the incident energy, E_0 , taken away by the fast nucleon in a nucleon-nucleon collision at energies 10^{11} - 10^{12} eV. It is found that E_k/E_0 depends on energy approximately as $E_0^{-1/4}$.

W. G. Lock

RM

4
1

56-2-51/51

AUTHORS: Podgoretskiy, M. I. , Rozental', I. L. , Chernavskiy, D. S.

TITLE: A Correction of the Article "On Fluctuations in the Collision of Particles of High Energy" (Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1955, Vol 29, p 296) (Popravka k stat'ye " O fluktuatsiyakh pri stolknovenii chastits vysokoy energii (ZhETF), 29, 296, 1955 '))

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 2, p 536 (USSR)

ABSTRACT: In the article mentioned in the title an error occurred in the calculation of the quantity
$$\frac{1}{(n - \bar{n}) (E - \bar{E})}$$

The wrong numerical values resulting from this are corrected and replaced by the right values. The authors thank A. I. Mikishov for his valuable information.

AVAILABLE: Library of Congress
Card 1/1 1. Theoretical corrections

USCR/Human and Animal Physiology (Normal and Pathological) T
Nervous System. Higher Nervous Activity. Behavior.

Abs Jour : Ref Zhur Biol., No 6, 1959, 27048

Author : Rozental', I.S.

Inst : -

Title : On the Problem of the Influence of Overstrain of Higher Nervous Activity on the Origination of Tumors in Dogs.

Orig Pub : V sb.: Probl. fiziol. tsentr. nervn. sistemy. M.-L., AN SSSR, 1957, 494-499

Abstract : In 2 dogs, in the course of a long period of time, overstrain of higher nervous activity was induced, by means of putting forward difficult problems (differentiation of tactile stimuli according to rhythm, many errors of stimulation and inhibition, change of conditioned reflexes, and others); furthermore, in one dog, the right hemisphere was decorticated; in both animals, temporary collapse of higher nervous activity took place.

Card 1/2

ROZENTAL', I. S.

Abuladze, K. S. and Rozental', I. S. "The conditional reflex action of dogs after partial destruction (impairment) of the suberose zones," Trudy fiziol. laboratoriy im. Pavlova, Vol. XIII, 1948, p. 183-208--Bibliog: 5 items

SO: U-2888, Letopis Zhurnal'nykh Statey, No. 1, 1949

ROZENTAL', I. S.

Rozental', I. S. "Materials on the problem of the relation of function and structure of blood which has been obtained from a dog after removal of the right hemisphere of the cerebrum," Trudy fiziol. laboratorii im. Pavlova, Vol. XIV, 1948, p. 118-33--Bibliog: 19 items

SO: U-3264, 10 April 1953, (Letopis 'zhurnal 'nykh Statey, no. 3, 1949)

ROZENTAL, I.S.

114

ca

The influence on a dog of prolonged application of sodium bromide. I. S. Rozental. *Fiziol. Zhur. S.S.S.R.* (J. Physiol.) 34, 431-4 (1948). To the dog whose behavior with NaBr on short application was reported earlier (*Arch. sci. Biol. (U.S.S.R.)* 41, No. 2 (1936)), NaBr was given in 4-g. doses (in 60 ml. milk) 1.8 hrs. before expts. for a period of 3 months (total NaBr used—300 g.). The expts. were conducted on a low level of conditioned food reflexes (produced by abundant feeding). The stimuli used were sound, light, and metronome ticks, as well as a "jack-in box." Conditioned reflexes began to rise after 3 days and reached a max. in 20 days, remaining at this level until the end of the expt.; on the 87th day signs of intoxication became evident and the reflex level showed a sharp drop. Considerable daily variations were noted. Seven days after termination, the symptoms of intoxication were gone and were replaced by the bromine-enhancement of the reflexes, which rose even higher than those obtained during bromination. This persisted for 1 month then dropped to normal. Typical thirst was exhibited by the dog during the expt. G. M. K.

Histophysiol. Lab., Physiol. Sec. in. Pavlov, Inst. Experim. Med., AM S USSR

ASA-SLA METALLURGICAL LITERATURE CLASSIFICATION

AUTHOR INDEX

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

ROZENTHAL, I. S.

5
1-RMP

4027
ON ANNIHILATION OF ANTIPROTONS WITH STAR FORMATION. S. Z. Belen'ki and I. S. Rozenthal' (P. N. Lebedev Physical Inst., Academy of Sciences, USSR). Soviet Phys. JETP 3, 786-7(1956) Dec. 2

Phys
Sci

RMP
copy

1. ROZENTAL', I. S.
2. USSR (600)
4. Conditioned Response
7. Characteristics of complex conditioned tactile and light reflexes, Zhur. vys. nerv. deiat., 2, No. 5, 1952.

9. Monthly List of Russian Accessions, Library of Congress, February 1953. Unclassified.

ROZENTAL', I.S.

Materials on the interrelation of stimulation and inhibition;(new
type of differentiation of the conditioned cutaneomechanical
stimulus). Trudy fiziol. lab. 1 no.1/3:121-139 '53 (MLRA 9:5)

(CONDITIONED RESPONSE)

ROZENTAL', I.S.

USIYEVICH, M.A. [author]; ROZENTAL', I.S. [reviewer].

"Physiology of the higher nervous function"; articles and reports. M.A.
Usievich. Reviewed by I.S.Rozental'. Fiziol.zhur. 39 no.5:640-644 S-O '53.
(MIRA 6:10)

(Nervous system) (Usievich, M.A.)

ROZENTAL', Iosif Solomonovich

Pavlov. Moskva, Medgiz, 1963. 146 p. (MIRA 17:10)

ROZENTAL', I.S.

Nature of tactile and light complex conditioned reflexes. Zh. vysshei
nerv. deiat. 2 no.5:634-639 Sept-Oct 1952. (CLML 23:4)

1. Physiology Department imeni I. P. Pavlov of the Institute of Experi-
mental Medicine of the Academy of Medical Sciences USSR.

ROZENTAL, K.

600

ROZENTAL24K8

1. SHLYGIN, A.: REZUMOVSKAYA, E.: ROZENTAL', K.

2. USSR (600)

"The Platinum Electrode," Part VII. "The Effect of Poisoning on the Capacity
Of a Platinum-Plated Electrode," Zhur. Fiz. Khim., 13, no.8, 1939.
Moscow, MGU, Electrochemical Laboratory. Received 9 Feb 1939.

9. [REDACTED] Report U-1615, 3 Jan 1952.

PA 56/49T102

ROZENTAL', K. [1.]

USSR/Physics
Resistance; Electrode
Electrodes; Mercury

Nov 48

"Research on the Kinetics of Electrode Reactions With Alternating Current Discharge of Mercury Ions, Formation of an Adsorbed Film of Chlorine and Oxygen on a Mercury Electrode. Formation of Mercuric Oxide, II," K. Rozental', B. Ershler, 1st pp Physicochem Inst Imeni L. Ya. Karpov, Moscow, 154 pp

"Zhur Fiz Khim" Vol XXII, No 11 - p-1344-57

Measures capacity and resistance of a mercury drop electrode at frequencies of 200-12,000 cycles in various solutions, and shows resistances of the

56/49T102

Nov 48

USSR/Physics (Contd)

reaction in all cases studied to be close to the margin of error, 0.03 Ω sq cm. This gives the value of 0.4-0.8 A/sq cm for the low limit of rate of these reactions. Submitted 26 Feb 48.

56/49T102

ROZENTAL, K. II

CATALYSTS

Chemical Abst.
Vol. 48 No. 3
Feb. 10, 1954
Electrochemistry

8-31-54
gyp

Chem

The mechanism and kinetics of electrochemical oxidation by the method of anodic voltammetry on a platinum electrode. K. I. Rozental and V. I. Yezlovskij (E. Ya. Karpov Phys.-Chem. Inst., Moscow). Zhur. Fiz. Khim. 27, 1103-71(1953); cf. C.A. 44, 6718f.—A Pt wire (e.g., 0.5 mm. thick) rotated in a soln. (e.g., 900 r.p.m.) could be used as the electrode in polarography if it was polarized 4 times in 3 min. from the potential $\phi = 1.5-0.3$ v. relative to the *N*H electrode. The half-wave potential *E* of such an anode was 1.2 v. in *N*HClO₄, *N*H₂SO₄, and *N*HNO₃, and the limiting current *I* was independent of the rotation of the electrode, i.e. was detd. by the rate of charging the electrode. In *N*H₂SO₄ + dil. Na₂SO₄, *E* was 0.7-0.8 v., i.e. the overvoltage was approx. 0.5 v.; when the concn. of SO₄²⁻ increased 10 times, *I* also increased 10-fold and *E* was more anodic by 0.15 v. At $\phi > 1.1$, current *i* decreased when ϕ increased, and at $\phi = 1.5$ v. it was 0.1 that at 1.05 v. An analogous dependence of ϕ on *i* was observed for *N*H₂SO₄ + 0.003*M* H₂S and for *N*HNO₃ + 0.0003*M* KNO₃ (with *E* = 1.23 v.). No final explanation was available for the decrease of *i* at higher ϕ . In *N*HNO₃ + 0.01*M* KNO₃ and in *N*HClO₄ + 10⁻⁴*M* H₂O₂ (*E* = 1.19 v.), a 2nd wave occurred at $\phi = 1.5$ v.; it may be due to decompn. of a Pt peroxide. When ϕ of Pt was increased more rapidly (e.g., 0.032 instead of 0.004 v./sec.), *I* was greater (e.g., 4 × 10⁻⁴ instead of 2 × 10⁻⁴ amp. in *N*HClO₄) because $I = I_0 + C(d\phi/dt)$, where *I*₀ was the fraction of current due to depolarizers, *C* the electrode capacity, and *t* time. The *I* in *N*H₂SO₄ + 0.005*M* FeSO₄ was independent of $d\phi/dt$ because Fe²⁺ → Fe³⁺ was an electronic reaction. The electrochem. oxidation of SO₃²⁻, NO₂⁻, and H₂O₂ was detd. by reactions between these substances and the O adsorbed by Pt. J. J. Bikerman

ROZENTAL, K. I.

Category: USSR

B-12

Abs Jour: R Zh--Kh, No 3, 1957, 7680

Author : Yakovleva, Ye. I., Rozental, K. I., and Filippov, T. S.

Inst : Not given

Title : On the Mechanism of the Electrochemical Formation of Oxygen Compounds with Chlorine at a Smooth Pt Electrode. I. Investigation of the Kinetics of the Electrochemical Oxidation of Cl^- and ClO_3^- Ions by Anode Polarography

Orig Pub: Zh. Fiz. Khimii, 1956, Vol 30, No 4, 937-944

Abstract: The polarographic curves for the anodic oxydation of Cl^- (I), ClO^- (II), ClO_2^- (III) and ClO_3^- (IV) have been recorded with a rotating Pt electrode for the purpose of investigating the mechanism of the electrochemical formation of compounds of oxygen with chlorine by a previously described method (RZhKhim, 1954, 35690). Sharp waves were obtained for I on a background of 0.9N Na_2SO_4 + 0.1N H_2SO_4 , for II and III on a background of 1N NaCl , and for IV on a background of 6N NaClO_4 . The half-wave potential $E_{1/2}$ under these conditions is equal to 1.65, 0.41, 1.07, and 1.72 volts, respectively. The limiting

Card : 1/3

-12-

Category: USSR

B-12

Abs Jour: R Zh--Kh, No 3, 1957, 7680

I is oxidized to Cl_2 ; in dilute HCl solutions (10^{-2} - 10^{-3} N), I is oxidized to IV, and the reaction involves the active oxygen adsorbed at the Pt surface (RZhKhim, 1954, 35690); it is assumed that the rate of the overall process is determined by the rate of the step in which the Cl^- ions are oxidized by the oxygen adsorbed at the Pt electrode. It is also assumed that the anodic oxidation of IV to ClO_4 proceeds by way of the formation of ClO_3 radicals which are subsequently oxidized by the surface oxygen to ClO_4^- .

Card : 3/3

-14-

Distr: 4E43

Electrochemical oxidation and reduction of gaseous hydrogen and oxygen mixtures in solutions of electrolytes on platinum and gold electrodes. K. I. Rozental and V. I. Vesnovskii (L. Ya. Karpov Phys. Chem. Inst., Moscow). *Zhur. Fiz. Khim.* 31, 1555-63(1957).—The polarization changes of $N H_2SO_4$ soln. satd. at various pressures with H_2 , O_2 , and their mixes. were measured by the authors' anodic polarography method (C.A. 48, 1174e) with smooth rotating Pt and Au microelectrodes. The H_2 ionization and the O_2 reduction processes in H_2SO_4 soln. in the potential range of 0-0.4 v. proceeded apparently independently of each other, and the external polarization currents represented the difference between the H_2 -oxidation current and the O_2 -reduction current. At 0.8-1.2 v. the O_2 reduction practically ceased, and O_2 became adsorbed on the Pt surface, and the anodic oxidation current was caused by the H_2 ionization and its oxidation by the adsorbed O_2 . The anode passivation during the H_2 ionization was increased by gaseous O_2 . Unlike on the Pt electrode, no H_2 ionization occurs on the Au electrode, presumably owing to the very low H_2 adsorption on Au; the O_2 kinetics on Au did not depend on the H_2 concn. in soln. The results obtained justify the use of anodic polarography method with rotating Pt or Au electrodes for the analytical detn. of H_2 and O_2 in H_2SO_4 soln. W. M. Sternberg

7
1

ROZENTAL, K. I.

Distr: hEluj 7

✓ Anodic polarography study of the mechanism and kinetics of electrochemical hydrogen oxidation on a platinum electrode. K. I. Rozental and V. I. Veslovskij (L. Ya. Karpov Inst. Phys. Chem., Moscow). *Zhur. Fiz. Khim.* 31, 1732-B (1957). — The anodic polarography method described previously (*C.A.* 48, 1174g) was used to measure the polarization potentials on rotating Pt anodes against a Pd-H electrode in the same cell, at different rotation speeds of the anode, different preliminary electrochem. treatment of the surface, different rates of potential rise, and different kinds of anions in soln. The ionization proceeded by a simple discharge mechanism only at potentials close to the reversible H potential. The electrode passivation was important in the H ionization processes. The polarization curve of H in NH_4Cl or at 0.9–1.2 v, had a 2nd current max. which may have resulted either from the H ionization on the oxidized Pt surface, which proceeds at a high overvoltage, or from mol. H oxidation to H_2O by a catalytic process by the O adsorbed electrochemically on the Pt surface, as suggested for the anodic oxidation of SO_2 and NO . The effect of the rate of the rise of potential on the electrochem. characteristics of H oxidation were connected with the difference in activity of the Pt electrode.

W. M. Sternberg

[Handwritten signatures]

AUTHORS: Rozental', K. I., Veselovskiy, V. I. SOV/76-32-6-23/46

TITLE: The Process of the Electrochemical Oxidation of Tetravalent Uranium on the Pt-Electrode (Protsess elektrokhimicheskogo okisleniya soley chetyrehvalentnogo urana na Pt-Elektrode)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 6, pp. 1341 - 1347 (USSR)

ABSTRACT: This work was carried out at the Laboratory of Electrochemistry of the Physical-Chemical Institute imeni L.Ya.Karpov between 1948 and 1950; the technical report is to be found at the library of this institute. At present few data are found in papers dealing with the problem mentioned in the title; among them are the papers by Betts (Ref 1) and Heal (Ref 2). The present investigation was conducted by means of a rotating Pt-micro-electrode using an already earlier described method of anode polarography. From the obtained results of the experiments of the anodic oxidation of UO^{+2} -ions in $HClO_4$ -solutions as shown on the current versus voltage diagrams a wave may be seen at $E_{1/2} = 1.05$ V, as well as

Card 1/3

The Process of the Electrochemical Oxidation of
Tetravalent Uranium on the Pt-Electrode

SOV/76-32-6-23/46

a current $i_d = 4.3 \mu\text{A}$ directly proportional to the concentration of the UO^{2+} -ions within the interval of from $1 \cdot 10^{-2}$ to $2 \cdot 10^{-4} \text{M}$. It was found that the value of i_d depends on the surface of the Pt-electrode, as well as that the value of i_d decreases with the retardation of the decrease of the I - E curve, so that, for instance, in the case of an increase of the velocity of the potential application to the 8-fold an increase of the limit current to the 2.5-fold takes place. In order to make use of this knowledge in the increase of the sensitivity for analytical purposes some conditions must however be taken into account. Based on the evidence obtained and on some rules it is assumed that an interaction of the UO^{2+} -ions with oxygen which is electrochemically adsorbed at the platinum takes place and that it determines the velocity of the reaction mechanism. The electrochemical redox processes which take place only due to the exchange of ion charges do, however, not need any activation energy and take a reversible course. The investigations of the anodic oxidation of UO^{2+} -ions in the presence of H_2O_2 , HNO_3 and Cr^{3+} -ions,

Card 2/3

The Process of the Electrochemical Oxidation of
Tetravalent Uranium on the Pt-Electrode

76-32-6-23/46

as well as HNO_3 -solutions with Th^{+4} -ions showed that a change of the I-E curve occurs, where, e.g., a higher concentration of the Cr^{+3} -ions can cause the adsorption of the Cr^{+3} -ions at the Pt-surface. There are 7 figures and 9 references, 6 of which are Soviet.

ASSOCIATION: Fiziko-khimicheskiy institut im.L.Ya.Karpova, Moskva (Institute of Physics and Chemistry imeni L.Ya. Karpov, Moscow)

SUBMITTED: February 16, 1957

1. Uranium--Oxidation
2. Uranium--Electrochemistry
3. Platinum electrodes--Electrochemistry

Card 3/3

AUTHORS: Tyurikov, G. S., Rozental', K. I., Veselovskiy, V. I. SOV/76-32-7-8/45

TITLE: The Mechanism of the Electrochemical Reactions on a Mercury Cathode in Uranium Salt Solutions (Mekhanizm elektrokhimicheskikh reaktsiy v rastvorakh soley urana na rtutnom katode)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 7, pp. 1490 - 1498 (USSR)

ABSTRACT: The electrochemistry of uranium has been investigated by a great number of scientists, there are, however, a number of contradictions in publications. In a previous paper one of the authors of this paper carried out polarographic investigations on a dropping mercury electrode, as well as on a steady mercury electrode in the case of a weak polarization by alternating current; these investigations dealt with the electrochemical reactions

$$\text{UO}_2^{2+} + e \rightleftharpoons \text{UO}_2^+ \quad \text{and} \quad \text{UO}^{2+} + e \rightleftharpoons \text{UO}^+$$

The polarograms of the cathodic reduction of uranyl ions were automatically recorded on a polarograph according to Geyrovskiy, the work having

Card 1/4

The Mechanism of the Electrochemical Reactions on a
Mercury Cathode in Uranium Salt Solutions

SOV/76-32-7-8/45

been carried out in a hydrogen atmosphere at $25 \pm 0,1^\circ\text{C}$. In the investigations concerning the influence of the concentration of H^+ ions and of the nature of the anion of the solution on the process of the cathodic reduction the author used constant uranyl ion concentrations in solutions of sulfuric acid, hydrochloric acid and HClO_4 . The current versus voltage curves

obtained showed two and three polarographic waves respectively, corresponding to the acidity of the solutions; the first wave is explained by the reversible reaction

$\text{UO}_2^{2+} + e \rightleftharpoons \text{UO}_2^+$, while in the presence of three waves the

second represents the irreversible reaction $\text{U}_2^+ + e + 2\text{H}^+ \rightarrow \text{UO}^{2+} + \text{H}_2\text{O}$, and the third wave characterizes the reversible reduction

of uranium from the tetra- to the trivalent state $\text{UO}_2^{2+} + e \rightleftharpoons \text{UO}^+$. The I - E curves of the highly acid HCl and H_2SO_4 solutions

do not show a second wave, and a disproportionation reaction is assumed: $2 \text{UO}_2^+ + \text{H}^+ \rightleftharpoons \text{UO}_2^{2+} + \text{UO}(\text{OH})^+$. The function of the value for i_d of the first wave vs. the nature of the acid

Card 2/4

The Mechanism of the Electrochemical Reactions on a
Mercury Cathode in Uranium Salt Solutions

SOV/76-32-7-8/45

anion is expressed by the series

$i_d \text{H}_2\text{SO}_4 > i_d \text{HCl} > i_d \text{HClO}_4$ and it was observed that the effect of the anions extend to the various stages of the cathodic reduction. For determining the velocity of disproportioning of the UO_2^+ -ions an apparatus was used, with the measuring

method having an advantage as compared to that by Heal (Ref 6), viz., that the measurements were carried out directly. The technique of current measuring in the determinations carried out in the exchange reactions: $\text{UO}_2^{2+} + e \rightleftharpoons \text{UO}_2^+$ and $\text{UO}_2^{2+} + e \rightleftharpoons \text{UO}^+$,

as well as the apparatus has been described in the paper by K.I.Rozental' and B.V.Ershler (Ref 11). From the results of the investigation mentioned may be seen that the electrochemical reduction of UO_2^{2+} in UO_2^+ determines the velocity of the exchange of the first reaction. It was found that the exchange current acquires various values in solutions of different concentrations; this fact is traced back to a function of the degree of dissociation of the uranium (VI)-salts vs. the pH

Card 3/4

The Mechanism of the Electrochemical Reactions on a
Mercury Cathode in Uranium Salt Solutions

SOV/76-32-7-8/45

of the solution. The determinations in the second exchange reaction showed a linear function of the quantity of the exchange current vs. the UO_2^{2+} ion concentration in the solution; this is explained by the influence of the electrochemical reduction of the tetravalent ions to trivalent ions on the velocity of the exchange. There are 9 figures, 2 tables, and 11 references, 5 of which are Soviet.

ASSOCIATION: Fiziko-khimicheskiv institut im.L.Ya.Karpova, Moskva (Moscow,
Physicochemical Institute imeni L.Ya.Karpov)

1. Mercury cathodes—Electrochemistry
2. Uranium salt solutions
- Electrochemistry 3. Uranium—Polarographic analysis
4. Exchange reactions

Card 4/4

28287

S/076/61/035/010/004/015
B101/B110

26.2510 (also 120P)

AUTHORS: Rozental', K. I., and Veselovskiy, V. I. (Moscow)

TITLE: Kinetics of the electrochemical reactions of oxidation and reduction of H_2 , O_2 , and oxyhydrogen gas on a platinum electrode in electrolyte solutions

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 10, 1961, 2256-2264

TEXT: The authors describe a method of measuring the effective rate of H_2 oxidation, O_2 reduction, and "combustion" of oxyhydrogen gas on a platinum electrode, based on gas consumption. A confrontation is made with data found earlier by polarography (Ref. 11: K. I. Rozental', V. I. Veselovskiy, Zh. fiz. khimii, 31, 1555, 1732, 1957). Fig. 1 shows the experimental arrangement. The electrode to be tested is placed in the central part A, and the auxiliary platinum electrode B is situated in the lateral ramifications along with the reference electrode C (Pd sheet saturated with H_2). The electrode to be tested consisted of a platinum net wrapped around a glass tube which was caused to rotate at 700 rpm by a magnetic field. A was filled with electrolyte (1 N H_2SO_4 ; 1 N $HClO_4$ or 1 N KOH) which was

Card 1/1

UH