"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G.S.

Proton stoppage of extremely relativistic electrons. Dokl.AN Arm.SSR 15 no.1:3-10 '52. (MLRA 9:10)

1.Yerevanskiy Gosudarstvennyy Universitet imeni V.M.Moloteva. Predstavleno V.A.Ambartsumyanom.
(Protons) (Electrons) (Nuclear reactions)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

KOCHARYAN, N.M.; SAAKYAN, G.S.

Nonionization losses of high-energy protons. Dokl. AN Arm. SSR. 15 no.3:65-70 '52. (MLRA 9:10)

1. Yerevanskiy gosudarstvennyy universitet imeni V.M. Molotova. Predstavleno A.I. Alikhanyanom.
(Photons)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S. PA 236T74

USSR/Nuclear Physics - Cosmic Rays Nov 52

"Investigation of Composition of Cosmic Rays at 1,000 Meters Above Sea Level," N. M. Kochoryan, G. S. Saakyan, M. T. Ayvazyan, Z. A. Kirakosyan, S. D. Kaytmazov, Phys Inst, Acad Sci Georgian SSR

"Zhur Eksper i Teoret Fiz" Vol 23, No 5, pp 532-542

Describe results of measurements in 1950-51. Show that number of pi-mesons within a certain interval is 5% less than that of mu-mesons. Numerical data of observations are given. Indebted to A. I. Alikhanyan, Ye. L. Feynberg, M. P. Gambaryan, A. S. Aleksanyan, and Kh. V. Pachadzhyan. Received 4 Jun 52.

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APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S.

Generation of π mesons in dense materials. G. S. Saakyan. *Izvest. Akad. Nauk Armyan. S.S.R., Ser. Fiz.-Mat., Estestven. i Tekh. Nauk* 6, No. 3, 65-78(1953); *Referat. Zhur., Fiz.* 1954, No. 2602.—The energy spectra and the variation with depth of the no. of pions formed by nucleons in a dense medium are calcd. Data on the energy and angular distribution of mesons formed in stars in photographic plates serve as a basis for the calcns. The following assumptions are used in the calcns.: (1) the no. of nucleons varies with depth exponentially; the exponent corresponds to the geometric cross section of the reaction with the nuclei of the substance being studied; (2) all of the mesons scatter at an av. angle of 30° from the direction of motion of the nucleon which generates the star; (3) the energy spectrum of the nucleons does not change with depth; (4) the stars formed by nucleons and pions have the same character. It is shown that the no. of pions vs. depth curve has a max. at a depth which only slightly exceeds the path of the nucleon, corresponding to the geometric cross section of the reaction. Thus, for the emulsion (the path which corresponds to the geometric cross section ~90 g./sq. cm.) the max. occurs for a depth ~100 g./sq. cm. — T. Rovtar Leach

Yerevan State U.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

KOCHARYAN, N.M.; SAAKYAN, G.S.

Spectra of proton creation in air and lead. Izv. AN Arm. SSR Ser. FMET nauk 8 no.1:15-20 Ja-F '55. (MIRA 8:6)

1. Yerevanskiy gosudarstvennyy universitet im. V.M.Molotova.
(Protons--Spectra)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

KOCHARYAN, N.M.; SAAKYAN, G.S.; AYVAZYAN, M.T.; KIRAKOSYAN, Z.A.; ALEKSANYAN, A.S.

Spectra of π-meson and proton production in graphite. Izv.AN SSSR Ser.fiz.19 no.5:508-514 S-O '55. (MIRA 9:4)

1.Fizicheskiy institut Akademii nauk Arm.SSR.
(Cosmic rays) (Nuclear physics)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S.

724

ENERGY SPECTRUM OF PROTONS AT 3200 m ABOVE SEA LEVEL. N. M. Kocharyan, G. S. Saakyan, M. T. Alvazyan, Z. A. Kirakosyan, and A. S. Aleksanyan. (Armenian Inst. of Physics). Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 19, 515-18(1955) Sept.-Oct. (In Russian)

Spectra of protons in the impulse range of $p < 2$ Bev/c was determined in previous works. With high impulses the copper absorbers located under the magnetic clearance prevented the direct separation of the proton beams from the π-meson beams. Nevertheless, this division was obtained indirectly by investigations of the interaction of the particles in the absorber and the observation of the phenomenon that μ mesons do not interact with nuclei while the protons do. The measurements were taken under the magnetic clearance from six copper absorbers with total surface density of 178 g/cm^2. μ mesons which stopped in these absorbers had impulses of $p \approx 0.4$ Bev/c. Protons with $p \approx 1.1$ Bev/c impulses were stopped because of ionization, but with large impulses they stopped because of internuclear interactions. (R.V.J.)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

Saakyan, G.S.

USSR/Nuclear Physics - Elementary Particles C-3

Abst Journal : Referat Zhur - Fizika, No 12, 1956, 33922

Author : Mocharyan, N. M., Saakyan, G. S., Ayvazyan, M. D., Kirakosyan, Z. A., Aleksanian, A. S.

Institution : Institute of Physics, Academy of Sciences Armenian SSR

Title : Nuclear Interaction of π^--Mesons in Copper

Original Periodical : Dokl. AN SSSR, 1955, 105, No 6, 1204-1207

Abstract : A magnetic spectrometer was used to study the spectra of creation of π^--mesons, generated in copper absorbers at an altitude of 3,250 m. Approximately 500 π^--mesons with a total energy exceeding 510 Mev were recorded. The energy spectrum of the resulting π^--mesons can be approximated by a power law with an index $\gamma = 2.2$. The magnitude of the interaction cross section of π^--mesons with copper nuclei turned out to be weakly dependent on the energy and close to its geometrical value.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SHAKYAN, G.S.

KOCHARYAN, N.M.; SAAKYAN, G.S.

Meson and electron generation in the lower atmospheric layers. Dokl. AN Arm. SSR 21 no.1:11-14 '55. (MIRA 8:11)

1. Institut fiziki Akademii nauk Armyanskoy SSR. Predstavleno A.L. Shaginyanom

(Mesons) (Cosmic rays)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S.

Nuclear reactions of high-energy protons in copper. N. M. Kocharyan, G. S. Saakian, M. T. Alvasyan, Z. A. Kirakosyan, and A. S. Aleksanyan. *Soviet Phys. "Doklady"* 1, 200-10(1956)(English translation).—See *C.A.* 51, 8815g. B. M. R.

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S.

Passage of nucleon components through the atmosphere. G. S. Saakyan. *Izvest. Akad. Nauk Armyan. S.S.R. Fiz.-Mat., Estestven. i Tekh. Nauki* 9, No. 7, 79-104(1956) (in Russian).—Phenomenological theory of the nucleon cascade process in air, based on the idea presented by Vernov, *et al.*, (cf. *C.A.* 50, 7615a) was developed. From the initial energy spectra of nucleon with a simple algebraic operation, theory permits detn. of the energy spectra, angular distribution, range of absorption, and some other characteristics of nucleon components in the different depths of the atm. 66 references. —M. Charmandarian

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S.

19 539.172.13

2635. NUCLEAR INTERACTIONS OF HIGH-ENERGY PROTONS 19
IN COPPER. N.M.Kocharyan, G.S.Saakyan, M.T.Alvazyan,
Z.A.Kirakosyan and A.S.Aleksanyan.
Dokl. Akad. Nauk SSSR, Vol. 107, No. 5, 668-70 (1956). In Russian.

Using a magnetic spectrograph described earlier (Abstr. /1957) momenta of π^+-mesons and protons are selected. The inelastic cross-section is measured. The cross-section for π^+-mesons is separated off by assuming it equal to that for π^--mesons which was measured and described in the earlier article (Abstr. /1957). Measurements in the range 0.9-2.2 BeV are in good agreement with the results of others. In the region 1-5 BeV the proton cross-section changes slowly and is roughly equal to 0.75 geometrical. G.E.Brown

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S.

19 19 19 15 10 2

Nuclear interactions of π mesons and protons in graphite. N. M. Kocharyan, G. S. Saakyan, M. T. Alvazyan, A. S. Aleksanyan, and [redacted] Pachadzhyan. *Izvest. Akad. Nauk Armyan. S.S.R., Ser. Fiz.-Mat. Nauk* 10, No. 3, 81-8 (1957)(in Russian).—The nuclear interaction cross section of protons and π mesons in graphite was detd. at the high-altitude station Aragats in 1956. A magnetic spectrometer, after Alikhanyan-Alikhanov, was used in the measurements. Graphite and Pb absorbers of a multilayer type were employed in obtaining the trajectories of the particles; these devices are described in some detail. The particle deflection is controlled by the proper arrangement of the absorber plates. The cross section of nuclei of graphite as detd. for π mesons exhibits some transparency (cf. Isc, *et al.*, *C.A.* 51, 11093g); since it is smaller than the geometrical cross section. Error calcn. shows that the expts. have been sufficiently precise for measuring impulses of particles and detg. the cross section for protons and π mesons to 60 b.e.v. A. Kremheller

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SAAKYAN, G. S.

19

Energy spectrum of π-meson production in the atmosphere. G. S. Saakyan. *Doklady Akad. Nauk Armyan. S.S.R.* 24, No. 1, 3-8(1957)(in Russian).—On the basis of energy spectra of μ mesons at sea level and at 3200 m. altitude the energy spectra of π-meson production were calcd. The following assumptions were made: at 3200 m. μ mesons form as the result of decay of $\pi^{\pm}$ mesons. From spectra of π-meson production little change was observed with depth; the av. range of inelastic nuclear interaction of nucleons in the air, and the range of absorption of nucleon components in the atm. were considered to be 70 and 120 g./sq. cm., resp. There is no significant difference between the cross sections of nuclear interaction of protons and π mesons. Calcns. and diagrams are presented. M. C.

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SAAKYAN, G.S.

21 19

Energy spectrum of μ mesons at 3200 meters elevation above sea level. N. M. Kocharyan, G. S. Saakyan, and M. T. Alyazyan (State Univ., Erevan). *Doklady Akad. Nauk Armyan. S.S.R.* 24, No. 2, 49-52(1957)(in Russian). —The energy distribution of μ mesons was detd. with the aid of a powerful magnetic spectrometer capable of measuring the impulse of particles from 100 to 1 b.e.v./c. Graphite absorbers were used to sep. protons and π mesons from μ mesons. The no. of nucleus-activated particles in the stream of μ mesons was obtained from the ratio of interacting particles with the interaction probability (W) of protons and π mesons in the absorbers ($W = 1 - e^{-x/\lambda}$, where x = 43 g./sq. cm. — total thickness of the absorbers; λ — penetration value of nonelastic nucleus interaction in graphite. In the region of energies $E \leq 10$ b.e.v. for protons and π mesons λ = 95 g./sq. cm.). For $E > 4$ b.e.v. the energy spectrum of μ mesons was precisely described by a power function of the type $n(E)dE = 0.50 (5 + E)^{-3} dE$. Diagram of the spectrometer and tables are given. A. P. Kotlov

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G.S.; KIRAKOSYAN, Z.A.: ALEKSANYAN, A.S.

Energy spectrum of protons at 3200 meters above sea level.
Dokl.AN Arm.SSR 24 no.3:97-104 '57. (MLRA 10:5)

1. Fizicheskiy institut Akademii nauk Armyanskoy SSR. Predstavleno A.I. Alikhanyanom.
(Protons) (Spectral analysis)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

21(0) SOV/56-35-6-3/44

AUTHORS: Kocharyan, N. M., Saakyan, G. S., Kirakosyan, Z. A.

TITLE: Energy Spectra and Nuclear Interactions of Cosmic Ray Particles (Energeticheskiye spektry i yadernyye vzaimodeystviya chastits kosmicheskogo izlucheniya)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 6, pp 1335-1349 (USSR)

ABSTRACT: In the present paper the authors published results obtained by their investigations of cosmic particles carried out in 1953-1956 at the laboratory of the Aragats mountain station (3200 m above sea level). The energy spectra of muons and protons were investigated by means of a magnetic spectrometer (Fig 1). The accuracy of momentum measurement was great compared with that of previous measurements (Refs 1,2). The energy distribution of protons and muons (nuclear interaction in C-,Cu, and Pb-absorbers) up to 100 Bev was investigated. Experimental results are shown in detail by tables. Those obtained by the two series of experiments carried out for the purpose of determining muon energy distribution are given by tables 1 and 2. Figure 2 shows the differential and integral energy spectra within the range of 1 - 100 Bev (diagram). For E>4 Bev the following applies with respect to muon energy distribution:

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$$n_{\mu}(E)dE = 0.5(E+5)^{-3}dE \quad \text{(for } E<2 \text{ Bev see reference 2).}$$

The proton energy spectrum was also investigated, but in four series of experiments, and the following was obtained for $E>3$ Bev:

$$n_p(E)dE = 3.2.10^{-3}(2+E)^{-2.8}dE$$

Here E denotes the kinetic energy of protons in Bev. Details of the investigations are given by tables 3 and 4. Figure 3 shows the course of the differential proton energy spectrum (diagram). Further, the inelastic nuclear interaction cross sections of pions and protons in copper, graphite, and lead were investigated. Results are shown by table 5 (for π^--mesons in copper; with increasing energy accuracy decreases sharply). Table 6 shows the same for particles with a positive charge. Table 7 shows the results of cross section measurements for π^--mesons in copper, table 8 the total inelastic interaction cross sections for protons in copper. Tables 9 and 10 give the results obtained by investigations of inelastic cross section measurements for π^--mesons and protons respectively in lead. Measuring results lead to the following conclusions:

1) The inelastic nuclear interaction cross sections of pions and protons within the energy range of 1 to several 10 Bev are equal

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SOV/56-35-6-3/44

Energy Spectra and Nuclear Interactions of Cosmic Ray Particles

and independent of energy within the limits of measuring accuracy. 2) For a geometric cross section in matter of $\sigma_o = (1.4 \cdot 10^{-13} A^{1/3})^2$ (the nucleus does not behave as a black body with respect to pions and protons with $E > 1$ Bev) $\sigma_a = 0.65\ \sigma_o$ holds for graphite, $\sigma_a = 0.75\ \sigma_o$ for copper, and $\sigma_a = 0.9\ \sigma_o$ for lead.- There are 3 figures, 10 tables, and 23 references, 7 of which are Soviet.

ASSOCIATION: Fizicheskiy institut Akademii nauk Armyanskoy SSR (Physics Institute of the Academy of Sciences, Armyanskaya SSR)

SUBMITTED: June 7, 1958

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S.

"ENergy spectrum of cosmic ratiation" Protons:
G. S. Saakyan, N. M. Kocharyan, Z. A. Kirakosyan

In 4 independent experiments, the proton spectrum from 40 Mev to 66 Bev was measured at an altitude of 3200 m above sea level by means of the Alikhanyan-Alikhanov magnetic spectrometer.

In the energy range E 3Bev, the differential spectrum is approximated by the following power function:

$$N(E)\,dE = 3.2 \times 10^{-3}\,(2+E)^{-2.8}dE,$$

where E is the proton kinetic energy expressed in Bev. The obtained spectrum is compared with the primary radiation spectrum.

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

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

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S/022/59/012/05/07/009

AUTHOR: Saakyan, G.S.

TITLE: Induced Deceleration Radiation and Absorption

PERIODICAL: Izvestiya Akademii nauk Armyanskoy SSR. Seriya fiziko-matematicheskikh nauk, 1959, Vol. 12, No. 5, pp. 99-104

TEXT: Besides the usual deceleration radiation the author observes the induced deceleration radiation and absorption in presence of an external field. On behalf of simplicity the author assumes that the external radiation field is not polarized and he calculates the probabilities of the induced processes. The probability dW of the induced deceleration radiation in the unit of time is obtained as :

$$dW = \left[1 + 8\pi^3 \frac{\rho(\omega, \vartheta, \varphi)}{\omega^3}\right] dW_0 \tag{3'}$$

where dW_0 is the probability of the usual deceleration radiation, ρ the density of the radiated energy, ω the frequency. For the probability dW' of the induced deceleration absorption the author obtains

$$dW' = 8\pi^3 \frac{\rho(\omega, \vartheta, \varphi)}{\omega^3} dW'_0 , \tag{10}$$

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where dW'_o arises from dW_o by alternating everywhere the sign of the photon impulse. It is stated that for small energies it is always

(15) $$dW'_o > dW_o$$

i.e. that the probability of the induced absorption is greater than that of the induced radiation. For very intensive radiation fields (sun, stars) the probability of the induced radiation can be greater than the probability of the usual deceleration radiation. If it is assumed that in the stars there is a black radiation field, then (3') and (10) can be integrated :

(18) $$W(\varepsilon_1, \omega)\, d\omega\, dx = \left(1 - e^{-\frac{\omega}{aT}}\right)^{-1} dW_o(\varepsilon_1, \omega)\, d\omega\, dx \quad ,$$

where a is the Bolzmann constant, $W_o(\varepsilon_1, \omega) d\omega\, dx$ is the probability that an electron with the energy ε_1 after passage through a dx strong medium layer radiates a photon, the energy of which lies in the interval $\omega, \omega + d\omega$. In the case of absorption from (10) it follows

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Induced Deceleration Radiation and Absorption S/022/59/012/05/07/009

$$(21) \quad W'(\varepsilon_1, \omega)d\omega\, dx = e^{-\frac{\omega}{aT}}\left(1 - e^{-\frac{\omega}{aT}}\right) W'_0(\varepsilon_1, \omega)d\omega\, dx \quad .$$

The author thanks I.I. Gol'dman for valuable discussion.
There are 2 Soviet references.

ASSOCIATION: Fizicheskiy institut AN Armyanskoy SSR (Physical Institute AS Armenian SSR)

SUBMITTED: March 4, 1959

Card 3/3

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G.S.

Induced Cherenkov radiation. Dokl.AN Arm.SSR 28 no.3:121-125 '59. (MIRA 12:7)

1. Yerevanskiy gosudarstvennyy universitet. Predstavlenom chlenom-korrespondentom AN ArmSSR N.Kocharyanom.
(Cherenkov radiation)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6"

"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G.S.

New mechanism of the creation and annihilation of electron pairs in a medium. Dokl. AN Arm.SSR 29 no.1:23-28 '59. (MIRA 12:11)

1. Fizicheskiy institut Akademii nauk Armyanskoy SSR. Predstavleno chlenom-korrespondentom AN Armyanskoy SSR N.M. Kocharyanom.
(Electrons)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

PHASE I BOOK EXPLOITATION SOV/4413

International Cosmic Ray Conference. Moscow, 1959.

Proceedings. v. III. Moscow, 1960. 253 p. Errata slip inserted. No. of copies printed not given.

Sponsoring Agency: International Union of Pure and Applied Physics. Cosmic Ray Commission.

Ed.: S. I. Syrovatskiy, Editorial Board: G. B. Zhdanov (Ed.-in-Chief), I. P. Ivanenko (Assistant Ed.-in-Chief), N. M. Gerasimova, A. I. Nikishov, V. I. Zatsepin, B. A. Khrenov, L. I. Dorman, V. F. Tulinov, S. I. Syrovatskiy, V. M. Fedorov, Yu. N. Vavilov, and A. T. Abrosimov.

PURPOSE: This book is intended for physicists, astronomers and other scientists concerned with the earth's radiation belts and cosmic ray research.

COVERAGE: This is Volume 3 of a 4-volume work containing the proceedings of the Moscow Cosmic Ray Conference held July 6-11, 1959. This volume contains 40 reports on the earth's radiation belts and primary cosmic radiation. The reports delivered by Soviet scientists are abstracted below. References accompany individual reports.

9. Krasovsky (Krasovskiy), V.I., I.S. Shklovsky (Shklovskiy), G. I. Gal'perin, and K.N. Svetlitsky (Svetlitskiy). On Fast Corpuscles of the Upper Atmosphere 59-63

This paper presents experimental data on fast corpuscles of the upper atmosphere and gives a detailed description of the equipment used in the experiment.

11. Dorman, L.I. On the Problem of the Nature of Soft Radiation in the Upper Atmosphere 74-80

This paper summarizes the available data on bursts of soft radiation in the atmosphere and investigates the nature of the bursts in relation to processes on the sun, in corpuscular streams, and in the interplanetary medium. It also investigates the nature of these bursts in relation to the properties of the Earth's belts of radiation.

12. Askar'yan G. A. On the Nature of the External Radiation Belt of the Earth 81-82

It is stated that the external radiation belt encircling the earth is of nuclear origin, but that the explanations of the capture and accumulation of particles by the Earth's magnetic field in the course of its local variations are not convincing as an explanation of the nature of the external radiation belt. A more convincing explanation of the observed effects is given in this paper.

II. PRIMARY COSMIC RADIATION

22. Charakhch'yan, A.N., and T.N. Charakhch'yan (Lebedev Physical Institute, USSR Academy of Sciences; Nuclear Physics Research Institute, Moscow University). Energy Spectrum of Primary Cosmic Particles 129-135

This paper explains the results obtained from investigations of the electron component of cosmic radiation in the upper layers of the atmosphere.

23. Kocharyan, N.M., G.S. Saakyan, and Z.A. Kirakosyan (Kirakosyan). Spectrum of Cosmic Radiation Protons 136

This is an abstract of the results obtained in four independent experiments. The full text has been published in Russian in the Zhurnal eksperimental'noy i teoreticheskoy fiziki, 35, 1335 (1958).

SAAKYAN, G.S.

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S/026/60/000/011/001/009
A166/A026

3,1560 (1057, 1172, 1177)

AUTHOR: Saakyan, G.S.

TITLE: Hyperon Stars

PERIODICAL: Priroda, 1960, No. 11, pp. 14 - 21

TEXT: The author discusses V.A. Ambartsuman's theory on the formation of star groups and galaxies whereby, in contrast to previous opinions, the development is from the denser prestellar bodies to the lighter states of matter. The super-dense prestellar matter "explodes" into numerous star groups and masses of dispersed interstellar matter. The author then turns to a special case of this theory and advances the hypothesis of the existence of neutron and hyperon stars, prefacing the discussion with a review of current theory on elementary particles and antiparticles and the statistical laws which apply to them. The temperature, mass, gravity, density, energy levels and composition of white dwarfs, neutron and hyperon stars are then compared. The theory on white dwarfs was developed by the Soviet physicist L.D. Landau, while the theory of neutron stars was developed by Landau and also by R. Oppengeymer and M. Volkov. The author demonstrates that, with an increase in density above 10^8 g/cm^3, the percentage of neutrons in the matter will rise rapidly through a percentage decrease in electrons

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A166/A026

Hyperon Stars

and protons. Oppengeymer and Volkov have shown that the neutron star can be in equilibrium with a mass greater than 0.3 and less than 0.7 the mass of the sun. The immense gravitational forces are here balanced only by the pressure of degenerate neutron gas. During the formation of the neutron from the proton a neutrino is liberated, capable of passing freely through the mass of the star. The neutrinos could carry off the main part of the energy generated during compression, thus enabling the neutron star to develop within the time interval of our galaxy. Due to the intense gravitational pull, the neutron star would diffract light strongly and would act as an enormous collecting lens, condensing the light from many stars. As matter increases in density beyond 10^{15} g/cm^3, conditions become suitable for the formation of hyperon stars. These stars must have a mass similar to that of the sun, but a radius ranging from a few kilometers. The star consists of 3 regions: 1) an inner hyperon nucleus containing the main mass of the star and with a density greater than normal nuclear density; 2) a spherical neutron layer containing no hyperons but equal parts of protons and electrons; the mass and thickness are small compared to the hyperon nucleus; 3) an envelope a few dozen meters thick and consisting of bare nuclei and electrons, or atoms at the surface. Should a hyperon star collide with some other celestial body, a hyperon star of unstable mass and size might develop, which would then

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Hyperon Stars

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explode on a cosmic scale, liberating colossal energy. There are 8 figures.

ASSOCIATION: Fizicheskiy institut AN Armyanskoy SSR (Physics Institute, AS Armyanskaya SSR), Yerevan

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SAAKYAN, G.S.

Dispersion properties of a medium in the case of very great densities and temperatures. Report No.1: Scattering of electromagnetic waves by electrons. Dokl.AN Arm.SSR 30 no.1:47-54 '60. (MIRA 13:7)

1. Fizicheskiy institut Akademii nauk Armyanskoy SSR. Predstavleno chlenom-korrespondentom AN Armyanskoy SSR. N.M.Kocharyanom.
(Electromagnetic waves--Scattering)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G. S.

Dispersion properties of a medium in cases of very great densities and temperatures. Report No.2. Dokl.AN Arm.SSR 30 no.4:211-218 no.4:211-218 '60. (MIRA 13:8)

1. Fizicheskiy institut Akademii nauk Armyanskoy SSR. Predstavleno chlenom-korrespondentom AN Armyanskoy SSR N.M. Kocharyanom.
(Dispersion)

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E032/E914

3.1530

AUTHORS: Ambartsumyan, V.A. and Saakyan, G. S.

TITLE: Degenerate Superdense Gas of Elementary Particles.

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol 37, Nr 2, pp 193-209 (USSR)

ABSTRACT: Analysis of available observational material shows that the evolution of stellar groups and galaxies takes place from dense prestellar bodies to less dense states. In other words, groups of stars and large amounts of matter scattered in interstellar space originate from very dense prestellar bodies. The first group of facts which may be used to support this hypothesis relates to galaxies and groups of galaxies and was analyzed by Ambartsumyan in Ref 1. Thereis evidence that the appearance of new galaxies and spiral arms is associated with matter in the nuclei of galaxies. These nuclei have small dimensions and high density. The second group of facts relates to the formation of stellar groups making up stellar associations. The presence in these associations and, in particular, in their central regions, of large gaseous nebulae, tight stellar

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Degenerate Superdense Gas of Elementary Particles

groups, and systems of the Trapezium type, is in conflict with the hypothesis according to which stellar associations are formed from diffuse nebulae. The properties of systems of the Trapezium type indicate that they have originated from a massive and very dense body. The primary superdense configurations should, in general, have very complex properties and it is therefore useful in the first instance to consider configurations whose temperature is close to absolute zero, i.e. all the fermions form a degenerate gas. An important property of superdense configurations is the presence of both neutrons and hyperons. Since at sufficiently low temperatures the nucleon gas is strongly degenerate, hyperons having an energy below a certain limiting value become stable, since in accordance with the Pauli principle their decay products cannot be accommodated in

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Degenerate Superdense Gas of Elementary Particles

the phase space. Mutual transformations of hyperons of different kinds are also forbidden by this principle. The present authors derive equations giving the concentration of the different kinds of baryons at $T = 0$. These equations are derived under the following assumptions: 1) In the equilibrium state the energy of the systems should be a minimum. 2) In all possible processes leading to the appearance of a static equilibrium state between the various components of matter, the number of baryons must be conserved. 3) Both the star as a whole and its separate macroscopic volume elements should be neutral. It is shown that for densities below 1.28×10^7 g/cm^3 the degenerate neutral gas at $T = 0$ consists of protons and electrons only. When the density becomes equal to the above value, neutrons appear for the first time. As the density increases above the limiting value, the number of protons increases much more slowly than the number of neutrons. For

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densities above 2×10^8 the number of neutrons is many times greater than the number of protons and electrons and the gas may be looked upon simply as a neutron gas. The first hyperons appear when the density reaches 1.1×10^{15} g/cm^3, In spite of the fact that Λ, Σ^+ and Σ^0 particles have rest masses smaller than the rest mass of Σ^-, the latter particles appear first. With further increase of density up to 2.36×10^{15} g/cm^3, the number of Σ^- hyperons increases, but hyperons of other types do not appear. At $\rho = 2.36 \times 10^{15}$ g/cm^3 the first Λ hyperons appear, and as the density is increased further other heavier particles appear also. Thus, for densities of the order of 10^{16} g/cm^3 one has a baryon gas consisting of a mixture of nucleons,

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Degenerate Superdense Gas of Elementary Particles

hyperons and nucleon isobars, and the concentration of the different baryons is of the same order of magnitude. For baryon densities in excess of 2×10^{40} cm^{-3} (5×10^{16} g/cm^3) the theory meets with the following difficulties:

a) Owing to the small distances between the baryons they begin to experience very large repulsive forces whose nature is not well-known at present;

b) The distribution of particles among the different kinds of baryons becomes strongly dependent on the presence of hyperons having a mass greater than that of the Ξ hyperon. For this reason, no definite conclusions can be reached for states of such high density. However, the relative number of these higher hyperons will increase with density until a density is reached at which the existence of π^- mesons, making up a Bose gas, becomes possible. Thus, superdense stars cannot be looked upon as consisting of practically pure neutron configurations. This simple picture must be replaced by a more complex configuration consisting of a hyperon nucleus, a neutron shell surrounding the nucleus

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Degenerate Superdense Gas of Elementary Particles

and a further outer shell consisting of electrons and protons. The major part of the mass can be concentrated in the hyperon nucleus. There are 3 figures and 14 references, of which 6 are English and 8 are Soviet.

ASSOCIATION: Byurakanskaya astrofizicheskaya observatoriya AN ArmSSR (Byurakan Astrophysical Observatory of the Academy of Sciences, Armenian SSR)

SUBMITTED: January 20, 1960.

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B006/B063

24.6900

AUTHOR: Saakyan, G. S.

TITLE: Single-photon Annihilation and Electron Pair Production in a Medium

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 5, pp. 1593-1596

TEXT: The present paper describes a theoretical investigation of the processes (1): $e^+ + e^- \rightleftarrows \gamma$ in a dispersive medium whose refractive index $n(\omega)$ is smaller than unity. As a result of the law of conservation of momentum, the following relation holds for such a medium: $\vec{k} = \vec{p}_1 + \vec{p}_2$; $k = \omega n(\omega)$; $\omega = E_1 + E_2$. By estimating the limit of photon energy for such processes one obtains a value corresponding to a particle density of $N \approx 1.4 \cdot 10^{32}$ cm^{-3}. Such densities do not occur even in the interior of the Sun or other normal stars. Only in the centers of White Dwarfs densities of the order of magnitude of nuclear density or even higher might occur

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Single-photon Annihilation and Electron Pair Production in a Medium

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(cf. Refs. 1-3). V. A. Ambartsumyan studied the possible existence of matter of superhigh density. As processes of the type (1) may occur only in disperse media, the photon energy must satisfy the condition $2m \lesssim \omega \lesssim N^{1/3}$. Here, the temperature of the medium plays a significant role. At sufficiently low temperatures, the electron gas is degenerate, and the process $\gamma \rightarrow e^+ + e^-$ is forbidden according to the Pauli principle. The author calculates the probability of (1) on the assumption that the conditions required for (1) are all satisfied in nature. First, he studies pair production by a gamma quantum, and derives some relations for dW and W. $W \approx (m/137\omega)(1 - 2m/\omega)\lambda_C^{-1}$ holds approximately; $\lambda_C = 1/m$ is the Compton wavelength of the electron divided by 2π. The probability of pair production by gamma quanta according to the ordinary mechanism (e.g., in the nuclear field) is given by the relation $W_0 = Z^2 \Phi N$, where N denotes the density of the nucleus, and $Z^2\Phi$ is the total pair-production cross section. An estimate of these probabilities and of the W/W_0 ratio shows that in the energy range $2m < \omega < 10m$ W is much greater than W_0. In the following, the author investigates single-photon pair annihilation. For the total

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positron annihilation probability (positron energy = E_2) one obtains:

$$W' = \frac{\pi\mu e^2}{2E_2p_2}\int\left[n^2m^2 + \frac{1-n^4}{4}\omega^2 - (1-n^2)E_1E_2\right]\frac{N_1(E_1)dE_1}{E_1p_1n^2}$$

, where $N_1(E_1)dE_1$ is the number of electrons in the range $(E_1, E_1 + dE_1)$ per unit volume. The lower limit of the integral is m, and the upper limit is equal to ∞ if the electron gas in the medium is not degenerate. If the electron gas is highly degenerate, the upper limit is equal to the Fermi energy limit. There are 9 references: 7 Soviet and 2 US.

ASSOCIATION: Yerevanskiy gosudarstvennyy universitet (Yerevan State University)

SUBMITTED: December 16, 1959

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SAAKYAN, G.S.

Dispersion at very high densities and temperatures of the medium. Zhur.eksp.i teor.fiz. 38 no.3:843-849 Mr '60. (MIRA 13:7)

1. Yerevanskiy gosudarstvennyy universitet.
(Electrons) (Dispersion)

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PHASE I BOOK EXPLOITATION SOV/5723

Saakyan, G. S.

Energeticheskiye spektry i yadernyye vzaimodeystviya chastits kosmicheskogo izlucheniya (Energy Spectrum and Nuclear Interaction of Cosmic Radiation Particles) Yerevan, Izd-vo Yerevanskogo univ., 1960. 113 p. Errata slip inserted. 1,000 copies printed.

Sponsoring Agency: Yerevanskiy gosudarstvennyy universitet.

Ed.: N. Samsonova and G. Yesayan; Tech. Ed.: A. Ovasapyan.

PURPOSE : This book is intended for nuclear and cosmic ray physicists.

COVERAGE: The book deals with energy spectra and nuclear interactions of cosmic ray particles. Ch. I concerns the recording probability of charged particles by means of a magnetic spectrometer. General formulas for differential and total recording

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probability of charged particles required for measuring the absolute intensities of charged cosmic radiation particles are included. Ch. II. treats nuclear interactions of pi-mesons and protons in copper and graphite in which the magnetic spectrometer was used for measuring the cross sections of inelastic nuclear interaction of particles. The nuclear interactions of particles were studied in absorbers placed under the magnetic gap. Trajectory projections for each particle were plotted on a model representing a drawn-to-scale image of two mutually perpendicular vertical sections of the unit parallel and perpendicular to the lines of force of the magnetic field. The cases in which particles passed the absorber system with or without nuclear interaction were then determined. Measurement of effective cross sections was made in the region of energies up to ~ 10 Bev for which no data was available at that time. Ch. III. deals with the energy distribution of protons and mu-mesons on Mount Aragats at 3,200 m above sea level. The energy distribution of mu-mesons served as a basis for calculating the energy spectrum of pi-meson production in the atmosphere. The functions

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Energy Spectrum and Nuclear (Cont.) SOV/5723

obtained of energy distribution of particles are within an energy range of several hundred Mev to 100 Bev. Ch. IV, treats the nature of nuclear interactions of nucleons, ranging in energy from several Bev to several hundred Bev, with the air nuclei. The portion of energy, spent during the nucleon collision with air nuclei on the formation of mesons, increases monotonically with the increases in energy and at several hundred Bev approaches unity, i.e., the collision is entirely inelastic. The book is based on research carried out by the author in cooperation with the staff of the Laboratoriya malogo elektromagnita (Small Electromagnet Laboratory) of the Fizicheskiy institute Akademii nauk (Institute of Physics of the Academy of Sciences) of the Armyanskaya SSR, under the supervision of Professor N. M. Kocharyan in the years 1955 to 1957. The author thanks M. T. Ayvazyan, Z. A. Kirakosyan, A. S. Aleksanyan, and Kh. B. Pachadzhyan. There are 87 references: 45 English, 37 Soviet, 2 German, 1 Hungarian, 1 Italian, and 1 French.

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SAAKYAN, G.S.

Hyperon stars. Priroda 49 no.11:14-21 N '60. (MIRA 13:11)

1. Fizicheskiy institut AN ArmSSr, Yerevan.
(Stars--Constitution) (Particles(Nuclear physics))

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S/022/61/014/005/005/007
D218/D301

AUTHORS: Saakyan, G. S. and Sedrakyan, D. M.

TITLE: On the theory of hyperon configurations of stellar masses

PERIODICAL: Akademiya nauk Armyanskoy SSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, v. 14, no. 5, 1961, 109-113

TEXT: Ambartsumyan and Saakyan (Ref. 1: Astron. Zh., 37, 193, 1960) have shown that if the density of matter in ultra-dense stellar configurations is greater by a factor of 3 than the density of nuclear matter, then its "chemical" composition becomes radically altered. In particular, it contains hyperons and negative muons. Such configurations of stellar masses are known as hyperon stars. It was also shown that a hyperon star consists of a hyperon nucleus, a neutron layer and an outer shell which is roughly in the same state as in the case of white dwarfs, i.e. it contains bare nuclei and free electrons, and neutral atoms at the surface. The dimensions and the mass of the outer shell of hyperon stars were not investi-

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D299/D301

AUTHOR: Saakyan, G. S.

TITLE: On the equation of state at superhigh densities of matter

PERIODICAL: Akademiya nauk Armyanskoy SSR. Izvestiya. v. 14, no. 6, 1961, 117-123

TEXT: The article has two objects: 1) to show that for any type of interaction, in which the energy of interaction of the particles exceeds their kinetic energy, the well-known law $P/\rho \leqslant 1/3$ is invalidated; 2) to show that the equation

$$P(n) \approx \rho(n) \sim n^2 \qquad (1.1)$$

(n - particle density, P - pressure, ρ - energy density) is not related to a particular type of interaction through a neutral mesonic field, but follows from general physical principles (such as the principle of indeterminacy and the fact that the velocity

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of sound cannot exceed that of light). Eq. (1.1) was obtained by Ya. B. Zel'dovich (Ref. 5: Uravneniye sostoyaniya pri sverkhvysokoy plotnosti i relyativistkiya ogranicheniya, ZhETF (in print)). First the indeterminacy relation is considered. For the total mean energy of particles one obtains

$$(m_k^2c^4 + c^2h^2n^{2/3})^{1/2} + u(n) \qquad (1.3)$$

where u(n) has the meaning of potential energy which is assumed as similar for all types of particles. For the mean energy density one obtains

$$\rho(n) \approx cn\,(m^2c^2 + h^2n^{2/3})^{1/2} + nu(n) \qquad (1.4')$$

where m is the average mass of barions (nucleons and hyperons). For the pressure-to-density ratio one obtains

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$$\frac{P(n)}{\rho(n)} \approx \frac{1}{3} \frac{ch^2 n^{5/3}(m^2c^2 + h^2n^{2/3})^{-1/2} + 3n^2u'(n)}{cn(m^2c^2 + h^2n^{2/3})^{1/2} + nu(n)} \qquad (1.6)$$

The case is considered when the energy of interaction exceeds the kinetic energy of particles

$$u(n) \gg c(m^2c^2 + h^2n^{2/3})^{1/2} \qquad (1.7)$$

This case is not devoid of physical meaning. With very high densities of matter, when the velocity of sound approaches that of light, one obtains

$$n^2u'' + nu' - u(n) = 0 \qquad (1.11)$$

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whose solution is

$$u(n) \approx an + \frac{b}{n} \qquad (1.12)$$

where a and b are integration constants. Hence one obtains, for sufficiently high densities of matter, Zel'dovich's result

$$P \approx p \approx a \cdot n^2 \qquad (1.14)$$

The relation between this result and the cosmological problem is considered. Sound propagation in very dense media: In the foregoing, the velocity of sound was expressed by the formula $v = c\sqrt{\partial P/\partial \rho}$. This formula was derived on the assumption of a Euclidean space. It is shown that this formula remains valid even in the case of very dense media, with a metric considerably differing from Euclidean. Thereby the author proceeds from the hydrodynamics

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equation in the presence of a gravitational field:

$$\frac{1}{\sqrt{-g}} \frac{\partial}{\partial x^k} (\sqrt{-g}\, T_i^k) - \frac{1}{2} T^{kl} \cdot \frac{\partial g_{kl}}{\partial x^i} = 0 \qquad (2.1)$$

where T_{ki} is the energy-momentum tensor. The quadratic form

$$ds^2 = - g_{ik} dx^i dx^k = e^{\nu} dx_0^2 - r^2 (d\theta^2 + \sin^2\theta d\varphi^2) - e^{\lambda} dr^2 \qquad (2.3)$$

is introduced. In order to derive the formula for the velocity of sound, it is sufficient to consider only a spherical-symmetric gravitational field, described by the form (2.3). After computations, one obtains

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$$\frac{1}{\sqrt{-g}}\frac{\partial}{\partial x^k}\left(\sqrt{-g}\, g^{ik}\frac{\partial w}{\partial x^i}\right) = 0 \qquad (2.9)$$

where $x^0 = vt$. The quantity $v = c(\partial P/\partial \rho)^{1/2}$ can be interpreted as the velocity of sound. Thus the formula remains valid for strong gravitational fields, too. As $\partial P/\partial \rho$ is (in general) a function of r, the velocity of sound v is also a function of the coordinate r. The author expresses his thanks to V. A. Ambartsumyan, Ya. B. Zel'dovich, V. L. Ginzburg and Ye. L. Feynberg. There are 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: A. G. W. Cameron, Neutron Models, Astrophys. J., 130, 884, 1959; E. E. Salpeter, Matter at High Densities. Ann. of Phys., 11, 393, 1960.

ASSOCIATION: Yerevanskiy gosudarstvenny universitet (Yerevan State University); Fizicheskiy institut AN Armyanskoy SSR

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On the equation of state ... S/022/61/014/006/004/004
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(Institute of Physics AS ArmSSR)

SUBMITTED: June 21, 1961

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

AMBARTSUMYAN, V.A.; SAAKYAN, G.S.

Equilibrium configurations of superdense degenerate gaseous stellar masses. Astron.zhur. 38 no.5:785-797 S-O '61. (MIRA 14:9)

1. Byurakanskaya astrofizicheskaya observatoriya AN Armyanskoy SSSR.

(Stars--Masses)

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AMBARTSUMYAN, V.A.; SAAKYAN, G.S.

Internal structure of hyperon configurations of stellar masses.
Astron.zhur. 38 no.6:1016-1024 N-D '61. (MIRA 14:11)

1. Byurakanskaya astrofizicheskaya observatoriya AN Armyanskoy SSR.
(Stars--Constitution)

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35307

3.1900 (1057,1538)
24.4100

S/022/62/015/001/007/007
D237/D301

AUTHOR: Saakyan, G. S.

TITLE: On the superdense state of matter in the universe

PERIODICAL: Akademiya nauk Armyanskoy SSR. Izvestiya. Fiziko-matematicheskiye nauki, v. 15, no. 1, 1962, 123-134

TEXT: The author investigates some physical properties of matter on the assumption that at the beginning of the expansion of the universe, density of energy in it was of the order of the density occurring within the nucleus, or higher. The problem stated is to investigate the properties of the gas of elementary particles in a closed system. Only the whole universe can be such a system, and the author bases his deductions on the general principles of the thermodynamics of systems in equilibrium. It is assumed that the change of state of matter caused by contraction or expansion of space is slow enough to permit the occurrence of quasi-equilibrium state in at least some regions of space. Barions, leptons and bosons are assumed to be present in the gas and statistical formulas

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On the superdense state ...

are given for their thermodynamic potentials, entropies and energies, true for both particles and anti-particles and for photons. Assuming the laws of: conservation of the number of barions, conservation of leptons, conservation of charge and conservation of the sum of the energy of matter and gravitational field, and assuming also that the normal entropy is maximum, the author derives the conditions of thermodynamic equilibrium by variational methods and shows that the conditions obtained are not only necessary, but also sufficient for the entropy to be maximum. Consideration of the equilibrium relations leads to the conclusion that knowledge of the volume or radius of curvature (in the case of a homogeneous isotropic model) alone is sufficient for detailed description of the state of matter in the universe if it is at any instant in the state of thermodynamic equilibrium, i.e. if the change of state is adiabatic and reversible. The author discusses next the problem of concentration of the particles and ends the paper with the following conclusions: If it is assumed that the distribution of matter in the universe is homogeneous and isotropic

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then its physical properties are characterized by four basic parameters: Electrical, lepton and barion charges and the total energy of matter and that of the gravitational field (mass of the universe). These parameters are time independent and if their magnitudes are known (the total electrical charge is known to be equal to zero), then the volume or the radius of curvature of space determines the state of matter in the universe, assuming that the change of state of the universe is adiabatic. The above conclusion is stated to be true also for other (rarified) systems. The author expresses his gratitude to Academician V. A. Ambartsumyan, I. I. Goldman and A. Ts. Amatuni for the interest shown by them towards his work. There are 11 references: 9 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: R. C. Tolman. Relativity thermodynamics and cosmology. Glava X. Oxford, 1949; S. Sakata. Progess. theor. Phys., 16, 686, 1956.

ASSOCIATION: Yerevanskiy gosudarstvennyy universitet (Yerevan

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

S/022/62/015/006/005/006
D218/D308

AUTHORS: Saakyan, G.S. and Vartanyan, Yu. L.

TITLE: On the solutions of Einstein's equations for axially symmetric fields

PERIODICAL: Akademiya nauk Armyanskoy SSR. Izvestiya, v. 15, no. 6, 1962, 83 - 87

TEXT: Olijnychenko (Nuovo Cimento, 21, 389, 1961) has considered Weyl's solution and has shown that in the case of a static field with an arbitrary metric

$$ds^2 = Xdx^2 + Ydy^2 + Zdz^2 + fdu^2 , \qquad (1.5)$$

there are no solutions with non-zero distribution of matter. It is now shown that this paradox could be eliminated by the use of the following expression

$$T^{ik} = (p + \varepsilon)\, u\, u^k + pg^{ik} . \qquad (1.8)$$

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S/022/62/015/006/006/006
D218/D308

AUTHORS: Vartanyan, Yu. L. and Saakyan, G.S.

TITLE: On the collapse of gravitating masses

PERIODICAL: Akademiya nauk Armyanskoy SSR, Izvestiya, v. 15, no. 6, 1962, 89 - 91

TEXT: Oppenheimer and Volkoff (Phys. Rev., 56, 455, 1939) have discussed the behavior of degenerate stars whose masses exceed the mass of the sun. They assumed the pressure to be zero and showed that on this approximation the field equations used in the above paper, indicate that the pressure gradient is also zero, which is inadmissible. One should assume that

$$ds^2 = c^2 e^{\sigma} d\tau^2 - e^{\mu} (d\vartheta^2 + \sin^2\vartheta d\varphi^2) - e^{\omega} dR^2 \quad (4)$$

where σ, μ and ω are functions of R and τ. It is noted that Einstein's equations corresponding to this metric have not as yet

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been solved, and hence the continued gravitational concentration of large masses is still an open question.

ASSOCIATION: Yerevanskiy gosudarstvennyy universitet, Fiziko-tekhnicheskaya laboratoriya, AN Armyanskoy SSR (Yerevan State University, Physicotechnical Laboratory AS Armenian SSR)

SUBMITTED: August 21, 1962

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SAAKYAN, G.S.

Nonrelativistic theory of superdense stellar configurations. Astron.zhur. 39 no.6:1014-1019 N-D '62. (MIRA 15:11)

1. Fizicheskiy institut AN ArmSSR.
(Stars)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

S/2555/63/009/000/0091/0131

ACCESSION NR: AT4019687

AUTHOR: Ambartsumyan, V. A.; Saakyan, G. S.

TITLE: The present status of the theory of superdense celestial bodies

SOURCE: AN SSSR. Astronomicheskiy sovet. Voprosy* kosmogonii (Problems of cosmogony), v. 9, 1963, 91-131

TOPIC TAGS: astrophysics, astronomy, elementary particle, elementary particle physics, electron, neutron, barion, barion star, neturon star, star formation, lepton, star

ABSTRACT: The paper deals with the theory of superdense celestial bodies (barion configurations). In the bibliography of 26 items, 22 of the articles listed are in English or available in English translation. An investigation of the gas of elementary particles at a temperature of 0C led to the following results: (a) at densities $\rho < \rho_n$, where $\rho_n = 1.28 \cdot 10^7$ g·cm^{-3}, the gas consists of protons and neutrons. (b) When $\rho = \rho_n$, neutrons appear. With a further increase in density the number of protons increases far more slowly than the number of neutrons. At densities greater than $2 \cdot 10^8$ g·cm^{-3} the number of neutrons already greatly exceeds the number of protons and electrons. At these densities matter virtually consists

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only of neutrons. (c) When $\rho = \rho_{\Xi^-} = 1.1 \cdot 10^{15} g \cdot cm^{-3}$ the first hyperons appear. Despite the fact that Λ, Σ^+ and Σ^0 possess rest masses smaller than Ξ^-, the latter are the first to appear. With a further increase in density to $\rho = \rho_{\Lambda} = 2.36 \cdot 10^{15} g.cm^{-3}$ the number of Σ^- hyperons increases, but hyperons of other kinds still do not appear. (d) After the appearance of Σ^- hyperons in matter, the proton concentration increases rapidly and soon becomes on the order of the neutron concentration. (e) When $\rho = \rho_{\Sigma^-}$ hyperons appear, and with a further increase of density, other heavier particles appear. (f) When $\rho = \rho_{\pi^-} = 1.44 \cdot 10^{17} g \cdot cm^{-3}$, π^- mesons will appear. Thus, at sufficiently high densities there will be a gas consisting of a mixture of nucleons, hyperons, resonance barions, π^- mesons, and leptons. The concentration of all the particles in this gas is of the same order of magnitude, except in the case of leptons (electrons and μ^- mesons), whose concentration is three or four orders of magnitude less than the concentration of each kind of barion. In a general case, when the central densities of energy are sufficiently great, the hypothetical superdense celestial body (barion star) consists of four principal regions: first, a central sphere, consisting for the most part of barions, barion resonances, and π^- mesons. This region is followed by a spherical layer in which matter consists for the most part of definite kinds bf barions, specifically, hyperons. The next layer for the

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most part consists of neutrons. The last, outer layer, consists of protons, nuclei, and electrons. The dimensions of all the regions are about the same, but the thickness of the outer layer is very small. In configurations consisting of an ideal barion gas, the thickness of the outer layer is several hundreds of meters ($60 < \lambda < 150$ m), while in configurations consisting of a real gas it is several tens of meters ($6 < \lambda < 65$ m). With a decrease in the density of mass ρ_0 at the center of a barion star, the above mentioned regions gradually disappear. When $\rho_0 < \rho_{\varepsilon}$ there exists a neutron start consisting of two regions the neutron layer and the outer layer. When $\rho_0 < \rho_n$ the neutron layer also disappears. An investigation of the internal structure of barion configurations reveals that within such stars and in the surrounding neighborhood the metric properties of space deviate appreciably from Euclidean. Thsi means that the precise theory of such bodies should be based on the Einstein gravitational law. Orig. art. has: 85 formulas, 7 figures and 4 tables.

ASSOCIATION: Astronomicheskiy sovet AN SSSR (Astronomy Council AN SSSR)

SUBMITTED: 00Oct62 DATE ACQ: 12Mar64 ENCL: 00

SUB CODE: AA NO REF SOV: 015 OTHER: 013

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

ACCESSION NR: AR4039239 S/0269/64/000/004/0031/0031

SOURCE: Ref. zh. Astronomiya, Abs. 4.51.231

AUTHOR: Saakyan, G. S.; Vartanyan, Yu. L.

TITLE: Possible phase states of matter at extraordinarily great densities

CITED SOURCE: Soobshch. Byurakansk. observ., vy*p. 33, 1963, 55-86

TOPIC TAGS: phase state, astrophysics, high density, baryon, elementary particle, star, superdense star, nuclear density, lepton, baryon-lepton gas

TRANSLATION: A study has been made of the equation of state of matter at very great densities and low temperatures. In the development of earlier investigations (see RZhAstr, 1960, No. 10, 10003) the authors considered the possibility of the formation of nuclei in some layer of equilibrium superdense configuration. Until now they have considered purely baryon configurations, that is configurations consisting of a gas of elementary particles. In the investigated superdense star there is a change of phases with movement from

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the center to the surface; these phases correspond to the densities: above nuclear, nuclear and below nuclear. It is shown that when $\rho > 3.3 \cdot 10^{14}$ g/cm^3 the matter for the most part consists of baryons. The concentration of Leptons is several orders of magnitude less than the concentration of each of the types of baryons. At greater densities the concentrations of all types of baryons are of the same order of magnitude. In the region $6.7 \cdot 10^{13} < \rho < 3.3 \cdot 10^{14}$ g/cm^3 the matter consists of baryon-lepton gas. The ratio of the quantities of neutrons and protons changes in this interval from 157:1 to 21:1. The quantity of electrons is equal to the quantity of protons. The protons appear beginning at $\rho \sim 6 \cdot 10^{13}$ g/cm^3. When $\rho = 2.5 \cdot 10^{11}$ g/cm^3 the "generation" of neutrons begins. In the region $2.5 \cdot 10^{11} < \rho < 6.0 \cdot 10^{13}$ g/cm^3 the matter consists of neutrons, atomic nuclei and electrons. The energy density and pressure are determined for the most part by neutrons. When $\rho < 2.5 \cdot 10^{11}$ g/cm^3 matter consists of atomic nuclei and an almost ideal electron gas. For densities $> 1.5 \cdot 10^{13}$ g/cm^3 the approximation of an ideal gas is inexact and interaction between baryons must be taken into account. Baryons and leptons, unstable under ordinary conditions, become stable in

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ACCESSION NR: AR4045178 S/0269/64/000/007/0027/0027

SOURCE: Ref. zh. Astronomiya. Otd. vy*p., Abs. 7.51.226

AUTHOR: Saakyan, G.S., Chubaryan, E.V.

TITLE: The theory of white dwarfs and the envelopes of baryon stars

CITED SOURCE: Soobshch. Byurakansk. observ., vy*p. 34, 1963, 99-133

TOPIC TAGS: astrophysics, white dwarf, baryon star, star envelope, nuclear density, free neutron, baryon gas, free electron

TRANSLATION: A study has been made of the properties of the degeneration of matter at densities less than nuclear as applied to the outer layers of baryon stars and white dwarfs. The authors give an approximate method for the analytical integration of differential equations for the envelope of a baryon star (phase 'Ae', consisting of free electrons and atomic nuclei and phase 'nAe' in which free neutrons are also present). The authors computed the parameters of envelopes for 8 configurations consisting of an ideal gas of baryons and for 10 configurations of a real baryon gas. In the case of central densities $\rho_c > 15 \cdot 10^{15}$ g/cm^3 the extent of the envelope is 1 km and its mass is $\sim 10^{-6}$ M.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

S/033/63/040/001/009/016
E032/E314

AUTHOR: Saakyan, G.S.

TITLE: On a paper by A.G.W. Cameron

PERIODICAL: Astronomicheskiy zhurnal, v. 40, no. 1, 1963, 82 - 84

TEXT: It is noted that for the majority of the configurations considered in Cameron's paper (Astrophys. J., 130, 884, 1959) the masses turn out to be greater by a factor of about 2 as compared with the masses of the corresponding configurations in the paper by Ambartsumyan and Saakyan (Astron. zh., 38, 785, 1961). Since it was believed that the mass of a super-dense star was not very sensitive to the form of the equation of state, the discrepancy between the two calculations was rather unexpected. The present work was therefore undertaken to verify Cameron's calculations. It is found that if Cameron's assumptions are accepted then all his numerical results are, in fact, correct. However, it is pointed out that Cameron used:

$$P(\sigma) = 5.32 \cdot 10^{9} \sigma^{5/3} + 1.632 \cdot 10^{-5} \sigma^{8/3} - 1.381 \cdot 10^{5} \sigma^{2} \qquad (2)$$

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, G.S.; VARTANYAN, Yu.L.

Main parameters of baryon configurations. Astron.zhur. 41 no.2: 193-200 Mr-Ap '64. (MIRA 17:4)

1. Fiziko-tekhnicheskaya laboratoriya AN ArmSSR.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

BAGDASAROV, G., inzh.; SAAKYAN, I., inzh.

Automation of the process of proportioning molten aluminum in die casting. Prom.Arm. 4 no.9:26-27 S '61. (MIRA 14:11)

1. Armyanskiy filial Vsesoyuznogo nauchno-issledovatel'skogo instituta elektromekhaniki.

(Armenia--Die casting)
(Automation)

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

23937 S/035/61/000/006/020/044
A001/A101

3,1560

AUTHOR: Saakyan, K.A.

TITLE: White dwarfs discovered in the constellation Cygnus

PERIODICAL: Referativnyy zhurnal. Astronomiya i Geodeziya, no. 6, 1961, 36-37, abstract 6A327 ("Soobshch. Byurakansk. observ.", 1959, v. 27, 3-13, Armenian summary)

TEXT: A method of detecting white dwarfs by searching for stars with negative color indices in regions with considerable interstellar absorption was employed. Previously this method was not employed because of the lack of data on weak stars colors. Stars weaker than 16^m were investigated in the region of almost $5^o \times 5^o$ whose center has coordinates: $\alpha = 20^h34^m$, $\delta = +40^o$ (1950). By means of maps of the Palomar atlas were selected 65 white and blue stars. Their photographic and red magnitudes were estimated by comparing them with stars of cluster M3 the magnitudes of which were determined by A.R. Sandage. To determine variability of the selected stars, 5 photographs of the given region were used which were taken by the author in 1958-1959 with the 21" Schmidt telescope at the Byurakan Observatory. 53 of 65 stars can be reliably classified as white dwarfs,

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23937 S/035/61/000/006/020/044
White dwarfs discovered in the constellation Cygnus A001/A101

8 - probable white dwarfs, 2 stars were not detected on the plates, and 2 stars varied luminosity. Data on the reliable and probable white dwarfs (coordinates, photographic magnitudes and color indices) are presented in tables. Maps for identification of white dwarfs are also presented.

B. Fesenko

[Abstracter's note: Complete translation]

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

S/035/62/000/002/007/052
A001/A101

AUTHOR: Saakyan, K. A.

TITLE: White dwarfs discovered in the constellation Cygnus

PERIODICAL: Referativnyy zhurnal, Astronomiya i Geodeziya, no. 2, 1962, 20-21, abstract 2A203 ("Soobshch. Byurakansk. observ.", 1960, no. 28, 37-42, Armenian summary)

TEXT: This is a continuation of a study published earlier (RZhAstr, 1961, 6A327). The field studied was extended northward. The list of 19 white dwarfs is presented which were discovered in the new field of 1 x 4° size with the coordinates of the center as follows: $\alpha_{1950} = 20^h36^m$, $\delta_{1950} = +43^{\circ}15'$. The search for white dwarfs was undertaken for comparison in the free of noticeable absorption field of 1 x 1° size with center coordinates: $\alpha = 20^h03^m.4$; $\delta = +37^{\circ}11'$. The author presents coordinates, photographic magnitudes and color excesses for three dwarfs discovered in this field. An important conclusion has been drawn that the number of white dwarfs per 1 square degree in the "dark" and "light" fields is apparently about the same, when the stars up to 20^m are considered. It is presumed that the cause of the mentioned phenomenon may be the fact that

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ISKUDARYAN, S.G.; SAAKYAN, K.A.

Cluster of white dwarfs in Lyrae. Astron.tsir. no.221:6-9 Ap '61. (MIRA 14:11)

1. Byurakanskaya astrofizicheskaya observatoriya.
(Stars--Clusters)

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L 18386-65 EWG(v)/EWT(1)/EEC(t) Pe-5/Pae-2 SSD/AFWL/AFETR/ESD(t) GW
ACCESSION NR: AR4040393 S/0269/64/000/005/0042/0042

SOURCE: Ref. zh. Astron. Otd. vy*p., Abs. 5.51.339

AUTHOR: Ambartsumyan, V.A.; Iskudaryan, S.G.; Shakhbazyan, R.K.; Saakyan, K.A.

TITLE: Superassociations in remote galaxies

CITED SOURCE: Soobshch. Byurakansk. observ., vy*p. 33, 1963, 3-18

TOPIC TAGS: stellar association, stellar superassociation, galaxy, irregular galaxy, Large Magellanic Cloud, Small Magellanic Cloud, Ursa Major, supergiant, nebula

TRANSLATION: The complex 30 Dor in the Large Magellanic Cloud considerably exceeds other associations in luminosity ($M = -15^m.0$) and diameter (600 parsecs). The authors assign it to a special class of objects — superassociations. Searches have been made for superassociations in distant galaxies on photographs taken with the use of a 21" Schmidt reflector. Data are presented which were obtained in a study of 68 galaxies from the Shapley-Ames catalogue, mostly of type Sc and with known radial velocities. In the determination of absolute values it was assumed that H = 75 km/sec·Mps. Superassociations have been discovered in 12 galaxies; in most cases these are supergiant

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galaxies with $M < -20^{m}.5$. Often one galaxy contains several superassociations. The luminosity of the latter is less than the luminosities of galactic centers and superassociations are bluer than galactic centers. Superassociations are also found in irregular galaxies. Maps of the Palomar Atlas were also used for finding superassociations. A review of 250 objects with known radial velocities from the Shapley-Ames catalogue, after exclusion of 100 galaxies with overexposed images, made it possible to detect superassociations in 21 galaxies. In addition, superassociations were discovered in 13 of the 137 galaxies with diameters exceeding 1'.1 in the cluster in Ursa Major. In estimating the lower boundary of the age of the complex 30 Dor from the diameter of the complex and the velocity of expansion ($6 \cdot 10^{7}$ years) the authors conclude that during the period of development of the complex some ten generations of supergiants should have appeared in it and thousands of stars of high luminosity should have developed. The authors speculate on the mechanism of development of stars and nebulae in the Large and Small Magellanic Clouds and postulate that the stars and nebulae develop in associations and superassociations jointly from prestellar bodies whose nature is, for the time being, unknown. Bibliography with 7 items. B. Fesenko.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

SAAKYAN, K.A.; MNATSAKANYAN, R.G.

Faint blue stars in the region $\alpha = 17^h18^m$, $\delta = +43^\circ30'$ (1950). (MIRA 18:10)
Astrofizika 1 no.2:229-234 Je '65.

1. Byurakanskaya astrofizicheskaya observatoriya.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

S/072/60/000/008/003/007/XX
B021/B054

AUTHORS: Kostanyan, K. A., Saakyan, K. S.

TITLE: Electrical Conductivity of Some Industrial Glasses in Molten State

PERIODICAL: Steklo i keramika, 1960, No. 8, pp. 7 - 9

TEXT: The present paper gives data on the specific electrical conductivity of some electrovacuum glasses, which can be utilized in the electric melting of these glasses. Measurements were made in a platinum furnace by an a-c bridge and by the sounding method in the temperature range of 1100-1400°C. A figure shows the curves for the temperature dependence of the resistivity of glasses. Hence, it appears that the conductivity of the glasses investigated depends on their content of alkali ions and sodium oxide. The temperature dependence of electrical conductivity of molten glasses can be expressed by equation (1): $\log \chi = A - \frac{B}{T}$, where A and B are constants. It can also be expressed by equation (2): $\log \chi = a+bT+cT$, where a, b, and c are constants. An examination showed that equation (2)

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Electrical Conductivity of Some Industrial Glasses in Molten State

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B021/B054

gives better agreement between calculated and experimental values than equation (1). Table 2 gives the values of coefficients a, b, and c from equation (2) for the glasses investigated. The difference between the values obtained from equation (2) by means of the coefficients of Table 2 and the experimental values does not exceed 5%. There are 1 figure, 2 tables, and 5 references: 3 Soviet, 1 US, and 1 British.

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"APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001446610012-6

KOSTANYAN, K.A.; SAAKYAN, K.S.; GEOKCHYAN, O.K.

Density and electric conductance of sodium-calcium-magnesium aluminosilicate glasses in a fused state. Izv. AN Arm.SSR.Khim. nauki 17 no.4:357-367 '64. (MIRA 18:6)

1. Nauchno-issledovatel'skiy institut khimii Gosudarstvennogo komiteta tsvetnykh i chernykh metallov pri Gosplane SSSR.

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KOSTANYAN, K.A.; SAAKYAN, K.S.

Electroconductivity of glasses of the system Na_2SiO_3 - SiO_2 in the fused state. Izv. AN Arm.SSR. Khim.nauk 14 no.5: 409-416 '61. (MIRA 15:1)

1. Institut khimii Sovnarkhoza Armyanskoy SSR.
(Glass--Electric properties)

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SAAKYAN, L.

Problems of the intraplant business accounting. Prom. Arm. 6 no.6:23-26 Je '63. (MIRA 16:8)

1. Otdeleniye ekonomicheskikh issledovaniy i organizatsii proizvodstva Soveta narodnogo khozyaystva ArmSSR.
(Industrial management)

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SAAKYAN, L.

Relation of basic and auxiliary workers and the organization of auxiliary services in enterprises of the electric equipment industry in Armenia. Prom. Arm. 6 no.12:19-22 D '63. (MIRA 17:2)

1. Armyanskiy filial Vsesoyuznogo nauchno-issledovatel'skogo instituta elektromekhaniki, Otdeleniye ekonomicheskikh issledovaniy i organizatsii proizvodstva.

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SAAKYAN, M.

On the road of technological development. Prom. Arm. 6 no.6: 15 Je '63. (MIRA 16:8)

1. Glavnyy inzh. Leninakanskogo tekstil'nogo kombinata.
(Leninakan—Textile machinery)

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IGOL'CHENKO, M.I.; SAAKYAN, M.B.

Equilibrium moisture content of newly harvested sunflower seeds. Izv. vys. ucheb. zav.; pishch. tekh. no.4:22-24 '61. (MIRA 14:8)

1. Krasnodarskiy institut pishchevoy promyshlennosti, kafedra tekhnologii zhirov i kafedra vysshey matematiki i teoreticheskoy mekhaniki.

(Sunflower seed)

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SAAKYAN, M.P.

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Special features of the wear of cutters as related to their characteristics. Izv. AN Arm. SSR. Ser. tekh. nauk 17 no.2: 67-72 '64 (MIRA 17:7)

1. Yerevanskiy politekhnicheskiy institut imeni K. Marksa.

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SAAKYAN, M.S.

Enrichment of quartz-feldspar-pumice sands of the Armenian S.S.R. Izv.AN Arm.SSR.Ser.FMET 1 no.5:379-397 '48. (MLRA 9:8)

1. Institut geologicheskikh nauk Akademii nauk Armyanskoy SSR. (Armenia--Sand)

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SAAKYAN, M. S.

Dissertation: "Rodents and Other Mannals of Northwestern Armenia and Their Epizooto-Epidemiological Significance." Cand Biol Sci, Department of Biological Sciences, Acad Sci Armenian SSR, 27 Apr 54. (Kommunist--Yerevan, 16 Apr 54)

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Recent data on the age of strata containing Variamussium fallax Korobkov and Pecten arcuatus Brocchi. Dokl. AN Arm. SSR 35 no.3:135-140 '62. (MIRA 16:6)

1. Institut geologicheskikh nauk AN Armyanskoy SSR. 2. Chlen-korrespondent AN Armyanskoy SSR (for Gabriyelyan).
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A new location of thickets of Caucasian rhododendron in the Kirovakan District of the Armenian S.S.R. Izv.AN Arm.SSR.Biol.i sel'khoz. nauki 7 no.8:93-95 Ag '54. (MLRA 9:8)

1. Yerevanskiy veterinarnyy zootekhnicheskiy institut.
(Kirovakan District--Rhododendron)

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1ST AND 2ND ORDERS — PROCESSES AND PROPERTIES INDEX — 3RD AND 4TH ORDERS

8

Results of North Caucasian expedition of the Institute of Economic Mineralogy. P. S. Saak'yan. *Mineral. Syr'e* 11, No. 7, 1-6(1936).—In the cryst. belt of North Osetia and Kabardino-Balkaria 4 different age-types of ore-bearing acid intrusions were identified. The youngest is hypabyssal and granodioritic; the deposits genetically related to it are chiefly of the sulfide type, frequently contg. dispersed rare elements. The red microcline, gray medium-grained and porphyry-like granites are older. The red granites are relatively younger; their quartz and pegmatite derivs. are Au-bearing. Some pegmatites are rich in muscovite, beryl and flesh-red microcline. The medium-grained granites predominate in Central Caucasus; their ore deposits are Sn-bearing saccharoidal pegmatites and Au-bearing quartz veins. **Rare metals in Digoriya mountains.** K. I. Lyagin. *Ibid.* 6-7.—The Bi-arsenopyrite deposits are of some com. interest. **Tin in pegmatites of the Bilyagidon region of North Ossetia.** I. S. Shcheblyakin. *Ibid.* 8-9.—Preliminary survey resulted in location of cassiterite and Sn-bearing pegmatites, suggesting the existence of com. Sn deposits. **Arsenopyrite deposits of Digoriya mountains.** K. I. Lyagin and Kh. M. Friev. *Ibid.* 9-20.—Several deposits of arsenopyrites of com. importance, particularly those bearing Au, Bi, W and other metals, are reported. **Ore distribution in the area of the Flag-Don gorge.** A. Sh. Kurbanov and P. P. Epifanov. *Ibid.* 20-8.—The discovery of Au, W, cassiterite, scheelite and other minerals is reported. **Origin of the Orakh-Kom polymetallic deposits.** I. A. Pudovkina. *Ibid.* 29-36.—The genetic formation of various nonmetallic mineral deposits is discussed. **Mineral deposits of the Adyl-Su River Basin (Caucasus).** V. V. Chernyshev and P. G. Suslov. *Ibid.* 36-45.—The presence of deposits of scheelite, molybdenite and pyritic formations bearing As and Au is reported.

Chas. Blanc

A38-51A METALLURGICAL LITERATURE CLASSIFICATION

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CA

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Chas. Blanc

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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SAAKYAN, Papik Saakovich.

Dir., All-Union Inst. Mineral Raw Materials, -1950-. "The Problem of Ore Formation," Iz. Ak. Nauk SSSR, Ser. Geol., No. 2, 1949. Stalin 2nd Prize, 1949, mineral deposits.

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SAAKYAN, P.S.

POYARKOV, V.E.; BRITAYEV, M.D., redaktor; GERASIMOVKIY, V.I., redaktor; YERSHOV, A.D., redaktor; KONSTANTINOV, M.M., redaktor; NIFONTOV, R.V., redaktor; SAAKYAN, P.S., redaktor; SMIRNOV, V.I., redaktor; SOLOV'YEV, D.V., redaktor; CHERNOSVITOV, Yu.L.; NIFONTOV, R.V., redaktor; KOSOV, B.M., redaktor; KRASNOVA, N.E., redaktor; GUROVA, O.A., tekhnicheskiy redaktor.

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(Mercury) (Antimony)

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LAVROVICH, Nikolay Stepanovich; BRITAYEV, M.D., redaktor; GERASIMOVSKIY, V.I., redaktor; YERSHOV, A.D., redaktor; KONSTANTINOV, M.M.; NIFONTOV, R.V., glavnyy redaktor; SAAKYAN, P.S., redaktor; SMIRNOV, V.I., redaktor; SOLOV'YEV, D.V., redaktor; CHERNOSVITOV, Yu.L., redaktor; SOSHNIKOVA, M.S., redaktor vypuska; SERGEYEVA, N.A., redaktor izdatel'stva; AVERKIYEVA, T.A., tekhnicheskiy redaktor.

[Fluorspar; (fluorite).] Plavikovyi shpat (fliuorit). Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po geol. i okhrane nedr, 1956. 133 p. (Otsenka mestorozhdenii pri poiskakh i razvedkakh, no.16).
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