there can be no combustion for $\phi > \phi_B$, and there are two possible combustion rates for $\phi < \phi_B$, denoted by A and G. The results show that the higher the initial powder temperature the lower will be the final pressure before extinction. Combustion rate under arbitrarily small variations in pressure is also considered up to first order in temperature distribution in the powder. The analysis leads to a combustion rate given by

$$u = u_c(p) + \left(\frac{\partial u_c}{\partial p}\right)_{T_0} \beta (T_k - T_0) \frac{\varkappa}{u_c^2} \frac{dp}{dt} .$$

The analysis is finally summarized in the form of nondimensional combustion criteria given by

$$B = \frac{\tau}{p} \frac{dp}{dt} = \frac{\varkappa}{u_c^2 p} \frac{dp}{dt} \quad , \text{ and } \quad B = \frac{\varkappa}{u_1^2} p^{-1-2\nu} \frac{dp}{dt} = -\frac{\varkappa}{2\nu} \frac{d(u_c^{-2})}{dt} ,$$

which determine the rate, spontaneous combustion, and extinction of powders under unsteady state phenomena. "The author is grateful to K. K. Andreyev, O. I. Leypunskiy, I. P. Grave, M. Ye. Serebryakov, and I. M. Shapiro for their interest in the work. Specially mentioned is Yu. B. Khariton, who pointed out the powder extinction phenomenon in the muzzle of an artillery gun following the firing of the projectile. Thanks are also expressed to V. B. Librovich

ACCESSION NR: AP4041202

for preparing the manuscript for printing." Orig. art. has: 60 formulas and 6 figures.

ASSOCIATION: none

ENCL: 01

SUBMITTED: 29Feb64

OTHER: 003

SUB CODE: FP

NO REF SOV: 003

Card 4/5

ACCESSION NR: AP4041202

ENCLOSURE: 01

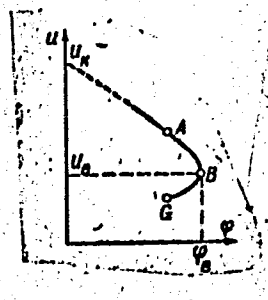


Fig. 1. u as a function of ϕ under given pressures.

Card 5/5

ZELDOVICH, Ya.B. akad.

Wonderful stars. Nauka i tekh mladezh 16 no.5:5-7 My '64

ZEL'DOVICH, Ya.B.

Observations in a universe homogeneous on the average. Astron.zhur. 41 no.1:19-24 Ja-F '64. (MIRA 17:4)

ZEL'DOVICH, Ya.B.

Newtonian and Einsteinian motion of a homogeneous matter.
Astron.zhur. 41 no.5:873-883 S-O '64. (MIRA 17:10)

DASHEVSKIY, V.M.; ZEL'DOVICH, Ya.B.

Light propagation in a nonhomogeneous nonplanar universe. Part 2.
Astron. zhur. 41 no.6:1071-1074 N-D '64 (MIRA 18:1)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001964220014-2"

ACCESSION NR: AP4040509 S/0026/64/000/006/0025/0028

AUTHOR: Zel'dovich, Ya. B.

TITLE: Evolution of prestellar matter

SOURCE: Priroda, no. 6, 1964, 25 - 28

TOPIC TAGS: astronomy, nuclear physics, prestellar matter, stellar evolution, neutrino, antineutrino, lepton, baryon, antibaryon

ABSTRACT: The initial hypotheses concerning the composition of the initial prestellar matter were based on the assumption that it consisted of 98-99% neutrons, that is, baryons, and there were virtually no leptons. However, this would mean that very soon after onset of "expansion of the universe" the initial matter would be transformed almost entirely into helium and virtually no free hydrogen would remain, a result contradictory to present-day observations. The cold neutron hypothesis had to be rejected. Then Gamow and others postulated that in the initial stage matter was at a superhigh temperature and its density at the initial stage was caused almost exclusively by light quanta, but again, this hypothesis of hot matter at the early stage of evolution of the universe must be considered improbable, since it contradicts present-day information.

Card 1/3

ACCESSION NR: AP4040509

This forces the conclusion that the lepton charge at the initial stage of development was different from zero. In the expanding universe the neutrinos, arriving at a particular point as a result of the red shift, have an energy less than their energy at an earlier time and place. The change in neutrino density is obviously proportional to the change of density in matter; this also applies antineutrinos. Furthermore, at the present time the quantity of antibaryons is many times less than the quantity of baryons. The universe, being asymmetric with respect to baryons and antibaryons, has a predominantly positive baryon charge. Two possibilities appear: the baryon charge is positive and the lepton charge is negative, or both charges are positive. These possibilities are discussed. It is concluded that the idea that matter consisted of neutrons in the superdense stage is unacceptable. The idea was derived carelessly from the writings of L. D. Landau, who discussed the neutron core of superdense stars; this was applied uncritically to the entire universe. It is shown that at a high density neutrinos stabilize protons. At the time of expansion their density decreases, accompanied by a decrease in electron density. It follows from the considerations presented that prestellar matter consisted of pure hydrogen. With the present-day mean density of nucleons of 10^{-30} g/cm^3, the density of the mass

Card 2/3

ACCESSION NR: AP4040509

of neutrinos is 10^{-39} g/cm^3 and their quantity per cubic centimeter is 6.10^{-7}. There is one neutrino in every 1.7m^3. The hypothesis that cold pure hydrogen was the initial matter for the stellar stage of evolution is in agreement with current astrophysical concepts.

ASSOCIATION: Akademiya nauk SSSR (Academy of Sciences SSSR)

SUBMITTED: 00	DATE ACQ: 26	ENCL: 00
SUB CODE: AA	NO REF SOV: 000	OTHER: 000

3/3
Card

ACCESSION NR: AP4022952 S/0020/64/155/001/0067/0069

AUTHOR: Zel'dovich, Ya. B. (Academician)

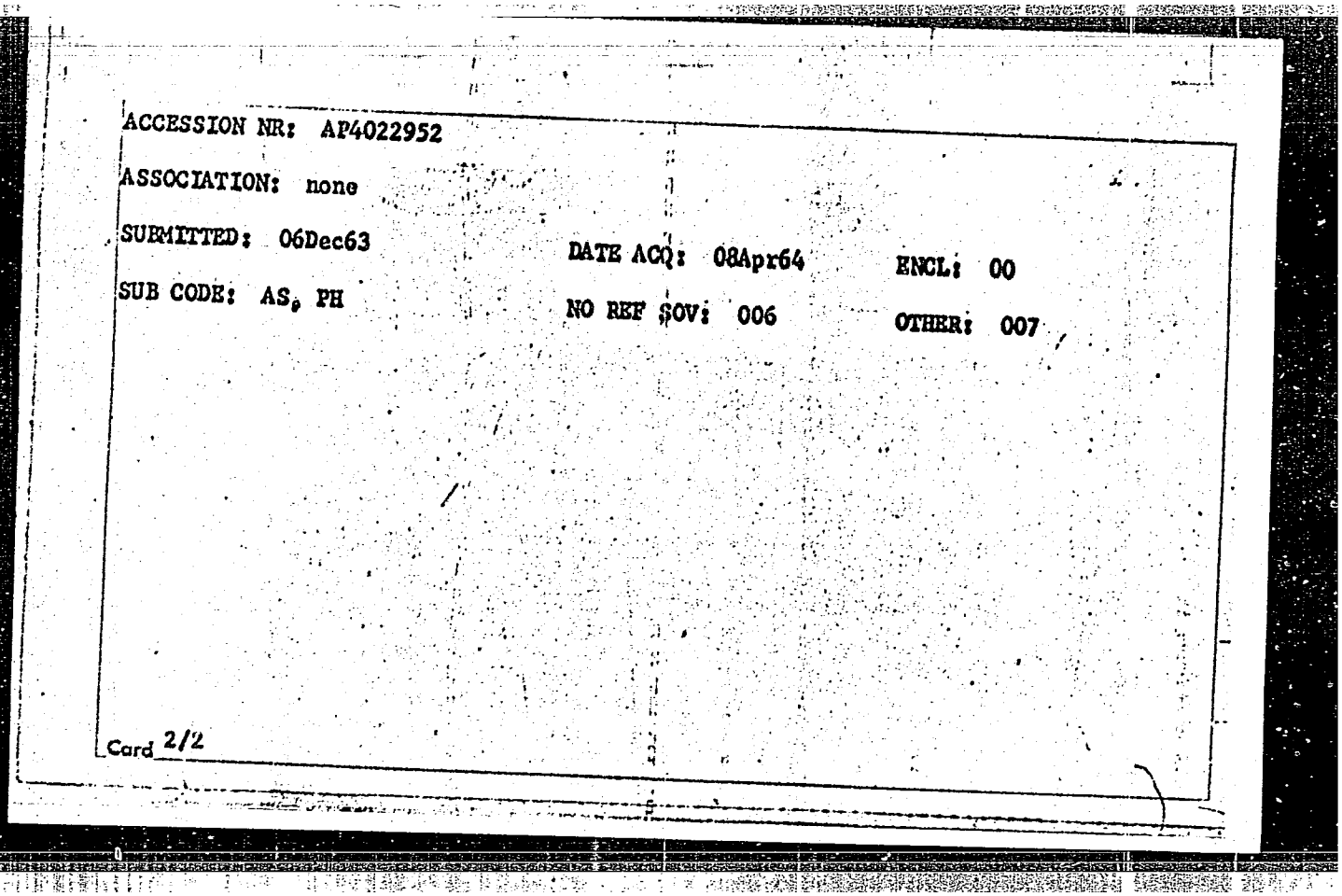
TITLE: Fate of a star and evolution of gravitational energy during accretion

SOURCE: AN SSSR. Doklady*, v. 155, no. 1, 1964, 67-69

TOPIC TAGS: accretion gravitational energy, general relativity theory, star collapse, astronomy, celestial body, star, falling star

ABSTRACT: The author considers a mechanism of energy evolution which is connected with the fall of external masses in the gravitational field of a collapsing star. The velocity of a free falling particle approaches the velocity of light when the particle approaches the gravitational radius. If a flux of matter proceeds toward the star with a supersonic velocity, there occurs a shock wave from the side of the star opposite to the approaching matter. Under these conditions, a part of the matter may be thrown out with a velocity approaching C. "The author is grateful to I. D. Novikov and I. S. Shklovskiy for numerous discussions". Orig. art. has: 1 equation.

Card 1/2



ACCESSION NR: AP4022952

ASSOCIATION: none

SUBMITTED: 06Dec63 DATE ACQ: 08Apr64 ENCL: 00

SUB CODE: AS, PH NO REF SOV: 006 OTHER: 007

Card 2/2

S/0020/64/155/005/1033/1036

ACCESSION NR: AP4034533

AUTHOR: Zel'dovich, Ya. B. (Academician); Novikov, I. D.

TITLE: Radiation of Gravitational Waves by Bodies Moving in the field of a Collapsing Star.

SOURCE: AN SSSR. Doklady*, v. 155, no. 5, 1964, 1033-1036

TOPIC TAGS: gravitational wave, collapsing star, general theory of relativity, gravitation theory, gravitational radiation friction, astronomy

ABSTRACT: In the present communication, the author considers the radiation of gravitational waves by a body of small mass m moving in a spherical field of a large mass, the effect of this radiation on the motion of m, and the possible observable effects. The gravitational radiation friction provides a force acting on the body. This is the result of interaction of mass m with its own gravitational field, which is proportional to m^2, whereas the interaction with the external field is proportional to m. Thus, the radiation of gravitational waves introduces a correction to the motion of a body in an external gravitational field. Calculation shows that as a result of gravitational radiation, the system may

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ACCESSION NR: AP4034533

loose a few percent of energy. In a collision of two collapsed stars of equal mass which are 10^{24}cm (300 parseecs) away from the observer, the gravitational radiation should be detectable with an apparatus capable of recording a difference in acceleration with a precision of 10^{-9} cm/sec^2. Orig. art. has: 1 figure

ASSOCIATION: None

SUBMITTED: 03Jan64 DATE ACQ: 13May64 ENCL: 00

SUB CODE: AA, GP NO REF SOV: 005 OTHER: 005

Card 2/2

ACCESSION NR: AP4035809 S/0020/64/156/001/0057/0060

AUTHOR: Zel'dovich, Ya. B. (Academician); Podurets, M. A.

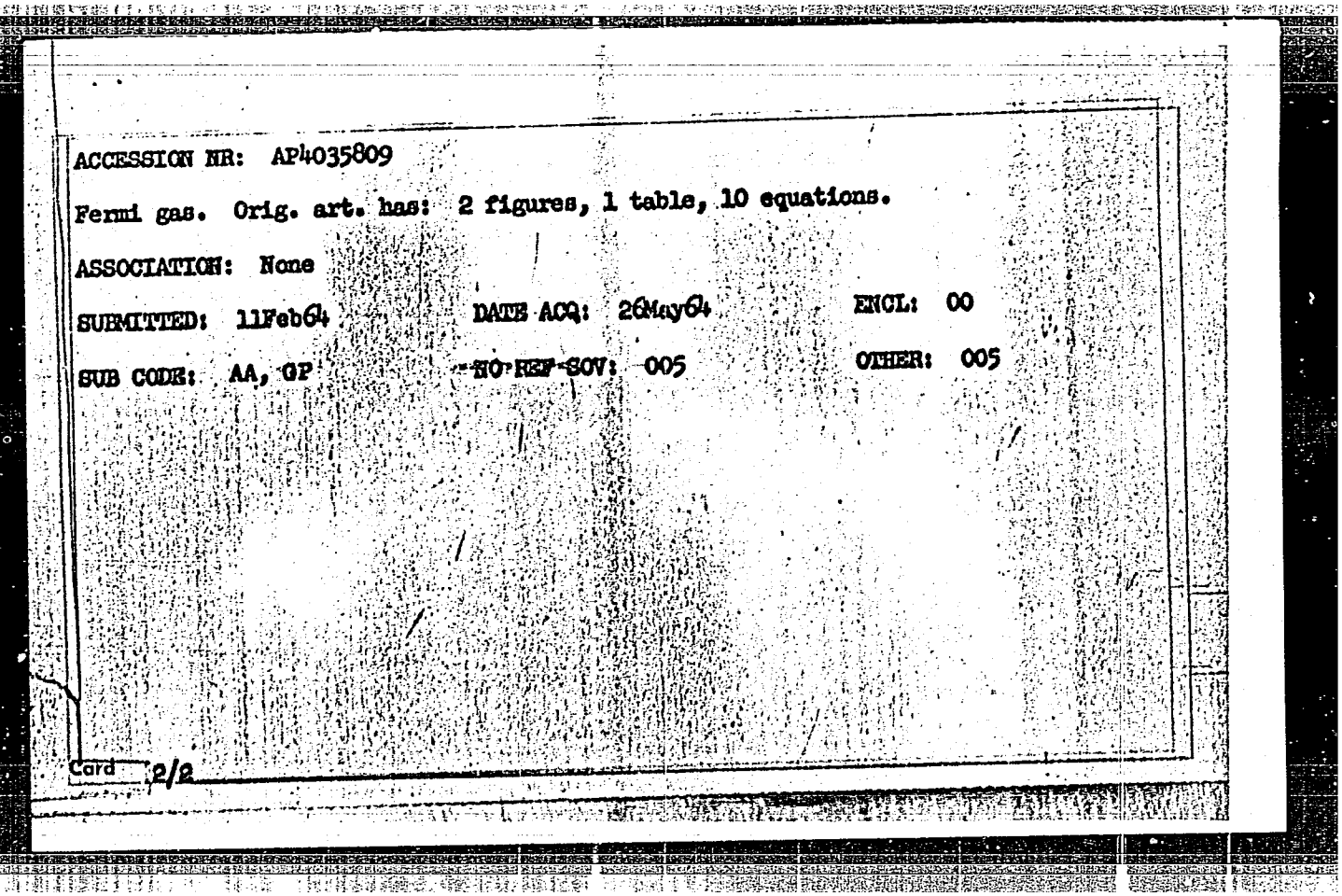
TITLE: Neutrino emission of a star during gravitational collapse in the general theory of relativity

SOURCE: AN SSSR. Doklady*, v. 156, no. 1, 1964, 57-60

TOPIC TAGS: neutrino emission, gravitational collapse, star self locking, general relativity theory, superstar collapse, superstar

ABSTRACT: The theory of a gravitational collapse was given by J. Oppenheimer et al (Phys. Rev. 56, 455 (1939)), and is now of interest because of the discovery of superstars. The theory, based on general theory of relativity, shows that the emission of light by the star into outer space approaches zero when the radius of the collapsing star reaches a certain value (gravitational radius). The star is gravitationally self-locked. The authors have investigated the gravitational self-locking with respect to neutrino emission. The origin of neutrinos is assumed to be in the center of the star so that Doppler-effect is absent. Two cases are considered: (1) collapse of dust, (2) collapse of a star from a cold

Card 1/2



ACCESSION NR: AP4035809

Fermi gas. Orig. art. has: 2 figures, 1 table, 10 equations.

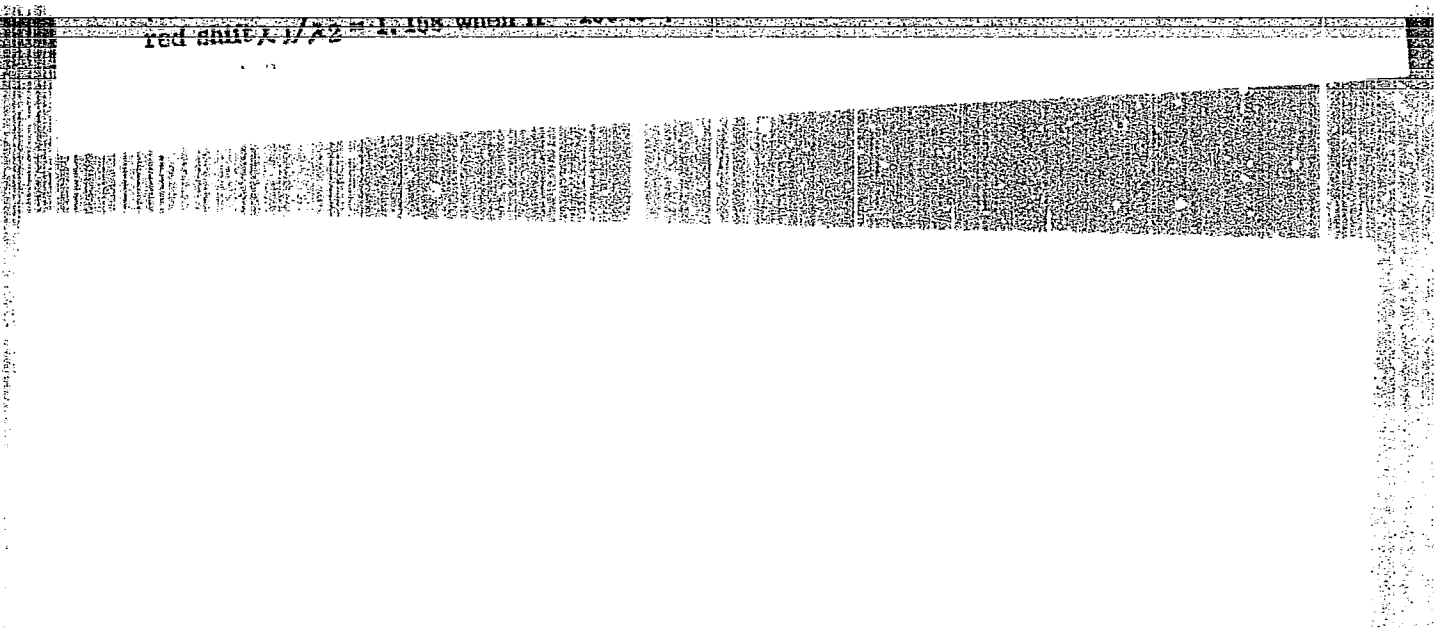
ASSOCIATION: None

SUBMITTED: 11Feb64 DATE ACQ: 26May64 ENCL: 00

SUB CODE: AA, GP NO REF SOV: 005 OTHER: 005

Card 2/2

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001964220014-2"



ASSOCIATION: None

ACCESSION NR: AP4047941

ZEL'DOVICH, Ya.B.

Probability of the genesis of superstars. Astron.zhur. 42 no.2:283-286 Mr-Ap '65. (MIRA 18:4)

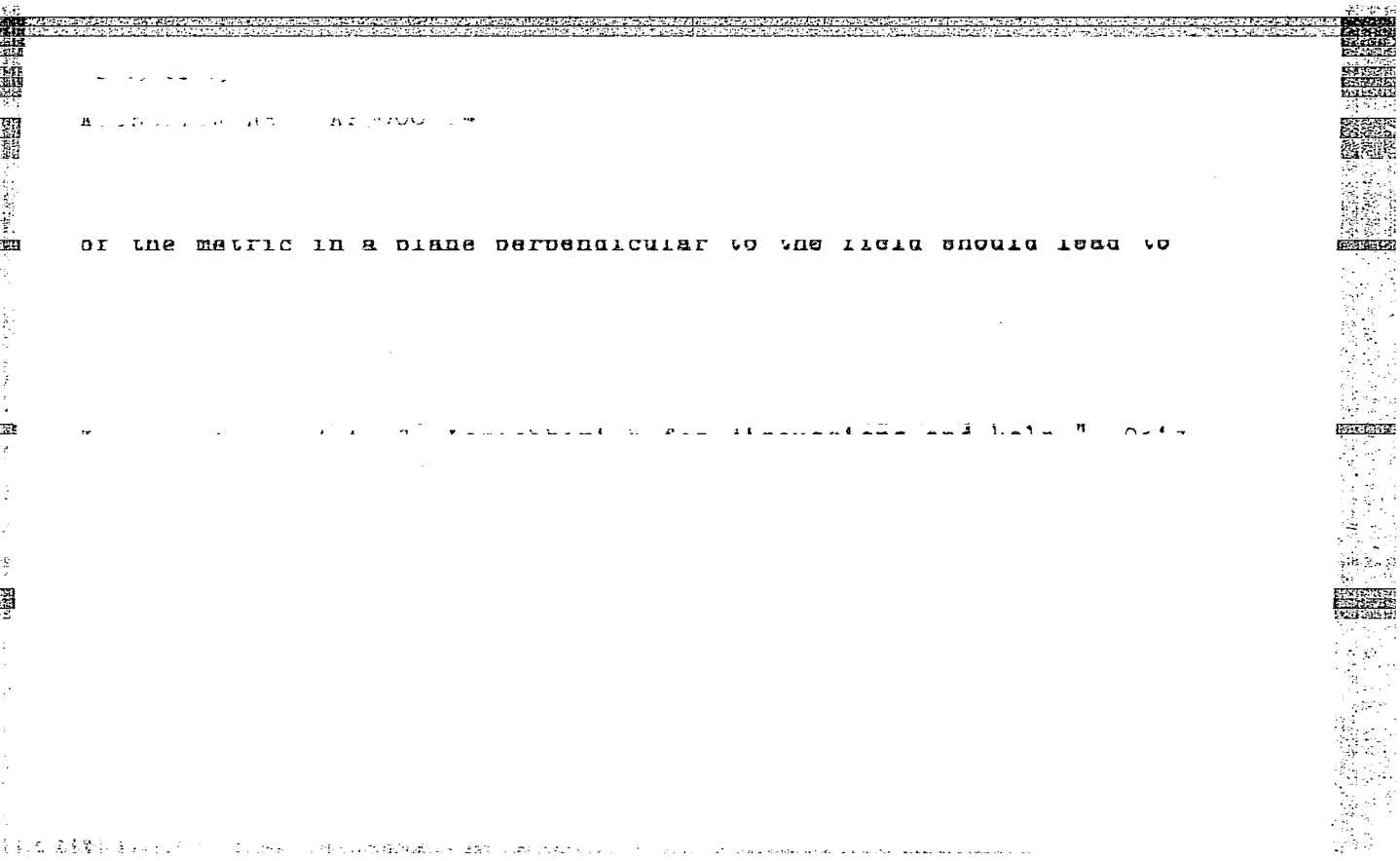
AUTHOR: Zel'dovich, Ya. B.

[illegible] to explain the statistical distribution of superstars on the basis of several assumptions: time of observation, distance of visibility, mass of star, nonsteady state, independence of time. The theoretical considerations of probability, in comparison with observed data, indicated that the formation of superstars was no more probable in earlier epochs than it is at present. Orig. art. has: 2 tables and 11 formulas.

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001964220014-2"

AUTHOR: Zel'dovich, Ya. B.

Card 1/2

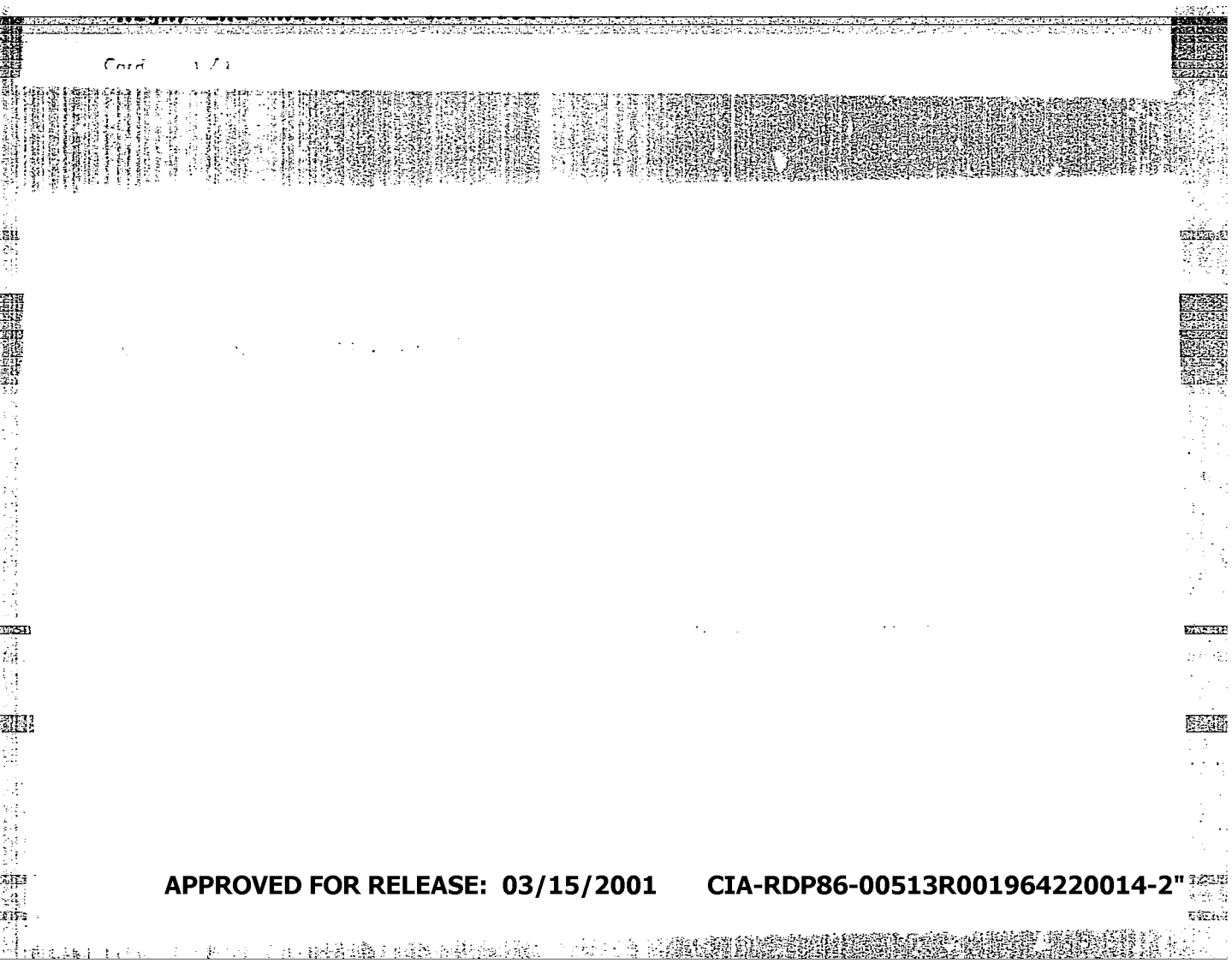


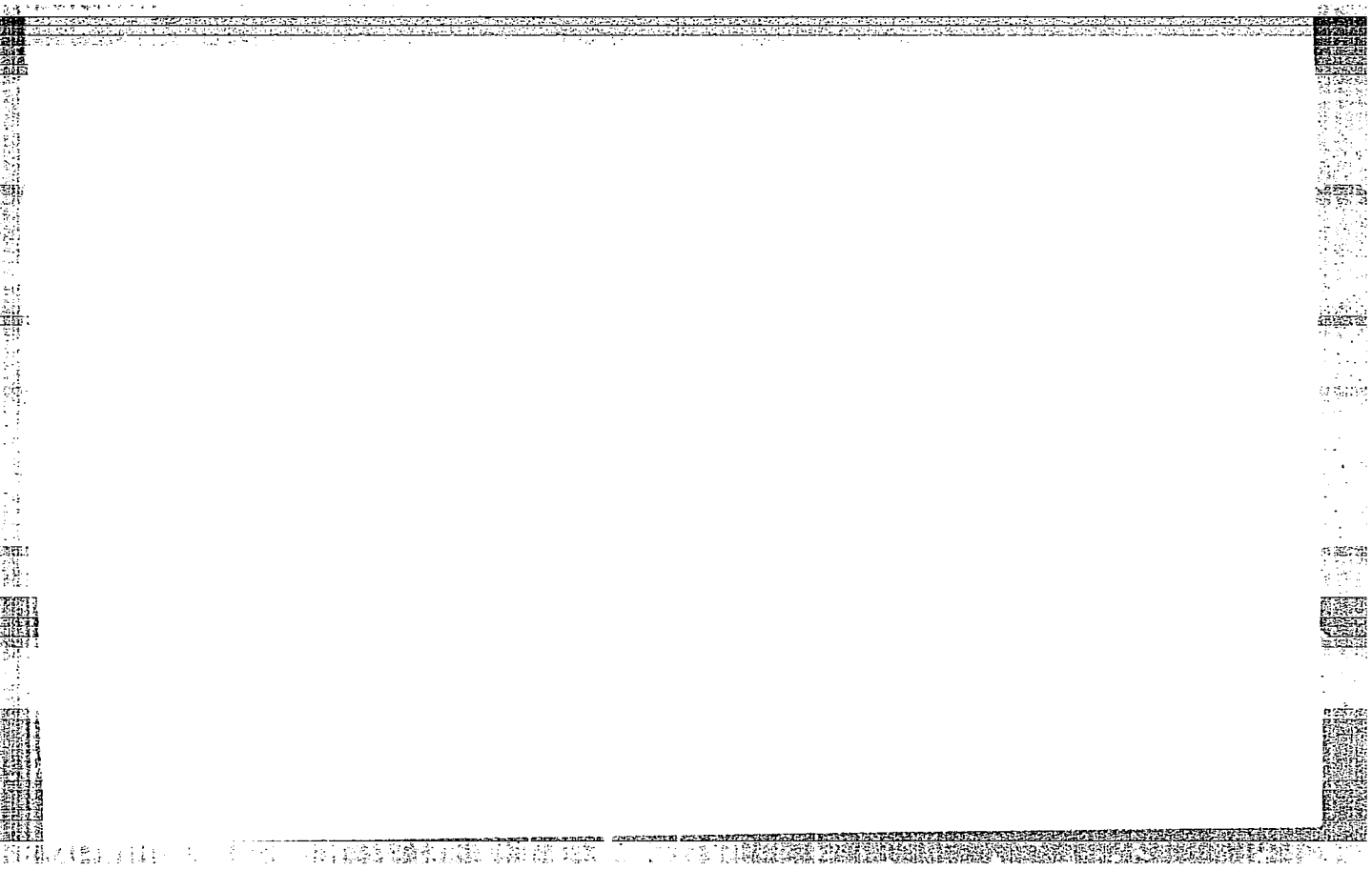
or the metric in a plane perpendicular to the field should lead to

ZEL'DOVICH, Ya.B.

Classification of elementary particles and quartets in a "presentation for pedestrians." Usp. fiz. nauk 86 no.2:303-314 Je '65. (MIRA 18:6)

of the tremendous energy stored in the cosmic rays and magnetic





APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001964220014-2"

ZEL'DOVICH, Ya.B.; SEMENOV, N.N.; KHARITON, Yu.B.; BELYAYEV, A.F.; GLAZKOVA, A.P.; KONDRIKOV, B.N.; ORLOVA, Ye.Yu.; SVETLOV, B.S.

Konstantin Kostantinovich Andreev, 1905-1964. Zhur. fiz. khim. 39 no.2:534-536 F '65. (MIRA 18:4)

BAZ', A.I.; GOL'DANSKIY, V.I.; ZEL'DOVICH, Ya.B.

Systematics of the lightest nuclei. Usp. fiz. nauk 85 no.3:445-483 Mr '65. (MIRA 18:4)

ZEL'DOVICH, Ya.B., akademik; GUSEYNOV, O.Kh.

Neutronization of matter on collapse and the neutrino spectrum.
Dokl. AN SSSR 162 no.4:791-793 Je '65. (MIRA 18:5)

ZEL'DOVICH, Ya.B.

Unstable quartets and their detection. Pis'. v red. Zhur. eksper. i teoret. fiz. 1 no.4:1-4 My '65. (MIRA 18:11)

1. Submitted April 1, 1965.

ZEL'DOVICH, Ya.B.; GUSEYNOV, O.Kh.

Neutronization of He^4. Pis'. v red. Zhur. eksper. i teoret. fiz. 1 no.4:11-17 My '65. (MIRA 18:11)

1. Submitted April 6, 1965.

L 12030-66 EWT(m)/T/EWA(m)-2

ACC NR: AP5027999 SOURCE CODE: UR/0386/65/002/007/0340/0344

AUTHOR: Zel'dovich, Ya. B.

31
28
B

ORG: none

TITLE: On the masses of particles (resonances) with strangeness S - -4 and S - +1

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsivu. (Prilozheniye), v. 2, no. 7, 1965, 340-344

TOPIC TAGS: strangle particle, baryon, mass spectrum, meson, lepton

ABSTRACT: The author supplements H. Harari's and H. J. Lipkin's (Phys. Rev. Lett. v. 13, 345 1964) discussion on several properties of a hypothical baryon 35-plet, which according to the SU(3) symmetry contains particles with strangeness from S = -4 (Y = -3) up to S = +1 (Y = +2), making use of the quark model. It is shown that to obtain the expected non-monotonic variation of the particle mass as a function of the strangeness S or hypercharge Y, it is necessary to have c < 0 in the Cell-Mann--Okubo formula

Card 1/4

$$M = a + bY + c\left[I(I+1) - 1/4\ Y^2\right]. \quad (1)$$

L 12030-66

ACC NR: AP5027999

An additional qualitiative aguments offered in favor of the assumption that $c < 0$ in the 35-plet. Using the experimental values for the constants b and c in formula (1), the author calculates the masses M of the different resonances (Table 1), listing also the decay schemes allowed by SU(3) symmetry and the corresponding thresholds. The comparison shows that only X_1 has a chance of being stable to strong decay.

Card 2/4

Table I. Masses, decays, and thresholds of 35-plet particles

Particle	Y	S	I	M, MeV	Decay	Threshold, MeV
I_4	+2	+1	2	1716-1760	$K\pi N$	1570
N_5^*	+1	0	5/2	1570	$\pi\pi N$	1210
N_3^*	+1	0	3/2	1814-1890	$\pi\pi N$	1210
Y_4	0	-1	2	1716-1760	$\pi\pi\Lambda$	1385
Y_2	0	-1	1	1910-2015	$\pi\pi\Lambda$	1385
Ξ_3^*	-1	-2	3/2	1863-1951	$\pi\pi\Xi$	1590
Ξ_1^*	-1	-2	1/2	2009-2141	$\pi\pi\Xi$	1590
Ω_2^*	-2	-3	1	2009-2141	$\pi\Omega$	1820
Ω_0^*	-2	-3	0	2106-2270	$\pi\pi\Omega$	1950
X_1'	-3	-4	1/2	2155-2332	$\bar{K}\Omega$	2160

Along with the search for X_1 (S = -4), the greatest interest is attached to searches for a baryon with positive strangeness I_4 (S = +1). The expected threshold of the

L 12030-66
ACC NR: AP5027999

3

reaction

$$N + N = I_4 + \Sigma_1$$

in the laboratory system (one of the N is at rest) is of the order of p_N = 4 Bev/c, and for $\pi^+ N = I_4 + K$ the threshold is p_π = 2.2 Bev/c. A reaction of particular interest is

$$\pi^+ + p = I_4^{++} + K^-, \quad I_4^{++} = p + \pi^+ + K^+$$

Author thanks L. B. Okun' for a discussion. Orig. art. has: 2 formulas and 1 table.

SUB CODE: 20/ SUBM DATE: 05Aug65/ ORIG REF: 001/ OTH REF: 001

jw

Card 4/4

L 7064-66 EWT(1)/EWP(m)/EWT(m)/EPF(c)/EPF(n)-2/EWA(d)/EWP(j)/T/FCS(k)/ETC(m)
ACC NR: AP5027287 EWA(1) WW/RM SOURCE CODE: UR/0207/65/000/005/0147/0148

AUTHORS: Barenblatt, G. I. (Moscow); Bulina, I. G. (Moscow); Zel'dovich, Ya. B. (Moscow); Kalashnikov, V. N. (Moscow); Sholomovich, G. I. (Moscow)

ORG: none

TITLE: On one possible mechanism of the effect of small additions of high-molecular weight compounds on turbulence

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1965, 147-148

TOPIC TAGS: hydrodynamics, turbulent flow, turbulence, vortex, turbulence depressant, polymer

ABSTRACT: To explain and extend the data of G. I. Barenblatt, I. G. Bulina, V. P. Myasnikov and G. I. Sholomovich (O vliyanii malykh dobavok rastvorimykh vysokomolekulyarnykh soyedineniy na rezhim dvizheniya zhidkosti. PMTF, 1965, No. 4) on the effect of small additions of soluble high-molecular weight compounds on turbulence, the particle sizes of sodium carboxymethylcellulose polymer in aqueous solutions were determined. The experimental procedure consisted in determining the viscosity of an aqueous solution of sodium carboxymethylcellulose by three different methods: capillary tubes, filter installation and Hepler viscosimeter, and comparison of the latter with the viscosity of a glycerine solution having the same viscosity. The experimental results are tabulated. It was found that the particle

Card 1/2

L 7064-66

ACC NR: AP5027287

21

size of the polymer was of the order of 10^{-2} cm. This particle diameter is just sufficient to explain the experimental results of G. I. Barenblatt et al (see above) on the assumption that the observed decrease in turbulence is due to the destruction of vortices in the liquid by the particles of the additive. The authors thank V. A. Gorodtsov and V. P. Myasnikov for their criticism, Ye. A. Myakotin for construction of the experimental installation, and V. A. Avseyenko, S. B. Gerashchenko, Z. P. Titov, and A. G. Tsypkin for their participation in the experimental measurements. Orig. art. has: 1 table.

SUB CODE: GC/ SUBM DATE: 26Jul65/ ORIG REF: 004/ OTH REF: 004

GC

Card 2/2

L 5444-66 EWT(l)/EWP(m)/T IJP(c) GW

ACCESSION NR: AP5019230 UR/0056/65/049/001/0170/0181

AUTHOR: Doroshkevich, A. G.; Zel'dovich, Ya. B.; Novikov, I. D. 56 B

TITLE: Gravitational collapse of asymmetrical and rotating masses

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 1, 1965, 170-181

TOPIC TAGS: gravitation, stellar evolution, cosmogony, gravitation effect, gravitation field

ABSTRACT: The theory of stars contracting without limit, hitherto developed for a simple model of a spherical body, is extended in this article to include non-spherical and asymmetrical stars. It is proved rigorously that the characteristic pattern of gravitational self-closing is valid also for the general case. Moreover, collapse of a non-rotating body leads to damping (proportional to the reciprocal of the time) of the quadrupole and higher field moments as seen by an external observer. The variation of a rotating body is shown to be different. The changes in the metric, connected with the rotation of the local inertial frame, are shown to tend to a nonvanishing constant value, but otherwise the collapse remains qualitatively the same as in the spherical case. Static nonspherical solutions of Einstein's

Card 1/2

L 5444-66

ACCESSION NR: AP5019230

equations are investigated and the properties of the Schwarzschild surface are analyzed for the case of static field with axial symmetry, a rotating body with an external field, a Schwarzschild sphere in an external quadrupole field, and the collapse of a perturbed spherical dust cloud. Orig. art. has: 1 figure and 20 formulas.

ASSOCIATION: none

SUBMITTED: 16Dec64 ENCL: 00 SUB CODE: GP, AA

NR REF SOV: 006 OTHER: 010

Card 2/2

ACC NR: AR6035556 SOURCE CODE: UR/0269/66/000/010/0076/0076

AUTHOR: Zel'dovich, Ya. B.; Novikov, I. D.; Syunyayev, R. A.

TITLE: Methods of investigation and the cosmological importance of He in the intergalactic matter

SOURCE: Ref. zh. Astronomiya, Abs. 10.51.572

REF SOURCE: Astron. tsirkulyar, no. 371, apr. 27, 1966, 1-3

TOPIC TAGS: helium, model, star cluster, intergalactic helium, cosmological model, quasar spectrum

ABSTRACT: An investigation of intergalactic He would make it possible to determine the degree of isotropy in the expansion of the metagalaxy in its early stages and the present density of intergalactic matter. Observation of the following phenomena is suggested: 1) light absorption in quasar spectra by intergalactic He remaining in its basic state; 2) absorption lines of neutral He in source spectra located beyond the cluster of galaxies; 3) neutral He radiation lines located in clusters of galaxies; 4) He^3 observations by radio methods. The presence of intergalactic He, which, according to the "hot" cosmological model, represents

Card 1/2 UDC: 523.11

ACC NR: AR6035556

~ 30% of the gas which has not passed the stellar state, increases the rate of intergalactic gas cooling and changes the conditions of its ionization. Bibliography has 6 titles. A. Zasov. [Translation of abstract] [DW]

SUB CODE: 03/

Card 2/2

ZEL'DOVICH, Ya.B.; NOVIKOV, I.D.

Relativistic astrophysics. Usp. fiz. nauk 84 no.3:377-417 N '64.
(MIRA 18:10)

L 00718-66 EWT(1)

ACCESSION NR: AP5014239 UR/0386/65/001/003/0040/0044

AUTHOR: Zel'dovich, Ya. B.

TITLE: Analog of the Zeeman effect in the gravitational field of a rotating star

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 1, no. 3, 1965, 40-44

TOPIC TAGS: gravitation field, gravitation effect, Zeeman effect, magnetic field, star

ABSTRACT: The author studies the effect which the change in the gravitational field due to rotation has on the spectrum emitted by atoms on the surface of a body and observed by a receiver located at a distance from the body. Components of the gravitational field which are analogous to a magnetic field cause changes in the spectrum which are similar to the Zeeman effect. In distinction from the classical magnetic Zeeman effect, the gravitational effect is universal. Splitting is independent of the physical properties of the system radiating the light; it is identical for atoms and molecules in the optical region and in the rf range. A proof of this hypothesis is given.

ASSOCIATION: none

SUBMITTED: 01Apr65 ENCL: 00 SUB CODE: GP, AA

NO REF SOV: 001 OTHER: 000

Card 1/1

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001964220014-2"

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001964220014-2"

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001964220014-2"

ZEL'DOVICH, Ya. B.

Masses of particles (resonances) with the singularities $S = -4$ and $S = +1$. Pis'. v red. Zhur. eksper. i teoret. fiz. 2 no. 7:340-344 O '65. (MIRA 18:12)

1. Submitted August 5, 1965.

ARTSIMOVICH, L.A., akademik; KELDYSH, M.V., akademik; KAPITSA, P.L., akademik; VUL, B.M.; VERESHCHAGIN, L.F.; PISTOL'KORS, A.A.; SHCHUKIN, A.N., akademik; SKOBEL'TSYN, D.V., akademik; ALEKSANDROV, A.P., akademik; AMBARTSUMYAN, V.A., akademik; ZEL'DOVICH, Ya.B.; SEMENOV, N.N., akademik; KOTEL'NIKOV, V.A., akademik; LIFSHITS, I.M.; VEKSLER, V.I., akademik; GINZBURG, V.L.; MILLIONSHCHIKOV, M.D., akademik

Some problems in the development of modern physics; discussion of the work of the Department of General and Applied Physics. Vest. AN SSSR 35 no.2:3-46 F '65. (MIRA 18:3)

1. Chleny-korrespondenty AN SSSR (for Vul, Vereshchagin, Pistol'kors, Lifshits, Ginzburg).

ZEL'DOVICH, Ya.B.; PODURETS, M.A.

Evolution of a system of gravitationally interacting point masses.
Astron.zhur. 42 no.5:963-973 S-O '65. (MIRA 18:10)

ZEL'DOVICH, Ya.B.

Magnetic model of the universe. Zhur. eksp. i teor. fiz. 48 no.3:986-988 Mr '65. (MIRA 18:6)

BOROSHKEVICH, A.G.; ZEL'DOVICH, Ya.B.; NOVIKOV, I.D.

Gravitational collapse of asymmetrical and rotating masses. Zhur.eksp. i teor.fiz. 49 no.1:170-181 Jl '65. (MIRA 18:8)

L 2009-66 EWT(1)

ACCESSION NR: AP5018609 UR/0053/65/086/003/0447/0536
523 + 530.12:531.51

AUTHOR: Zel'dovich, Ya. B.; Novikov, I. D.

TITLE: Relativistic astrophysics. II.

SOURCE: Uspekhi fizicheskikh nauk, v. 86, no. 3, 1965, 447-536

TOPIC TAGS: astrophysics, radio astronomy, stellar evolution, cosmogony

ABSTRACT: The first part of the article was published in Uspekhi fizicheskikh nauk v. 84, 377, 1964, and dealt with the conditions under which stars go over to the neutron or collapsed (cooled) state. The present part is a review of the literature up to the end of 1964, deals with the observational properties of stars that are on the verge of collapse or neutronization, and analyzes in detail how a star can either avoid or reach the state of collapse. Some problems concerning quasars, for which there is no complete theory as yet, are expounded. The section headings are: 1. Introduction. 2. Equilibrium of a supermassive star. 3. Equilibrium of a rotating star with $\gamma = 4/3$. 4. The possible occurrence of a supermassive star. 5. Evolution of supermassive stars. 6. Evolution of stars of medium mass. 7. Motion of trial particles and light rays in a Schwarzschild field. 8. Radiation of gravitational waves. 9. Collapse of rotating star. 10. Collapse of nonspherical body. 11. Does rapid rotation interfere with collapse of a star?

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L 2009-66
ACCESSION NR: AP5018609 O

12. Comparison with observations. 13. Accretion of gas by neutron and cooled stars. 14. Magnetic and magnetohydrodynamic phenomena. 15. Quasars ("superstars"). 16. Magnetoturbulent theory of quasars. 17. The anticollapse hypothesis. Appendix. Literature. Orig. art. has: 17 figures and 100 formulas.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: AA

NR REF SOV: 081 OTHER: 071

Card 2/2 DP

ZEL'DOVICH, Ya.B.; OKUN', L.B.; PIKEL'NER, S.B.

Quartets: astrophysical and physicochemical aspects. Usp. fiz. nauk 87 no.1:113-124 S '65. (MIRA 18:9)

L 2892-66 EWT(l)/EEC(k)-2 GW

ACCESSION NR: AP5015417 UR/0020/65/162/004/0791/0793

AUTHORS: Zel'dovich, Ya. B. (Academician); Guseynov, O. Kh. 23 B

TITLE: Neutronization of matter during collapse, and the neutrino spectrum 19

SOURCE: AN SSSR. Doklady, v. 162, no. 4, 1965, 791-793

TOPIC TAGS: neutrino, neutron reaction, cosmogony, stellar evolution

ABSTRACT: The authors consider the last stage of stellar evolution, consisting of the transformation of all the stable nuclei in the star into neutrons and emission of high-energy neutrinos, which, unlike the thermal neutrinos and antineutrinos, can be measured in experiments and thus give information on the course of the stellar evolution. It is shown by an approximate calculation, using the neutronization of cold hydrogen under free-fall collapse as an example, that the emitted neutrino will have an average energy 4.56 MeV and that the neutron production will occur in approximately 10^{-2} sec. In the case

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ACCESSION NR: AP5015417

of neutronization of a helium star, the neutrino energy is of the order of 10 MeV. Neutronization of heavier stars (iron) can raise the neutrino energy to as much as 30 MeV. It is further estimated that the flux of the high-energy neutrinos, assuming that 5--10 stars with masses 2--3 times that of the sun collapse in the galaxy every year, can become comparable with the flux of solar neutrinos, and in view of recent improvements in detection techniques, these may become observable, provided the spectrum of the neutrinos from the collapsing stars contains neutrinos which are not contained in the solar neutrino spectrum. Orig. art. has: 7 formulas

ASSOCIATION: None

SUBMITTED: 12Mar64 ENCL: 00 SUB CODE: AA

NR REF SOV: 003 OTHER: 001

Card 2/2

ZEL'DOVICH, Ya.B., akademik

Number of quanta as an invariant of the classical electromagnetic field. Dokl. AN SSSR 163 no.6:1359-1360 Ag '65. (MIRA 18:8)

ZEL'DOVICH, Yakov Borisovich, akademik; SEMENDYAYEVA, K.A., red.; NORKIN, S.B., red.

[Higher mathematics for beginners and its applications to physics] Vysshaia matematika dlia nachinaiushchikh i ee prilozheniia k fizike. Moskva, Nauka, 1965. 575 p. (MIRA 18:9)

L 20456-66 EWT(l)/EWT(m)/EWP(f)/T/ETC(m)-6 WW/WE
ACC NR: AP6009054 (A) SOURCE CODE: UR/0207/66/000/001/0102/0104

55
B

AUTHOR: Zel'dovich, Ya. B. (Moscow)

ORG: none

TITLE: One effect which stabilizes the curved front of a laminar flame

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 1, 1966, 102-104

TOPIC TAGS: combustion, combustion instability, flame, gas combustion

ABSTRACT: The present analysis of flame instability revealed a new factor which may substantially contribute to the stabilization of laminar flames. The development of perturbations was described by a model, in which the perturbed flame front moves at a constant normal speed in a stagnant gas and, therefore, Huyghens' wave theory can be applied. According to this theory, the original sinusoidal perturbation becomes cycloidal in shape with corner points at which the perturbed flame front surface has an angular break. Analysis of the processes in the vicinity of these corner points showed that the flame speed is higher at the corner points than in the curved sections of the flame front. Therefore, the corner points are responsible for the

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L 20456-66

ACC NR: AP6009054 O

decrease in perturbation amplitude according to the formula:

$$\left(\frac{dA}{dt}\right) = -\frac{2}{\pi^2} k^2 u_n A^2$$

where A is the amplitude; u_n, normal burning velocity; λ, wavelength, and ($k = 2\pi/\lambda$). Consequently, flame stabilization is proportional to the square of the perturbation amplitude. This effect was not taken into consideration in Landau's linearized theory, hence this may be responsible for the large discrepancy between the theoretical and experimental results. The presence of corner points is considered to be a major flame stabilizing factor. A stagnation zone is generated behind the corner points. Orig. art. has: 9 formulas and 3 figures. [FV]

SUB CODE: 21/ SUBM DATE: 18Aug65/ ORIG REF: 009/ OTH REF: 003

ATD PRESS: 4222

Card 2/2 BK

L 20683-66 EWT(1) IJP(c) WW/GG

ACC NR: AP6008741 SOURCE CODE: UR/0386/66/003/003/0137/0141

62
B

AUTHOR: Zel'dovich, Ya. B.; Rayzer, Yu. P.

ORG: Institute of the Problems of Mechanics (Institut problem mekhaniki)

TITLE: Self-trapping of light. Importance of the Kerr effect and the striction

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniya, v. 3, no. 3, 1966, 137-141

TOPIC TAGS: self trapping, laser, Kerr effect, electrostriction, dielectric constant

ABSTRACT: The authors consider self-trapping in order to determine whether the Kerr effect or electrostriction is responsible for self-trapping. Theoretical analysis shows that in anisotropic gases and liquids the minimum energy required for self-trapping should be four times greater for circularly polarized than for linearly polarized light if the Kerr effect is responsible for self-trapping. In the case of electrostriction the minimum energy should be the same for the two types of polarization. It is pointed out that in certain crystalline substances such as diamond and MgO the index of refraction decreases with pressure. In such materials a change in density caused by the field leads to self-trapping; however, broadening rather than narrowing will occur. An approximate calculation based on the diffraction of the beam shows that the linear velocity at which the self-trapping channel is propagated is greater in the case of the Kerr effect ($\sim 10^7 - 10^9$ cm/sec) than it is for

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L 20683-66
ACC NR: AP6008741

electrostriction ($\sim 10^5$ cm/sec). The experimentally observed relatively long channels formed by short pulses apparently indicate that the Kerr effect is primarily responsible for self-trapping. This, however, does not exclude the effect of electrostriction, which may be responsible for self-trapping in a zone of the channel propagated a certain distance behind the primary trapping zone. It is also pointed out that the light observed at the end of the channel changes frequency, i.e., a Doppler effect which depends on the linear velocity and the index of refraction should be observed. [CS]

SUB CODE: 20/ SUBM DATE: 20Dec65/ ORIG REF: 003/ OTH REF: 002/ ATD PRESS: 4223

Card 2/2 BK

L 36222-66 EWT(m)

ACC NR: AP6024522 SOURCE CODE: UR/0386/66/004/002/0078/0080

AUTHOR: Zel'dovich, Ya. B.

ORG: none

TITLE: Vortex isomers of nuclei

SOURCE: Zh eksper i teor fiz. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 2, 1966, 78-80

TOPIC TAGS: nuclear isomer, liquid helium, quantum liquid, vortex, particle collision

ABSTRACT: The author considers the possible behavior of the equivalent of a drop of nuclear matter when regarded as a drop of a superfluid liquid, i.e., a nucleus with a quantized vortex passing along the axis of the drop. Since the rotation is not similar to rotation with constant angular velocity, the equilibrium shape of the drop is that of a sphere with dips at two poles. The minimum energy of the nucleus is estimated as a function of the angular momentum of the drop and it is deduced that the vortical state of the drop can be regarded as isomeric in that its energy exceeds that of the ground state, but it can be decreased by emission of a quantum or of some particle only by changing simultaneously the momentum by an amount equal to not less than a certain fraction of the angular momentum. The possible experimental realization of such an isomeric vortical state of drops of liquid helium, the superfluidity and quantum vortices of which are known to exist, is discussed. It is concluded that the preparation of such isomeric states is apparently most probable by collision of

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L 36223-66

ACC NR: AP6024522

bulky particles but not by the action of quanta, protons, or neutrons. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 31May66/ ORIG REF: 001

Card 2/2

L 22784-66 FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(c) WG/JXT(CWW)
ACC NR: AP6007635 SOURCE CODE: UR/0141/66/009/001/0095/0101

51
B

AUTHOR: Zel'dovich, B. Ya.; Pilipetskiy, N. F.

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova)

TITLE: Laser radiation field focused by real systems

SOURCE: IVUZ. Radiofizika, v. 9, no. 1, 1966, 95-101

TOPIC TAGS: laser, laser beam, laser optics

ABSTRACT: Unlike other published works where relative illumination distribution in the image plane is examined, the present article offers formulas for calculating the light-field amplitude when a perfect round-cross-section beam is focused by a spheric-aberration (lens) system. The constant field amplitude in the beam cross section is assumed. Diffraction phenomena are allowed for by means of evaluating the field by caustic surfaces, in a geometric-optics approximation. Asymptotic formulas for calculating the field with large aberrations are developed; specifically, formulas for calculating the field with a 2nd-order arbitrary aberration. The

Card 1/2 UDC: 621.378.325.001

L 22784-66
ACC NR: AP6007635

existence of an optimal (for given lens shape and beam diameter) focal length which ensures maximum local field is proven. By using conical-surface (instead of spherical) lenses and mirrors, a filamentary beam with strong field and constant effective wave vector can be created, and a vector synchronism in nonlinear optics can be realized. Orig. art. has: 2 figures and 27 formulas. [03]

SUB CODE: 20 SUBM DATE: 28Apr65 / ORIG REF: 007/ OTH REF: 001
ATD PRESS: 4229

Card 2/2

L 22640-66 EWD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(c) WE/AM/GM

ACC NR: AP6010989 SOURCE CODE: UR/0056/66/050/003/0680/0690

55
B

AUTHOR: Zel'dovich, B. Ya.

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet)

TITLE: Theory of second harmonic generation of light in focused beams

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 3, 1966, 680-690

TOPIC TAGS: nonlinear optics, laser, second harmonic, laser beam, KDP crystal

ABSTRACT: A theory of second harmonic generation in focused beams in a finite medium with the momentum matching conditions $\vec{k}_2 = \vec{k}_1 + \vec{k}'_1$ such that $\vec{k}_1$ is not parallel to $\vec{k}'_1$ is developed. The analysis is conducted for a two-dimensional problem (cylindrically focused beam) and a three-dimensional problem (spherically focused beam). The concept of the interaction length for index matching conditions in a focused beam is introduced and is used for classifying various cases of the position of the focus in the crystal, crystal lengths, and focusing angles. The efficiency of harmonic generation is calculated for a specific type of conical lens. The efficiency of second harmonic generation by an ideal beam is also analyzed as a function of the system's parameters. Orig. art. has: 28 formulas and 1 figure. [CS]

laser 25
SUB CODE: 20/ SUBM DATE: 20Aug65/ ORIG REF: 005/ OTH REF: 001/ ATD PRESS: 4228

Card 1/1 UDC

ACC NR: AP6036755 SOURCE CODE: UR/0020/66/171/001/0065/0068

AUTHOR: Zel'dovich, Ya. B. (Academician); Korner, S. B.; Krishkevich, G. V.; Yushchko, K. B.

ORG: none

TITLE: The problem of the smoothness of the detonation front in a liquid explosive

SOURCE: AN SSSR. Doklady, v. 171, no. 1, 1966, 65-68

TOPIC TAGS: shock wave, detonation front, detonation front profile, detonation front reflectivity, detonation front reflecting loss, liquid explosive

ABSTRACT: An analytical investigation of the light reflectivity of the detonation front in a liquid explosive (a mixture of nitric acid and dichloroethane) is presented, to explain the deviation of the experimental values of the reflection factor from the values calculated on the basis of the change of the refractive index in the wave front. The analysis uses earlier experimental data and yields a semi-quantitative description of the phenomenon as based on the wave theory of light reflection. The difference between the observed and calculated values of the reflection index, the analysis shows, can be ascribed to a certain degree of roughness on the detonation front comparable to the wavelength of the incident light. The degrees of roughness and the corresponding losses of reflected light intensities within the full range from purely specular to fully diffuse reflection were

Card 1/2 UDC: 532.5+535.8

ACC NR: AP6036755 (A)

established. Conversely, the measured intensities of reflected light and dependence of the diffusely reflected portion on the angle of incidence characterize the degree and the average period of the roughness of the detonation front. The character of the roughness proved to be stationary under given conditions of detonation, while perturbations of higher orders leveled off very quickly. The deviation of the detonation front from a perfect specular surface is considered proven. The actual origin of the deviation, however, remains to be determined. At present, two explanations are considered possible: either it is a phenomenon resembling that observed earlier with gaseous detonation and only modified for the higher density of liquids; or it is initiated by inhomogeneities in the zone of chemical reaction, although no feedback of these fluctuations on the process of reaction has been observed. The use of the laser beam as a light source is being considered for a more detailed investigation of the profile of the detonation surface. Orig. art. has: 3 figures and 1 table.

SUB CODE: 20/ SUBM DATE: 18Jul66/ ORIG REF: 004/ ATD PRESS: 5107

Card 2/2

ACC NR: AT6029741 SOURCE CODE: UR/0053/66/089/004/0647/0668

AUTHOR: Zel'dovich, Ya. B.

ORG: none

TITLE: The "hot" model of the universe

SOURCE: Uspekhi fizicheskikh nauk, v. 89, no. 4, 1966, 647-668

TOPIC TAGS: cosmology, cosmic radiation, stellar evolution, entropy, plasma temperature, elementary particle, gravitation, nuclear reaction

ABSTRACT: This is a review article aimed at describing the status of cosmology after the discovery of the presence of an isotropic radiation in the universe at wavelenghts 7, 3, and 0.25 cm, corresponding to a temperature of approximately 3K. The existence of such radiation, predicted on the basis of Friedmann's theory of the expanding universe, has provided an impetus for further development of the hypothesis of the hot model, in which it is assumed that in the prestellar state matter was characterized by a very large entropy. The evolution of such a universe from a temperature of 10^{10} °K at t = 1 sec to 3K at the present time is traced and the generation of various elementary particles during its various stages is discussed. The existence of a hot intergalactic plasma and possible sources for its heating is also discussed. The theoretical difficulties of the hot model, still remaining, are the question whether a quantum theory can be constructed for the transition from compression at $t < 0$ to expansion at $t > 0$, the nature of the initial specific entropy of matter in the hot

UDC: 523.12

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L 10244-67

ACC NR: AP6029741

model, the existence of superdense bodies under gravitational radius, vortical motion in magnetic fields, theory of formation and evolution of "ordinary objects" (stars, galaxies, clusters, quasars), and the very nature of the expansion of the universe (cyclic or one-time processes). The main conclusion of recent developments are that Friedmann's theory, in spite of not having been fruitful for the last 30 - 40 years, is still basic, and that the earth, the sun, and the galaxy do not move with large velocity relative to the radiation field. An appendix describes the latest experimental results on radiation measurements at short waves, the nature and mechanics of the hot model, the nature of the entropy, and role of nuclear reactions and gravitation in the hot model, as well as references to other published works. Orig. art. has: 6 figures, 7 formulas, and 1 table.

SUB CODE: 03,04 / 21 SUBM DATE: 00/ ORIG REF: 006/ OTH REF: 002

Card 2/2

UR/

ACC NR: AM6029398 Monograph

Zel'dovich, YAkov Borisovich; Rayzer, YUriy Petrovich

Physics of shock waves and high-temperature hydrodynamic phenomena (Fizika udarnykh voln i vysokotemperaturnykh gidrodinamicheskikh yavleniy) 2d ed., rev. Moscow, Izd-vo "Nauka," 1966. 686 p. illus., biblio. 7500 copies printed.

TOPIC TAGS: gas dynamics, shock wave analysis, laser thermal wave, high temperature physics

PURPOSE AND COVERAGE: A great variety of problems from various fields of physics, physical chemistry, and astrophysics which involve modern gas dynamics and hydrodynamics are discussed in this book (second edition). It deals with the principles of gas dynamics and the theory of shock waves, and the theory of transport of radiation. Among the subjects considered are: the thermodynamic and optical properties of substances subjected to high temperatures and pressures; the kinetics of dissociation, ionization, and other non-equilibrium processes; phenomena connected with the radiation of light and radiative heat exchange in shock waves and explosions. The authors of this monograph have written a large number of original articles in this field of science which have been reflected in the book. Although the general plan and a large part of the text of the

Card 1/4 UDC: 541.12

ACC NR: AM6029398

second edition have remained unchanged from the first edition, some chapters have been revised and supplemented. A special section devoted to a semiclassical treatment of induced radiation and the laser effect was added to Chapter 2. A section on breakdown processes and heating of gases under a focused laser beam was added to Chapter 5; sections on the emission and absorption of light by free electrons in collisions with neutral atoms were also added to this chapter. Section 3 of Chapter 6 dealing with problems of ionization, recombination, and electron excitation were rewritten and supplemented to correspond with present-day views on the importance of ionization of atoms in stages and electron capture in ternary collisions on the upper energy levels of atoms; the ionization of air is considered in more detail than formerly. The discussion of gas ionization in shock waves in Chapter 7 was revised as were sections of Chapter 8 on the kinetics of changes in the degree of ionization and the "quenching" of an escaping ionized gas. A special section on the propagation of shock waves in an inhomogeneous gas with exponential distribution of density was added to Chapter 11. An appendix giving some constants, relationships between atomic constants, and relationships between units and formulas often encountered in practical work in the field was added to this edition. This book is intended as a practical aid to physicists, specialists in mechanics, and engineers working in applied physics and new fields

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ACC NR: AM6029398

of technology. It should be useful to graduate students and students in the appropriate specialties, also to physicists who wish to familiarize themselves with the present state-of-the-art of the science of shock waves.

TABLE OF CONTENTS [abridged]:

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ACC NR: AM6029398

Ch. 11. Shock waves in solids -- 536
Ch. 12. Some self-similar processes in gas dynamics -- 610
Appendix -- 672
Bibliography -- 675

SUB CODE: 20/ SUBM DATE: 26Feb66/ ORIG REF: 277/ OTH REF: 259

Card 4/4

ACC NR: AP7000541 SOURCE CODE: UR/0386/66/004/010/0426/0429

AUTHOR: Zel'dovich, Ya. B.

ORG: none

TITLE: Interference of different frequencies at bremsstrahlung radiation

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v rekadtsiyu. Prilozheniye, v. 4, no. 10, 1966, 426-429

TOPIC TAGS: electromagnetic wave, electromagnetic wave interference, bremsstrahlung, electrodynamics

ABSTRACT: Methods of classical electrodynamics were used in an investigation of the radiation generated by a single deflection of a charge whose motion was rectilinear before and after deflection. The charge was subjected to an accelerating impulse whose dependence on time was similar to the delta function. The electric field E of the generated electromagnetic radiation is proportional to the acceleration. At a distant point, E(t) has the form shown in Fig. 1. E is directed downward (a negative charge is shown) and the dependence E(t) is similar to $r^{-1}\delta(t - t_0 - r/c)$, where t_0 is the deflection instant of the radiating particle. The main point is that in the wave the E does not change sign; E is either equal to zero or is directed downward, i.e., there are no "oscillations." The pulse shape depends essentially on the phase relationships between waves of different frequencies. When a wave acts upon a free negative charge (electron), in classical electrodynamics the electron acquires a velocity directed upward since the acting force is directed upward and

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ACC NR: AP7000541

does not change sign. The velocity acquired is proportional to r^{-1}, and the energy is proportional to r^{-2}, in accordance with the fact that the flow of radiated energy diminishes as r^{-2}. Thus, in classical theory there should be a correlation

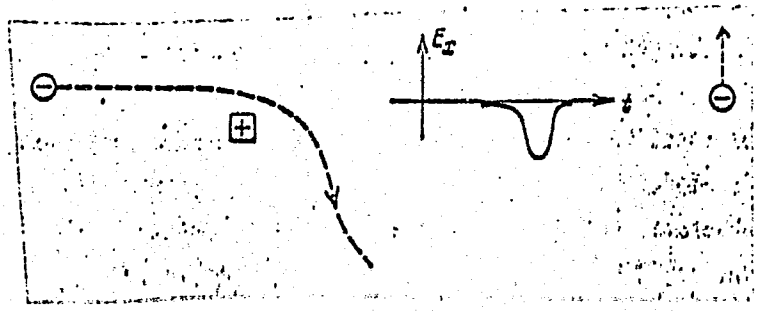

Fig. 1.

between the direction of the deflection of the radiating particle and the direction of the particle emission on which the radiation acts. Apparently the correlation can be observed only in the Compton effect. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 04Jun66/ ORIG REF: 002/ OTH REF: 001/

Card 2/2

ACC NR: AP6037078 SOURCE CODE: UR/0056/66/051/005/1492/1495

AUTHOR: Zel'dovich, Ya. B.

ORG: none

TITLE: The quasi-energy of a quantum system subject to a periodic action

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 5, 1966, 1492-1495

TOPIC TAGS: quantum physics, Schrodinger equation, periodic system, radiative transition

ABSTRACT: The author considers the structure of the solutions of a Schrodinger equation for a quantum-mechanical system subjected to the action of a classical force which is a periodic function of time. The concept of quasi-energy is introduced for the quasistationary states that exhibit periodic time variation. The radiation made up of single quanta with frequencies that are multiples of the frequency of the external field, or of groups of quanta related to the radiative transitions from one quasistationary state into another is considered, with particular attention paid to transitions from a lower state to a higher one, where the energy is drawn from the external field. Orig. art. has: 9 formulas.

SUB CODE: 20/ SUBM DATE: 24May66/ ORIG REF: 001/ OTH REF: 001

Card 1/1

ZEL'DOVICH, Ye.P.

ZELDOVICH,YE.P. 600

1. ZEL'DOVICH, YE. P.; Inzh.

2. USSR (600)

4. Plastering

7. Mechanizing plastering work. Biul. stroi. tech. 9, no. 8, 1952 VNIOMS

9. Monthly List of Russian Accessions, Library of Congress August 1952, Unclassified.

L 44706-66 EWT(1) GW

ACC NR: AP6031342 SOURCE CODE: UR/0386/66/004/003/0117/0120

AUTHOR: Zel'dovich, Ya. B.; Novikov, I. D.

ORG: none

TITLE: Charge asymmetry and entropy of a hot Universe

SOURCE: Zh. eksper. i teoret. fiz. Pis'ma v redaktsiyu. Prilozheniye v. 4, no. 3, 1966, 117-120

TOPIC TAGS: cosmology, stellar evolution, entropy, gravitation effect

ABSTRACT: The authors offer a natural explanation of the small charge asymmetry of the Universe at high density, which is deduced from recent measurements of the cosmic background of radio emission at wavelengths 20, 7, 3, and 0.25 cm, which have confirmed the theory of the hot Universe. The dimensionless entropy (per baryon, in a system of units where the Boltzmann constant is $k = 1$), amounts to approximately 10^9. This means that there are approximately 10^8 quanta of electromagnetic radiation per baryon, and approximately as many electrons and muonic neutrinos. The almost-charge-symmetrical state becomes rational if it is assumed that a phase when matter was compressed existed at $t < 0$. In this phase (at $t \simeq -10^{18}$ sec) there were no antibaryons at all, and only baryons existed (nucleons, ordinary nuclei, ions, and atoms). The average density at this instant was 10^{-30} g/cm^3. It is further assumed that up to that instant there was released an energy of the order of $E = 10^{16}$ erg/g as a result of nuclear reactions or gravitational processes. During the course of contraction

Card 1/2

this energy (which initially could be in the form of optical quanta and high-energy neutrinos) should be transformed into equilibrium forms; the presented value of E ensures the necessary entropy. In this case the occurrence of baryon-antibaryon pairs and the surprising almost-charge-symmetrical state are already a natural consequence of the known laws of physics. Consequently, during the expansion phase there exists the same high specific entropy and almost complete charge symmetry at high densities. In particular, it follows from this that cyclic evolution with an infinite number of contraction and expansion cycles does not agree with the finite value of the entropy S at the present time. This quantity, which is fundamental for cosmology, may possibly be expressed in terms of a combination of atomic and gravitational quantities. The expression for S differs from the outwardly analogous formulas of Eddington, Dirac, and others in the fact that S is a local quantity and the expression has been derived logically, from a consideration of physical processes during the course of the evolution. It can be concluded on this basis that the Universe is 100% charge-symmetrical, with the exception of a short high-density period, when it is almost symmetrical for natural reasons. The authors thank B. P. Konstantinov and A. D. Sakharov for discussion that led to the formulation of the problem considered in this note. Orig. art. has: 1 formula.

SUB CODE: 20/ SUBM DATE: 2Jun66/ ORIG REF: 004/ OTH REF: 005

MADEJCZYK, Anna; ZBORZIL, Jozef; ZELECHOWSKA, Anna; ZULAWSKI, Maciej

Evaluation of chemotherapy of advanced tumors according to data of the Chemotherapy Unit of the Institute of Oncology in Warsaw. Nowotwory 14 no.1:49-52 Ja-Mr '64.

1. Instytut Onkologii w Warszawie (Dyrektor: prof. dr. med. W. Jasinski).

L 39661-66 EWT(l)/ETC(f)/T/EWP(e) IJP(c) NW/WH/AW/JG/GD-2

ACC NR: AP6001434 SOURCE CODE: PO/0053/65/000/009/0431/0442

AUTHOR: Zelechowski, B.

ORG: Institute of Telecommunications and Radio Engineering (Instytut Tele-i Radiotechniczny)

TITLE: An experimental lamp for investigating the emission properties of high operating temperature thermoionic cathodes

SOURCE: Przeglad elektroniki, no. 9, 1965, 431-442

TOPIC TAGS: thermoelectric phenomenon, cathode, ion, electron beam, cermet, electron gun, thermionic emission, physics laboratory instrument

ABSTRACT: The article reports on an experimental lamp designed and developed in the course of the author's "diploma studies" under the direction Krystyn Lewenstein (MS in Engineering) at the Department of Electronic Devices of the Warsaw Polytechnical Institute (Kat. Przyrzadow Elektronowych Pol. Warsz.). The cathodes, in the form of tablets, were heated by electronic bombardment. The basic characteristics of the electron gun or emission tube are given. Cathodes made of a special cermet of high fusible metal and of ceramic powder prepared by the method of powder ceramics were tested with the aid of the lamp

Card 1/2 UDC: 621.396.96

and it was found that by electron bombardment a much higher temperature can be imparted to the electrodes than by any other means of heating. In the course of the tests a maximum temperature of 2040°K was reached without any difficulty. Further adjustments to the electron gun made it possible to achieve a temperature of 2,100°K, but it was found that at high voltage its operation was not stable. The thermionic emission constants of the cathodes tested were determined by the simple Richardson method, the technique for fabricating the lamp is explained and also the measurement methods and the equipment used in the experiments. "At the conclusion of this paper, the author expresses his thanks to Prof. Bohdan Paszkowski for making it possible to carry out the investigation at the "Department" and to Mr. Krystyn Lewenstein for consultations and advice." Orig. art. has 13 figures and 15 formulas.

SUB CODE: 20,09/ SUBM DATE: none/ ORIG REF: 002/ OTH REF: 006

POLAND

ZELECHOWSKI, Bartlomiej

Institute of Tele- and Radio Engineering (Instytut Tele- i Radiotechniczny)

Warsaw, Przeglad elektroniki, No 11, Nov 1966, pp 539-40

"Possibilities of Ta thin films' evaporating from a liquid by electron bombardment."

SOLOVSKOY, V.; VOINOV, V.; ZELEKIN, Yu.

Work in the communist way. NTO 5 no.2:9 F '63. (MIRA 16:3)

1. Predsedatel' sektsii svarki pervichnoy organizatsii Nauchno-tekhnicheskogo obshchestva Chelyabinskogo nauchno-issledovatel'skogo proyektno-tekhnologicheskogo instituta avtomatizatsii i mekhanizatsii mashinostroyeniya (for Solovskoy). 2. Uchenyy sekretar' svarki pervichnoy organizatsii Nauchno-tekhnicheskogo obshchestva Chelyabinskogo nauchno-issledovatel'skogo proyektno-tekhnologicheskogo instituta avtomatizatsii i mekhanizatsii mashinostroyeniya (for Voinov). 3. Profsoyuznyy organizator otdela svarki Chelyabinskogo nauchno-issledovatel'skogo proyektno-tekhnologicheskogo instituta avtomatizatsii i mekhanizatsii mashinostroyeniya (for Zelenkin).
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Zelena, Eva

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Country: Czechoslovakia

Academic Degrees:

Affiliation:

Source: Ceskoslovenska Hygiena (Journal of Hygiene), Vol V, No 9, Prague, Nov 60, Page 541.

Data:

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Affiliation: Member of the Board of Chairmen of Hygienic Work, comprised of the Medical and Hygienic Faculty of Karlov University, Prague. Also affiliated with the Department of Hygiene of the Hygienic and epidemiological station UNV hl. m. [?], Prague.
Data: Co-author of "The Hazard of Styrene in the Production of Glass Laminates," Source, Page 541.

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Data: Co-author of "The Hazard of Styrene in the Production of Glass Laminates," Source, Page 541.

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HNIK, P.; ZELENA, F.

Structure and function of muscle receptors. Cesk. fysiol. 12 no.1: 1-25 '63.

1. Fysiologicky ustav CSAV, Praha.
(MYONEURAL JUNCTION) (NEUROLOGY) (ACETYLCHOLINE) (NICOTINE) (MUSCLE RELAXANTS)

CZECHOSLOVAKIA

P. INIK and J. ZELENA, Institute of Physiology (Fysiologicky ustav) CSAV [Ceskoslovenska akademie ved = Czechoslovak Academy of Science].

"Structure and Function of Muscle Receptors."

Prague, Ceskoslovenska Fysiologie, Vol 12, No 1, Jan 1962; pp 1-25.

Abstract: A very well organized and comprehensive condensed review of studies on muscle receptors, ranging from Leydig's 1856 incidental observations to various electron microscopic and other sophisticated technics of 1962; phylogenesis and development, neuromuscular fascicle, pathological changes, number of receptor organs, appearance of impulse, function of afferent endings, motor innervation and significance, functional divisions. Five diagrams, 3 drawings, 9 electron microphotographs, 3 nerve potential patterns; of just over 300 references, 6 are Czech, 5 Soviet, rest Western.

1/1

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"Development of muscle tissues following intra-uterine denervation." p. 227.

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1. Institute of Physiology, Czechoslovak Academy of Sciences, Prague.
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ZELENA, J.

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1. Institute of Physiology, Czechoslovak Academy of Sciences, Prague.

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(REGENERATION) (RECEPTORS, NEURAL)
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1. Institute of Physiology, Czechoslovak Academy of Sciences, Prague, and Department of Pharmacology, University of Lund, Sweden.

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1. Fysiologicky ustav CSAV, Praha.
(MUSCLES, physiol.
develop. after intra-uterine denervation (Cz))