PIKEL'NER, S. B.

"An Investigation of the Motion and Luminescence of Interstellar Gas."
Dr Phys-Math Sci, Moscow Order of Lenin State U imeni M. V. Lomonosov, 24 Dec 54.
(VN, 14 Dec 54)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (1).
SO: Sum. No. 556, 24 Jun 55

PIKEL'NER, S.B.

"On the distribution of interstellar matter" [in English]. G.Alter. Abstract by S.B.Pikel'ner. Vop.kosm. 2:325 '54. (MIRA 8:5)
(Interstellar matter)

PIKEL'NER, S.B.

"Some structural characteristics of gas nebulae and their relation to the stars." V.G.Fesenkov. Abstract by S.B.Pikel'ner. Vop.kosm. 2:325-326 '54. (MIRA 8:5)
(Nebulae) (Stars)

PIKEL'NER, S.B.

Magnetic fields in interstellar space. Vop.kosm. 3:85-93 '54.
(Magnetism) (MLRA 8:3)

PIKEL'NER, S.B.

ALLER, L.H.; PIKEL'NER, S.B.

"Turbulence in the interstellar medium"[in English]. Abstract by S.B.Pikel'ner. Vop.kosm. 3:317-318 '54. (MLRA 8:3)
(Gases, Interstellar)

PIKEL'NER, S.B.

BATES, D.; SPITZER, L.; PIKEL'NER, S.B.

"The density of molecules in interstellar space"[in English]. Abstract by S.B.Pikel'ner. Vop.kosm. 3:318-319 '54.
(Gases, Interstellar) (MIRA 8:3)

PIKEL'NER, S.B.

SPITZER, L.; SAVEDOFF, M.; PIKEL'NER, S.B.

"The temperature of interstellar matter"[in English]. Abstract by S.B.Pikel'ner. Vop.kosm. 3:319-320 '54. (MLRA 8:3)
(Gases, Interstellar) (Temperature)

PIKEL'NER, S.B.

HILTNER, W.A.; PIKEL'NER, S.B.

"On polarization of radiation by interstellar medium"[in English].
Abstract by S.B.Pikel'ner. Vop.kosm. 3:320 '54. (MLRA 8:3)
(Stars--Radiation) (Polarization (Light))

BABCOCK, H.W.; PIKEL'NER, S.B.

"Stellar magnetic fields"[in English]. Abstract by S.B.Pikel'ner.
Vop.kosm. 3:321-322 '54. (MLRA 8:3)
(Stars) (Magnetism)

. IZBLNAK, ...

"Conference Devoted to Physics of Nebulae and of Interstellar Matter" Vop. Kosmogonii, 7, 1954, pp 3[illegible]-361

The conference was organized by the Crimean Astrophysical Observatory of the Acad Sci USSR in [illegible], 8-10 July 1953. The speakers on the above subject were V.A. Ambartsumian, V.F. Gaze, G.A. Gurzadyan, [illegible] Kazar, V.A. Krasovskiy, A. Ya. Kipper, V.A. Lombrovskiy, A.I. Lebedinskiy, S.I. [illegible]elmer, V.S. Safronov, G.A. Shayn, I.S. Shklovskiy, and B.A. Vorontsov-Vel'yaminov. (RZhAstr, No 3, 1955)

SO : Sur. No. 526, 10 Jun 55

PIKEL'NER, S.B.

Electromagnetic phenomena in astrophysics. Usp. astron.nauk 6:281-322 '54. (MLRA 7:8)
(Magnetism)

PIKELNER, S. B.

"Spectrophotometric Study of Diffuse Nebula NGC 7000"
Izv. Krymsk. Astrofiz. Observ., 11, 1954, pp 8-17

The study was carried out by means of the nebular spectrograph of Maksutov-Ioannisiani design. Relative intensities of H and N lines were corrected for interstellar absorption according to the reddening of the star HD 199579 of class O7 which, as it was pointed out by G. A. Shayn and V. F. Gaze (ibid. 7, 3, (1951)), excites the luminosity of the nebula. Author comes to the same conculsion. He also finds dusty absorbing matter between the Pelican nebula and the star HD 199081 of class B3. (RZhAstr, No.11, 1954)

SO: W-31187, 8 Mar 55

PIKELNER, S. B.

"Method for Studying Turbulence from Fluctuations of Brightness in Nebulae", (Theoretical Astrophysics, Diffuse Nebulae), Izv. Krymsk,Astrofiz, Observ. No. 11, 1954, pp 34-38

Abs

W-31146, 1 Feb 55

PIKEL'NER, S. B. and CHUVAYEV, K. K.

"The Probable Mechanism Governing the Luminescence of the Night Sky in the Continuous Spectrum".
Izvestiya Krymsk. Astrofiz. Observ., 11, pp 178-184, 1954.

The nature of the radiation of the night sky in the continuous spectrum is considered on the basis of measurements of its intensity, in various regions of the spectrum, which were carried out by K. K. Chuvayev by means of a photometer with secondary-electron multiplier. It is shown that recombination of electrons in neutral atoms of oxygen leading to the formation of negative ions O^- can give radiation close in intensity to the observed radiation. Such a process can be effective in the F layer of the ionosphere, which at night is about 250 km high and which has and electron concentration of n_1 2 10^5 cm^{-3}, concentration of neutral atoms of oxygen n_o 5.10^{10} cm^{-3}, and electron temperature of $T_1 = 1500$. In the expression for the energy radiated per unit volume containing n_1 electrons and n_o atoms is the quantity k, which is the coefficient of absorption computed for one negative ion. The effective thickness of the radiating layer is taken to be equal to 50 km. The computed intensity of radiation is close to the observed intensity. Given the quantity T_1 one can compute the behavior of k_ν as a function of wavelength on the basis of the observed energy distuibution. As it turned out, k_ν increases from the limiting series toward the side of short wave lengths. The authors evaluate how essential the other mechanisms of radiation in the continuous spectrum can be. They conclude that the choice of

Continued:

possible mechanisms is extremely limited. Formation of negative ions must lead to strong decrease of n_e. Inasmuch as the concentration of electrons and the intensity of luminescence do not decrease significantly in the course of the night, it is necessary to assume that there exists a process that disrupts the negative oxygen ions and restores the number of electrons. It is shown that in this connection electrom collisions cannot be effective. The same holds for heavy particles. The most probable mechanism of disruption of negative oxygen ions is considered by the authors to be their collisions with exicited oxygen atoms in the state $^1D_2$. This conclusion, however, is based on the assumption that the energy of dissociation of a negative ion is equal to the energy of a quantum of the red line of night-sky luminescence. Therefore the presented evaluation only indicates that in principle mechanisms can exist which involve disruption of negative ions. (RZhGeol, No 11, 1955)

SO: Sum No 884, 9 Apr 1956

PIKEL'NER, S. B.

"Electron Collision As One of the Possible Mechanisms Governing the Excitation of Night-Sky Radiation of the Red Line".
Izvestiya Krymsk. Astrofiz. Observ., 11, pp 185-188, 1954.

The possibility of the excitation, by electron collision, of the red triplet of oxygen 6300, 6364, 6392 Angstroms which is observed in the spectrum of night-sky radiation is considered. It is noted that form the viewpoint of "selective refraction" one cannot completely explain the very complex character of the behavior of the red line. The possibility of excitation of oxygen atoms by electrom collisions strongly depends upon the kinetiv temperature and density of the electrons in the upper layers of the atmosphere. In recent years it has been established by means of raido methods that in the F layer of the ionosphere the kinetic temperature T at night is equal to about 1500^{0} and the electron density is approximately ne $2 \cdot 10^{5}$. Employing an approximate expression for the cross section of excitation oxygen atom by electron collision and assuming Maxwell distribution for the electron velocities and effective thickness of the radiating layer to be equal to 30 km, the author obtains for the number of quanta of the red line the value $N = 1.43 \cdot 10^{7}$ quanta per cm^{2}. - sec. steradian, which agrees with the observed value.

The gradual drop in the intensity of luminescence in the course of the night can be in consequence of the gradual cooling of the radiating layer, and the variation from night to night can be in consequence of the irregualr variations in the temperature.

Continued:

For example, for a decrease of T from 1500 to 1300 the quantity N decreases by the same order. From the computations it follows also that the kinetic temperature in the F layer cannot exceed 1500 , since in the contrary case the radiation of the red line would be greater than the observed radiation. (RZhGeol, No 11, 1955)

SO: Sum No 884, 9 Apr 1956

PIK[illegible], S. [illegible]

"Spectr[illegible] metric [illegible] the Excitation [illegible] of Filament Nebulae," Izv. Krym[illegible]. Astr[illegible] Obs[illegible], [illegible]

Results of observations of nebula NGC [illegible] car[illegible] of Crimea[illegible] Observatory are presented. The [illegible] computed at various temper[illegible], 1.1 [illegible] and 0.1[illegible] [illegible]. The rec[illegible] the degree of [illegible]ionary state [illegible] h[illegible] con[illegible] t[illegible] tur[illegible] stationary processes in the case of [illegible] wave tr[illegible]rs[illegible] gas are analyzed. It is assumed that the [illegible] of filament [illegible] section of the [illegible] wave. [illegible] initial shock wave or "in[illegible]" of interstellar [illegible] shock wave velocity on density. (RZh Astr, [illegible], SC: [illegible]

SHAYN, G.A., akademik; GAZE, V.F., kand.fiz.-matem.nauk; PIKEL'NER, S.B.

Presence of dust and gas in diffuse nebulae. Izv.Krym.astrofiz. obser. 12:64-87 '54. (MIRA 13:4)
(Nebulae) (Interstellar matter)

PIKEL'NER, S. B.

Publication	:	USSR, Astronomy
Card	:	1/1
Authors	:	Shayn, I. A., Gaze, T. F., and Pikel'ner, S. B.
Title	:	Certain Results of the Study of the Presence of Dust and Gas in Diffused Nebulae
Periodical	:	Astron. zhur., v. 31, no. 1, Ja - F, 1954
Abstract	:	Photographs of 2 planetary, 20 emission (E, including EC) and 3 type (E + C) nebulae were made with the camera in combination with one each red and blue-violet yellow filter. Formulae of brightness were derived. Assumptions are made of a significant effect of dust on the distribution of brightness in some nebulae. A linear relation was found between stellar magnitudes of the emission and of the reflecting nebulae. In general a very complex state of interrelation of gas and dust exists in diffused nebulae. 2 tables and 10 references, 4 Russian (since 1940).
Institution	:	Academy of Sciences USSR, Crimean Astrophysical Observatory
Submitted	:	January 4, 1954

PIKELNER, S. B.
USSR/Astronomy

Card 1/1

Author : Pikelner, S. B.

Title : Studying fibrous nebulas

Periodical : Dokl. AN SSSR 95, 6, 1157 - 1160, 21 Apr 1954

Abstract : With the help of a nebula spectrograph, spectra of veil nebula in the sygnus constellation have been obtained and studied. A low ionization together with a comparatively high intensity of so-called forbidden lines have been noticed during the study. This peculiarity of the veil nebulae brings it closer to the filaments of the crab nebula. The article analyzes Oort's hypothesis according to which the glow of the nebulae is due to a shock wave which might have originated from an ultra new movement of the surface layer of interstellar gas some tens of thousands of light years ago. Table of intensities of spectral fundamental lines; two diagrams.

Institution : Crimean Astro-physical Observatory of the Acad. of Scs. of the USSR

Submitted : 15 Feb 1954

PIKEL'NER, S.B.

Results of the observations of solar corona of June 30, 1954.
Izv.Krym.astrofiz.obser. 13:111 '55. (MIRA 13:4)
(Sun--Corona)

PIKEL'NER, S. B.

USSR/ Astronomy - Solar system's magnetic field

Card 1/1 Pub. 8 - 6/13

Authors : Pikel'ner, S. B., and Poloskov, S. M.

Title : The possibility of evaluating the solar system's magnetic field by studying the movement of substances in the gaseous tails of comets

Periodical : Astron. zhur. 32/1, 45-47, Jan-Feb 1955

Abstract : The possibility is discussed of evaluating the solar system's magnetic field by studying the movement of substances in the gaseous tails of comets. Five references: 3 USSR, 1 German and 1 French (1951-1953). Diagram.

Institution : Council of the Acad. of Scs., USSR, The Crimean Astrophysical Observatory

Submitted : June 1, 1954

SHAYN, G.A.;PIKEL'NER, S.B.;IKHSANOV, R.I.

Measurement of polarization of the Crab nebulae. Astron.zhur. 32 no.5:395-400 S-O '55. (MLRA 9:1)

1.Krymskaya astrofizicheskaya observatoriya Akademii nauk SSSR.
(Nebulae) (Polarization (Light))

PIKEL'NER, S.B.; GINZBURG, V.L.; SHKLOVSKIY, I.S.

Mechanism of particle acceleration in envelopes of novae and supernovae. Astron. zhur. 32 no.6:503 513 N-D '55.
(Stars, New) (MLRA 9:2)

PIKEL'NER, S. B., GINZBERG, V. L. and SHKLOVSKIY, I. S.

"Radio Radiation of Discrete Sources," a report delivered at the Symposium on Radioastronomy held at the Jodell-Bank Experimental Radioastronomical Station, Manchester University, Englan, is summarized in the account of this symposium in an article by V. V. VITKEVICH in Vest. Ak. Nauk SSSR for January 1956.

Sum. 900, 26 Apr 1956.

PIKEL'NER, S.B.

Theory of magnetic storms and auroras. Izv.Krym.astrofiz.obser. 16:104-121 '56. (MIRA 13:4)
(Auroras) (Magnetic storms)

PIKEL'NER, S.B.

Dynamics of diffuse matter. Izv.Krym.astrofiz.obser. 16:184-197 '56. (MIRA 13:4)
(Interstellar matter)

Pikel'ner, S. B.

USSR/Astronomy - Conferences

Card 1/1 Pub. 124 - 19/28

Authors : Pikel'ner, S. B., Dr. of Phys-Math. Sc.

Title : Certain problems of astrophysics

Periodical : Vest. AN SSSR 26/1, 90-93, Jan 1956

Abstract : Minutes are presented from the scientific conference held at the Crimean Astophysics Observatory on September 19, 1955, where various problems of the science of astrophysics were discussed. Brief information on the newest equipment of the Crimean Observatory is included.

Institution : .....

Submitted : .....

Translation M-1329

PIKEL'NER, S.B.

Symposium on radio astronomy held at Jodrell Bank. S.B. Pikel'ner. Astron.zhur. 33 no.1:114-120 Ja-F '56. (MLRA 9:6)
(Jodrell Bank, England--Radio astronomy--Congresses)

PIKEL'NER, S.B.

Spiral motion of prominence knots. Astron.zhur. 33 no.5:641-645 S-O '56. (MLRA 9:12)

1. Krymskaya astrofizicheskaya observatoriya Akademii nauk SSSR.
(Sun--Prominences)

PIKEL'NER, S.B.

Magnetic field of the Crab nebula and the central star [with summary in English]. Astron.zhur. 33 no.6:785-799 N-D '56.
(MLRA 10:1)

1.Krymskaya astrofizicheskaya observatoeiya Akademii nauk SSSR.
(Nebulae) (Magnetic fields)

PIKEL'NER, S.B., doktor fiziko-matematicheskikh nauk.

Magnetic field of the Galaxy. Priroda 45 no.12:27-34 D '56.
(Magnetic fields) (Milky way) (MLRA 10:2)

PIKEL'NER, S.B.

Interstellar light polarization. Usp.fiz.nauk 58 no.2:285-320 F '56.
(Cosmic rays) (Interstellar matter) (Polarization(Light))(MLRA 9:6)

PIKEL'NER, S.B.

G.A.Shain; obituary. Astron.tsir.no.172:1-2 Ag '56.
(MLRA 10:1)
(Shain, Grigorii Abramovich, 1892-1956)

Name: PIKEL'NER, Solomon Borisovich

Dissertation: Investigation of the motion and luminescence of interstellar gas

Degree: Doc Phys-Math Sci

Affiliation: Crimean Astrophysics Observatory, Acad Sci USSR

Defense Date, Place: 28 Feb 55, Council of Moscow Order of Lenin State U imeni Lomonosov

Certification Date: 9 Mar 57

Source: BMVO 13/57

ACC NR: AM6026753 Monograph UR/

Pikel'ner, Solomon Borisovich

Principles of cosmic electrodynamics (Osnovy kosmicheskoy elektrodinamiki) 2d ed., rev. and enl. Moscow, Izd-vo "Nauka", 1966. 407 p. Illus., biblio. 5000 copies printed.

TOPIC TAGS: plasma physics, ~~plasma dynamics, plasma electromagnetics~~, plasma wave, plasma stability, plasma interaction, ~~cosmic~~ electrodynamics, ~~galactic magnetohydrodynamics, solar magnetohydrodynamics, solar magnetohydrodynamics~~, magnetohydrodynamics, astrophysics, cosmology

PURPOSE AND COVERAGE: This book is intended for the general reader interested in the principles of cosmic electrodynamics and its relationship to astrophysics and geophysics. Emphasis is on the physical aspects of the problem. Mathematical analysis is kept to a minimum; it is used only to illustrate a point, and is limited to relatively simple operations. The first several chapters deal with the general properties of plasma, magnetohydrodynamics, wave phenomena in a plasma, and plasma stability. The subsequent chapters explain various plasma-associated phenomena without going into too much detail or mathematical interpretation. There are 331 references, more than half of which are non-Soviet.

TABLE OF CONTENTS [abridged]:

Card 1/2 UDC: 523.037

ACC NR: AM6026753

SUB CODE: , 20/ SUBM DATE: 19Mar66/ ORIG REF: 161/ OTH REF: 170

Card

ACC NR: AP7001506 SOURCE CODE: UR/0033/66/043/006/1135/1142

AUTHOR: Livshits, M. A.; Obridko, V. N.; Pikel'ner, S. B.

ORG: Institute of Terrestrial Magnetism, Ionosphere, and Radiowave Propagation, AN SSSR (In-t zemnogo magnetizma, ionosfery i rasprostraneniya radiovoln AN SSSR); State Astronomical Institute im. P. K. Shternberg (Gos. astronomicheskiy in-t)

TITLE: Radio emission and atmospheric structure above sunspots

SOURCE: Astronomicheskiy zhurnal, v. 43, no. 6, 1966, 1135-1142

TOPIC TAGS: radio emission, sunspot, photosphere, chromosphere, Alfven wave, solar corona

ABSTRACT: The circularly polarized radio emission on centimeter wave lengths from the regions above sunspots requires the presence of a magnetic field $H \gtrsim 1000$ G and coronal temperature $\gtrsim 10^6$ K. Direct observations of magnetic fields in the photosphere and chromosphere as well as theoretical considerations on intense broadening of a tube of lines of force in rarefied atmospheric layers show that field strength of $H \geq 1000$ G is found only at heights not exceeding 3000 km. This implies that the corona apparently begins at a small height above spots. A model of a radio source is computed using the radio spectrum of sources and data on circular polarization. Hydrostatic density distribution is assumed. The radio data allow reliable determination of temperature on height. The sharp boundaries of the source, its radiation directivity, and its coin-

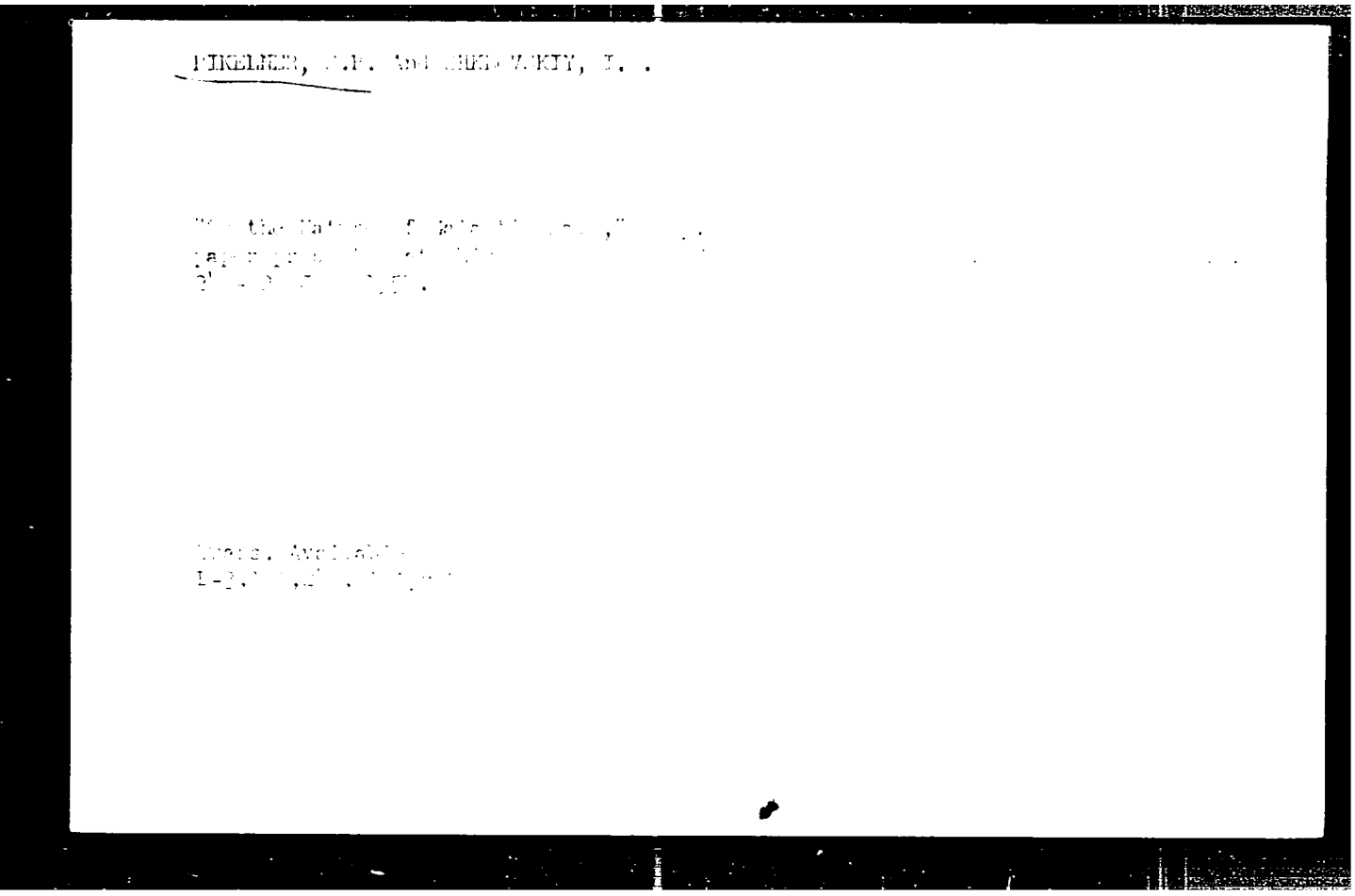
Card 1/2 UDC: 523.746

ACC NR: AP7001506

cidence with umbrae are also explained. The difference between the chromosphere above the spot and normal chromosphere is associated with small dissipation of Alfven and accelerated waves in a strong field. The slow (sound) waves fade in the low chromospheric parts, where they do not cause noticeable heating. Apparently only accelerated waves reach the corona, where they are transformed into other types of waves and fade at great heights. From there, the energy is passed by heat conduction to the low parts of the corona responsible for radio emission. Orig. art. has: 2 formulas, 2 figures, and 1 table.

SUB CODE: 03/ SUBM DATE: 22Mar66/ ORIG REF: 016/ OTH REF: 009

Card 2/2



PIKELNER, I.F. and [illegible] V.KIY, I. .

"[illegible]," [illegible]

[illegible]

PIKEL'NER, S.B.

G.A. Shain (1892-1956). Ist.-astron. issl. no.3:551-607 '57.
(Shain, Grigorii Abramovich, 1892-1956) (MIRA 11:3)

PIKEL'NER, S.B.

Symposium on radio astronomy. Vop. kosm. 5:279-282 '57.
(Jodrell Bank, England--Radio Astronomy--Congresses) (MLRA 10:8)

PIKEL'NER S. B.

30-11-23/23

AUTHOR: Masevich, A. G.

TITLE: The Problem of Cosmic Gasdynamics.
An International Conference in the USA.
(Problemy kosmicheskoy gazodinamiki.
Mezhdunarodnaya konferentsiya v SShA.)

PERIODICAL: Vestnik AN SSSR, 1957, Vol. 27, Nr 11, pp. 140-143 (USSR)

ABSTRACT: The physicists' interest in these problems has constantly increased, as the problem of the acceleration of cosmic rays and their lives in the space of the galactic system, as well as the investigation of the formation of interastral magnetic fields is closely connected with the motion of the so-called interastral gases. Representatives of astronomy, physics and mechanics met in Cambridge (Kembridzhe), USA; this was the third international symposium devoted to problems of cosmic aerodynamics. The report by the Dutchman Van der Kholst (observations of the radioemission on the 21 cm wave) caused great interest. G. Vokuler (USA) reported on the observations made in Australia of the spiral structure of the galactic system. O. Vilson (USA) dealt with the new research data regarding the inner kinetics of the planetary nebulae, G. Myunkh (USA) with the internal motions in the nebula of Orion,

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The Problem of Cosmic Gasdynamics.

R. Minkovskiy (USA) reported on the investigation of the group of fiber-like nebulae in the Swan, R. Devis (England) thoroughly examined the physical conditions in the gas-dust cloude on the basis of the most recent results of the observation of radio-radiation. Much attention in reports and discussions was paid to the problem of the dissipation of energy. Kh. Petchek (USA), L. Birman and A. Shlyuter (German Federal Republic - FRG) talked on this topic. Some speakers dealt with the nature of the magnetic field of the spiral extensions of the galactic system. Very great attention was paid by the conference to the problem of the gas-corona and of the formation of the radio-radiation (S.B. Pikel'ner). V.A. Ambartsumyan talked on the genetic connection of young stars with the diffuse environment. By means of observations made he rejected the hitherto existing assumptions with regard to the formation of the stars from an interastral substance. The members of the soviet delegation made themselves acquainted with the institutions and the organization of the optical observations of artificial earth satellites in the USA. The delegation visited the astrophysical observatory in Cambridge (Massachusetts) and a number of other scientific institutions in the USA. Then the

30-11-23/23

The Problem of Cosmic Gasdynamics.

report deals with the details of the optical observations of the artificail earth satellites in the USA. The delegation showed great interest for the organization and equipment of the **Massachusetts Institute of Techpology**.

AVAILABLE: Library of Congress

Card 3/3

AUTHORS: Pikel'ner, S. B. and Shklovskiy, I. S.

TITLE: An investigation of the properties and energy dissipation of the galactic halo. (Issledovaniye svoystv i dissipatsiy energiy gazovoy korony galaktiki).

PERIODICAL: "Astronomicheskiy Zhurnal" (Journal of Astronomy), 1957, Vol.34, No.2., pp. 145-158 (USSR)

ABSTRACT: The distribution of the sources of nonthermal radio-emission of the Galaxy is discussed. The division into a homogeneous sphere and an "Oort-Westerhout" sub-system is artificial. There is some concentration of emission towards the plane and centre of the Galaxy. The strength of the magnetic field in the upper ($H \approx 3.10^{-6}$) and lower ($H \approx 6.10^{-6}$) layers of the halo is estimated from the distribution of radio-emission and two hypotheses: 1) the concentration of cosmic rays is proportional to the field strength, 2) in the upper layers of the halo the magnetic pressure is about the same as the pressure of cosmic rays. The pressure of the magnetic field and cosmic rays at the height $z \sim 10$ kps is balanced by the weight of the upper layer. From this condition the density of the layer $n > 0.6 \cdot 10^{-2}$ cm^{-3} is estimated. Evidently the gas pressure does not play an essential role in supporting the halo. To keep the cosmic rays the field of the halo must be irregular. Hence the strength. Some examples of halos, with incomplete ionization and in rapid motion, are given. The Large

An investigation of the properties and energy dissipation of the galactic halo. (Cont.)

Magellanic Cloud is surrounded by an extended halo, having a neutral hydrogen concentration $n \sim 8.10^{-3}$ cm^{-3} on the periphery. High velocities did not lead to great ionization in the nucleus of our Galaxy, evidently because of the action of the field. Recent radio observations show that the Coma cluster of galaxies is surrounded by a halo, with a radial velocity dispersion ~ 500 km/sec. The motions are undamped and do not lead to a complete ionization of the gas, because of the magnetic field. Radio observations at low frequencies of galaxies enabled the estimation of $n_e \sim 0.01$ and $T \sim 10^4$ in the lower layers of the halo. 29 references, 11 of which are Russian.

Crimean Astrophysical Observatory,
Ac. Sc., USSR.
State Astronomy Institute
imeni P. K. Shternberg.

Recd. Dec.11, 1959.

PIKEL'NER, S. I.

AUTHOR: Pikel'ner, S. B. 33-3-2/32

TITLE: Energy dissipation, heating and ionisation of interstellar gas by shock waves. (Dissipatsiya energii, nagrev i ionizatsiya udarnymi volnami mezhzvezdnogo gaza).

PERIODICAL: "Astronomicheskiy Zhurnal" (Journal of Astronomy), 1957, Vol.34, No.3, pp.314-327 (U.S.S.R.)

ABSTRACT: In a previous paper (1) the author argued that the rarefied gas in the Galaxy is in the state of rapid motion and forms a spherical sub-system. However, Spitzer (2) has pointed out that at ultrasonic speeds the kinetic energy of the gas is rapidly dissipated into heat. The spherical gas sub-system was discussed in another paper (3) where it was shown that the field strengths in a spherical system are $\sim 6 \times 10^{-6}$ Oersted and $\sim 3 \times 10^{-6}$ Oersted in the upper and lower layers respectively, the mean gas concentration being $\sim 10^{-2}$ cm^{-3}. The latter falls off with increasing radius. It was also shown in that paper (3) that the presence of a magnetic field whose energy is comparable with the kinetic energy of the gas should lower the dissipation of energy. In the present paper the dissipation is calculated and estimates are made of the heating and thermal ionisation of the gas due to magnetohydrodynamic shock waves.

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Energy dissipation, heating and ionisation of interstellar gas by shock waves. (Cont.)

For simplicity, only perpendicular waves are considered, i.e. waves in which the magnetic lines of force are parallel to the wave front. It is shown that if, on the average, the magnetic energy density is equal to the kinetic energy density and is much greater than the thermal energy, then the motion takes place with the velocity of sound and shock waves are very weak. Next, the effect of cosmic ray pressure is estimated. In the galactic conditions the cosmic ray pressure is of the order of the field pressure. It is shown that the irreversible energy dissipation is given by:

$$\Delta Q = 0.044\ E$$
$$\Delta Q = 0.040\ E$$

where the first expression is derived by taking into account the cosmic ray pressure and the second by putting $p_{c.r.} = 0$; E is the energy of the wave (magnetic + kinetic) per gram. The velocity of motion of the gas, calculated by taking into account the cosmic ray pressure $p_{c.r.}$, is subsonic:-

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$$c_1 \approx 1.3_v$$

Energy dissipation, heating and ionisation of interstellar gas by shock waves. (Cont.)

to estimate the temperature of the gas, or the degree of ionisation of hydrogen, from observations, then the calculations carried out in this paper could be used to estimate the magnitude of the energy dissipation and to obtain more accurate values of n and H. In the absence of the field H, ΔQ and ΔT will be higher by a factor of 20-30. In this case the first wave ionises the gas by 30 to 40% and subsequent waves almost complete the ionisation.
There is one table and 8 references, 5 of which are Slavic.

SUBMITTED: December 11, 1956.

ASSOCIATION: Crimea Astrophysics Observatory, Ac.of Sciences USSR. (Krymskaya Astrofizicheskaya Observatoriya Akademii Nauk SSSR)

AVAILABLE: Library of Congress

Card 4/4

PIKEL'NER, S.B.

Voprosy kosmogonii, t. 6 (Problems in Cosmogony, Vol. 6) Moscow, Izd-vo AN SSSR, 1958. 367 p. 2,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Astronomicheskiy sovet.

ARTICLES

REPORTS

AUTHOR: Pikel'nev, S.B.

TITLE: The Basic Concepts of Magneto-Hydrodynamics (Osnovnyye ponyatiya magnito-gidrodinamiki)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1958, Nr 1, pp.46-53 (USSR)

ABSTRACT: This is a review paper giving a brief exposition of the ideas lying at the basis of magneto-hydrodynamics and in particular, the effect of the motion of the medium on the magnetic field and the effect of the field on the medium. The equations of motion of an ion and electron gas are formulated in Eqs.(4) and (5), taking into account interactions between them and following Schluter (Ref.1). On the basis of these equations it is shown that if the plasma is dense and the field not very large then the component of the electric field relative to the system moving with the gas and perpendicular to the magnetic field gives the same current density as in the absence of the electric field. If the contrary is the case, then the current in the same direction is very much less and there appears a much stronger current density component perpendicular to both the above electric field E^* and the magnetic field H. However, these are only very special cases. Next, the

The Basic Concepts of Magneto-Hydrodynamics.

attenuation of a magnetic field in a hard conductor is considered, following Cowling (Ref.2). An expression for the rate of change of the magnetic field as a function of the velocity of the medium, the magnetic field itself, and the conductivity is derived in the usual way and the significance of the various terms entering into this equation is discussed. The basic theorem of magneto-hydrodynamics is then formulated in the form: in a fluid with an infinite conductivity (or with a finite conductivity but sufficiently large characteristic dimensions), the magnetic flux through any material contour remains constant during motion. A discussion is given of magneto-hydrodynamic waves and it is pointed out that they play a major role in cosmic physics. Above all, they give a simple method of increasing the field via the transformation of kinetic energy into magnetic energy. Furthermore, they appear to be the way by which energy is transmitted over large distances. By means of these waves, energy is apparently transmitted from sub-photospheric layers to the upper layers on the Sun. There, the energy is transformed into heat and constitutes one of the main reasons for the high temperature of the

Basic Notions in Magneto-Hydrodynamics.

chromosphere and the corona. A mention is made of the work of Kaplan (Ref.10) and Kipper (Ref.11) who developed the theory of turbulence in the magneto-hydrodynamic case. However, these phenomena are very complex and have only been investigated in a first approximation. Somewhat simpler phenomena are those connected with magneto-hydrodynamic shock waves which were considered by Hoffman and Teller (Ref.12) and Helfer (Ref.13).
There is 1 figure, 1 table, and 13 references of which 7 are Slavic.

SUBMITTED: May 14, 1957.

AVAILABLE: Library of Congress.

PIKEL'NER, S.B.

Theory of the "equilibrium" origin of elements. Vop.kosm. 6:275-276 '58. (MIRA 11:10)

(Cosmogony)

PIKEL'NER, S.B.; METIK, L.P.

Anisotropy of velocities of interstellar gas clouds. Izv. Krym.astrofiz.obser. 18:198-201 '58. (MIRA 13:4)
(Gases, Interstellar)

3(1) PHASE I BOOK EXPLOITATION SOV/3236

Pikel'ner, Solomon Borisovich

Fizika mezhzvezdnoy sredy (Physics of the Interstellar Matter) Moscow, Izd-vo AN SSSR, 1959. 215 p. (Series: Akademiya nauk SSSR. Nauchno-populyarnaya seriya) 12,000 copies printed.

Ed.: V.G. Fesenkov, Academician; Ed. of Publishing House: Yu.I. Yefremov; Tech. Ed.: L.A. Sushkova.

PURPOSE: This book is intended for the general reader interested in astronomy.

COVERAGE: This is one of the popular science books devoted to interstellar matter. It gives background information on the stars and on our galaxy, and explains the various complex processes taking place in interstellar matter and their relation to the processes in stars. It is concluded that interstellar matter is closely associated with the origin and evolution of the stars. No personalities are mentioned. There are no references.

Card 1/[redacted]

PIKEL'NER, S.B.

Genetic relation of stars of various subsystems [with summary in English]. Izv.Krym.astrofiz.obser. 21:209-614 '59. (MIRA 13:6)
(Stars)

3(1)
AUTHORS: Pikel'ner, S.B., Shklovskiy, I.S. SOV/33-36-2-9/17
Ivanov-Kholodnyy, G. S.

TITLE: On Possible Mechanisms of Emission of Discrete Galactic Objects in the Spectral Region 1225 - 1350 Å

PERIODICAL: Astronomicheskiy zhurnal,1959,Vol 36,Nr 2,pp 264-268 (USSR)

ABSTRACT: The authors examine the possibility of explaining the emission of discrete galactic sources, observed in the spectral region 1225 - 1350 Å , by usual mechanics. However, this explanation requires the assumption that the absolute value of brightness of galactic sources in this spectral region were considerably overestimated. The measurings of the H_α line necessary for the investigation were carried out by N.N. Shefov and V.S. Prokudina in the Zvenigorod station of the Institute for Atmospheric Physics of the Academy of Sciences USSR.
There are 9 references, 3 of which are Soviet, 3 American, and 3 English.

SUBMITTED: October 27, 1958

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21(7)
AUTHOR: Pikel'ner, S. B.

SOV/56-36-5-37/76

TITLE: The Structure of a Magnetohydrodynamic Shock Wave in a Partially Ionized Gas (Struktura magnito-gidrodinamicheskoy udarnoy volny v chastichno ionizovannom gaze)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol. 36, No. 5, pp 1536-1541 (USSR)

ABSTRACT: The following problem is theoretically investigated in the present paper: In an only partially ionized gas, which is assumed to be in a magnetic field, a "piston" is assumed to move in a direction that is perpendicular to the H_0-direction, and that its motion produces a plane wave. Interaction between ions and neutral atoms is assumed to be negligible, and two waves then propagated away from the "piston", the magnetohydrodynamic wave in the plasma and the ordinary one in the neutral gas. If before the front the various kinds of particles have the same temperature, compression in the plasma is lower than in the neutral gas (because of the presence of the electrons and because of magnetic pressure). In the case of gases having the same velocity (in the "laboratory system"), the wave front will,

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however move with greater speed in the plasma than in the neutral gas. At temperatures below 100,000° and in the case of not too low ionization (> 10%), when the free length of path of the ions is 100 or 1000 times less than that of the neutral atoms, the structure of the shock wave is investigated within the domain of a relatively monotonous variation of the parameters. The magnetohydrodynamic shock wave in such a gas consists of a thin plasma discontinuity and a transition zone. Proceeding from the steady equations of motion in a system of coordinates that is connected with the front, the author derives an approximated solution of the equations for the transition zone with respect to several special cases (cf Fig. 1-4). It is found that the charge exchange effect exercises no essential influence upon the general nature of the motion, but that it reduces the scale. As long as the wave may be considered to be steady within the zone of transition, the order of magnitude of energy dissipation is independent of the degree of ionization. The author finally t Ya. B. Zel'dovich for his valuable remarks. There are 4 figures and 7 references, 3 of which are Soviet.

The Structure of a Magnetohydrodynamic Shock Wave in a Partially Ionized Gas

SOV/56-36-5-37/76

ASSOCIATION: Krymskaya astrofizicheskaya observatoriya Akademii nauk SSSR (Crimean Astrophysical Observatory of the Academy of Sciences, USSR)

SUBMITTED: November 30, 1958

Card 3/3

AUTHOR: Pikel'ner, S. E.

TITLE: Letter to the Editor. Gravitational [illegible] Sound

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, No [illegible], pp 1827-1828 (USSR)

ABSTRACT: The propagation of sound through the [illegible] usually considered according to linear approxim[illegible] (cf., G. Lamb, Hydrodynamics, State Tech. Pub. Moscow, 1947, pp 478-481). The propagation is affected not by the gravity force, but by the gradient related to it. The flow of [illegible] plane or a certain other surface is [illegible] according to the second approximation [illegible] method of the flow of the [illegible]

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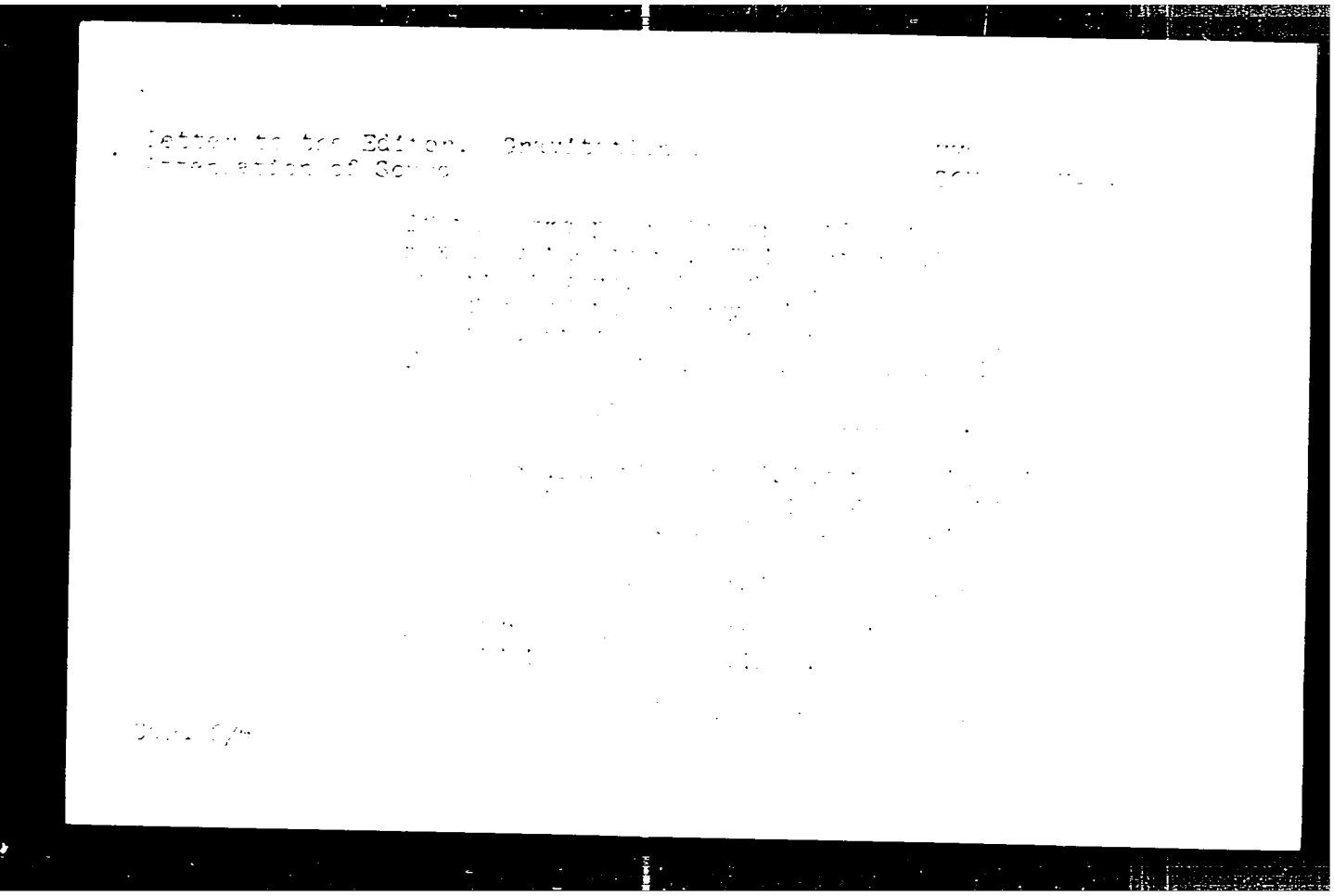

Letter to the Editor. Gravitational Attenuation of Sound

77011
SOV/56-37-6-51/52

The weakening of the flow is defined by the work of lifting the gas:

$$d(\rho v^2)/dz = -\rho g(1-e^{-\alpha z}) = -\rho v^2 g c^{-2}(1-e^{-\alpha z})$$

From this it follows that

$$\rho v^2 = (\rho v^2)_0 \exp\left\{-\frac{gz}{c^2} f(\alpha z)\right\}, \quad f(\alpha z) = 1 - \frac{1}{\alpha z}(1-e^{-\alpha z})$$

This means that within the limits of a homogeneous atmosphere ($\alpha z < (\gamma - 1)/\gamma$), the gravitational extinction is insignificant. At large distances the extinction increases exponentially. M. I. Iglevich participated in the discussion of the subject. There are 2 Soviet references.

ASSOCIATION: Crimean Astrophys. Observatory Acad. Sciences USSR

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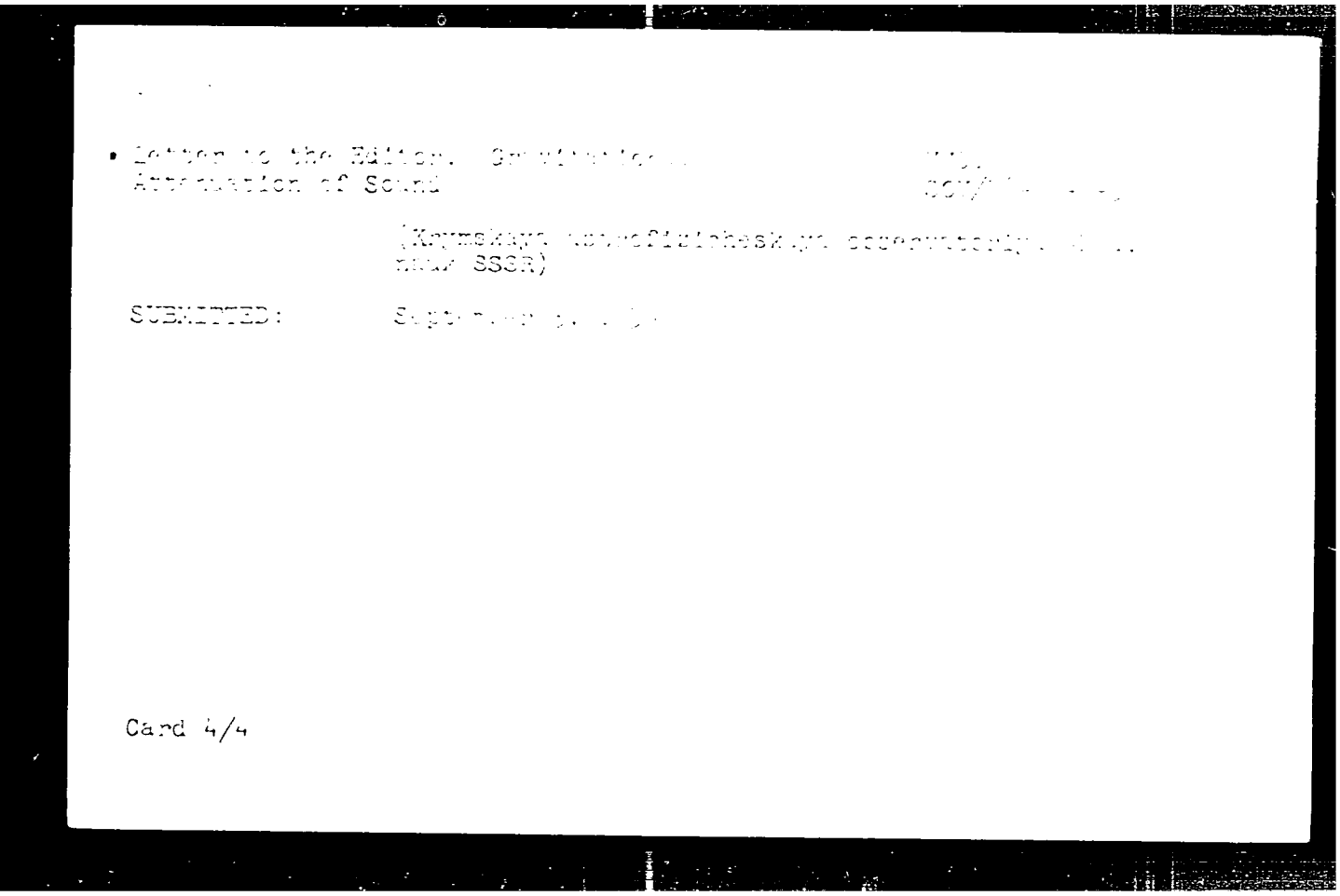

Letter to the Editor. On Viruses
Attenuation of Sound

(Kuybyshev Polytechnical Institute imeni V.V. Kuybyshev, USSR)

SUBMITTED:

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PIKEL'NER, S.B., red.

[Third Symposium on Cosmical Gas Dynamics; June 24-29, 1957]
Tretii simpozium po kosmicheskoi gazodinamike, 25-29 iiunia
1957 goda. Pod red. i s predisloviem S.B.Pikel'nera. Moskva,
Izd-vo inostr. lit-ry, 1960. 360 p. (MIRA 14:10)

1. Symposium on Cosmical Gas Dynamics, 3d, Cambridge, Mass., 1957.
(Astrophysics) (Aerodynamics)

PIKEL'NER, Solomon Borisvich

Physics of the interstellar medium. Wright-Patterson Air Force Base, Prepared by the Liaison Office, Techical Information Center, 1960.
1, 224p. illus., diagrs., graphs, tables. (MCL**661/1-4)
Translated from the original Russian: Fizika mezhzvezdnoy sredy. Moscow, 1959.
Bibliography: p. 222.

89803
S/169/61/000/003/021/022
A005/A005

9.9842 (2603, 1041, 1046)

Translation from: Referativnyy zhurnal, Geofizika, 1961, No. 3, p. 44, # 3G352

AUTHORS: Dvoryashin, A. S., Pikel'ner, S. B.

TITLE: On the Fine Structure of the Sudden Beginning of a Magnetic Storm

PERIODICAL: "Izv. Krymsk. astrofiz. observ.", 1960, Vol. 22, pp. 144-149 (English summary)

TEXT: The momentary decrease in field intensity (pri) preceding the magnetic perturbation with sudden beginning may be caused by the dynamoeffect connected with the increase of ionization of the lower ionosphere. The compression of the magnetic Earth's field which begins at a distance of about 7 R_o propagates with the speed of a magnetic-hydrodynamic wave. Simultaneously, the energy of the fast particles surrounding the Earth (induction acceleration) increases. These particles moving along the lines of force reach the polar regions of Earth and there they increase the ionization. It is possible that the perturbation furthers the permeation of particles into the atmosphere. The increase in energy of particles reaching average latitudes is less. Hence the latitude distribution (pri) is explained. Author's summary

Translator's note: This is the full translation of the original Russian abstract.

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PIKEL'NER, S.B.

Review of "Interstellar gas dynamics" by S.A. Kaplan. Astron. zhur. 37 no.3:593-594 My-Je '60. (MIRA 13:6)
(Gases, Interstellar) (Kaplan, S.A.)

S/033/60/037/04/002/012
E032/E314

AUTHOR: Pikel'ner, S.B.

TITLE: Mechanism of Formation of Active Regions in the Presence of a Magnetic Field

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol. 37, No. 4, pp. 616 - 621

TEXT: In order to explain the presence of plages, flocculi and coronal rays, it must be assumed that the presence of a weak magnetic field can lead to the amplification of motion in upper layers of the convective zone. Since the convective currents have a large Reynolds number, they should be unstable and give rise to turbulence. Usually, the velocity of major turbulent pulsations is of the order of 10% of the velocity of the main stream. For large Reynolds numbers, turbulent viscosity is much greater than molecular viscosity and determines dissipative forces. The appearance of convection is determined by the Rayleigh number given by:

$$R = \frac{g\beta l^4}{\chi\nu} (\nabla T - \nabla_{ad} T)$$

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where g is the acceleration due to gravity,
β is the volume expansion coefficient which for a gas is equal to T^{-1},
ℓ is the thickness of the layer, if it is thin or comparable with the height of a uniform atmosphere
χ is the temperature diffusivity, and
ν is the kinematic viscosity.

Convection will take place if $R > \sim 10^3$. If the number $R\chi/\nu$ is large, say, of the order of 10^5, then stationary convection is unstable, the motion is unordered and cells are not formed. For lower values of this number, non-stationary convection takes place, i.e. cells are formed but are irregular. Solar granulation resembles this type of convection. It would therefore appear that $R\chi/\nu$ is not too high. However, a simple estimate shows that $R \approx 10^{10}$ and, moreover, $\chi \gg \nu$, i.e. convective

Mechanism of Formation of Active Regions in the Presence of a Magnetic Field

cells should not be formed on the Sun at all. Schwarzschild (Ref.13) has pointed out that this contradiction can be avoided by using ν_{turb} instead of ν. The former is larger by several orders of magnitude and hence R is relatively low. Moreover, χ is only slightly greater than ν_{turb}, so that if convection is present it must be quasi-stationary. Thus, the velocity of convective motions is determined by the equilibrium between the upward forces and the turbulent viscosity force. If the viscosity is reduced, the upward velocity should increase. The intensity of a weak magnetic field is not sufficient to have an effect on the convective stream but may influence turbulence. A few tens of Oe should be sufficient for this mechanism to take place. It is argued that any field, independently of its origin and character, should give rise to active regions whose properties depend only on the field strength. In particular, a weak field tends to decrease dissipation and increase convective velocity

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since, as mentioned above, it does not affect the main stream but damps turbulence. This is illustrated by polar plages which are closely connected with the Sun's polar magnetic field. The low value of the latter field is the reason for their low brightness and the great depth of the upper boundary. Heating due to polar plages gives rise to polar coronal rays and possibly the permament solar wind. Complicated spectral variations in magnetic stars may also be related to the influence of the magnetic field on convection. There are 20 references: 5 English, 6 German, 1 Swedish and 8 Soviet.

ASSOCIATION: Gos. astronomicheskiy institut im. P.K. Shternberga
(State Astronomical Institute im. P.K. Shternberg)

SUBMITTED: April 10, 1960

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PIKEL'NER, Solomon Borisovich;KULIKOV, G., red.; LIKHACHEVA, L., tekhn. red.

[The sun] Solntse. Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1961. 82 p. (Populiarnye lektsii po astronomii, no.11) (MIRA 15:1)
(Sun)

PHASE I BOOK EXPLOITATION SOV/5732

Pikel'ner, Solomon Borisovich

Osnovy kosmicheskoy elektrodinamiki (Principles of Cosmic Electrodynamics) Moscow, Fizmatgiz, 1961. 295 p. 5,000 copies printed.

Ed.: B. Ye. Gel'fgat; Tech. Ed.: L. Yu. Plakshe.

PURPOSE: This book is intended for nonspecialists interested in cosmic electrodynamics.

COVERAGE: The book is an attempt to present in a systematic and simple form the fundamentals of cosmic electrodynamics and their connection with astro- and geophysics. The main emphasis is on physical rather than on mathematical concepts. The author thanks D. A. Frank-Kamenetskiy and S. I. Syrovatskiy for their advice, A. B. Severnyy for his photographs of solar formations, and B. N. Gershman and R. Z. Sagdeyev. There are 258 references: 135 Soviet, 95 English, 14 German, 7 Swedish, 2 French, and 5 other.

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S/033/61/038/001/002/019
E032/E314

3.1730 (1126, 1127, 1129)

AUTHOR: Pikel'ner, S.B.

TITLE: The Effect of Cosmic Rays on the Character of the Magnetic Field and the Formation of Filaments in the Envelopes of Supernovae

PERIODICAL: Astronomicheskiy zhurnal, 1961, Vol. 38, No. 1, pp. 21 - 27

TEXT: In the plane of the Galaxy the cosmic-ray and magnetic-field energy densities are roughly equal. I.S. Shklovskiy has frequently pointed out that this cannot be accidental. It is possible that this is connected with the retention of cosmic rays. Radio data show that magnetic fields and cosmic rays are also present in the galactic corona but the intensity of the radio emission gives only the relation between them. The quantity $KH^{1.8}$ is roughly 20-30 times smaller than in the "disc" (K is proportional to the concentration of the particles or their energy). In a previous paper (Ref. 5) the present author and Shklovskiy assumed that both K and H decrease so that the energy balance is preserved. Kahn and

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Woltjer (Ref. 6) assumed that since the distribution of cosmic rays in a closed stationary system should be uniform, only H decreases. In that case, the particle energy should be 5-10 times greater than the magnetic energy. Hoyle (Ref. 7), on the other hand, considers that the cosmic-ray energy is several times greater than the magnetic energy. The problem therefore arises as to whether the retention of the cosmic rays is possible. The present author argues that the magnetic energy should be comparable with or greater than the cosmic-ray energy. Moreover, magnetic forces should be comparable with the cosmic-ray pressure gradient and hence the field cannot be force-free in the entire region if the cosmic-ray energy is comparable with the magnetic energy. The equilibrium of gas in gravitational and magnetic fields is described by:

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The Effect of Cosmic Rays on the Character of the Magnetic Field and the Formation of Filaments in the Envelopes of Supernovae

$$\rho g + \nabla p + \nabla_{\perp} p_k + \frac{1}{4\pi} \operatorname{rot} \underline{H} \times \underline{H} \approx 0 \qquad (1)$$

where p is the pressure of the gas
p_k is the cosmic-ray pressure,
g is the acceleration due to gravity,
H is the magnetic field and
$\perp$ indicates that the gas is subjected to the component of the gradient which is perpendicular to H.

The problem is therefore reduced to the investigation of the stability of this equilibrium for $p < p_k$ and $H^2/8\pi < p_k$. If the system is stationary and cosmic rays are retained by it, their density should remain constant.

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In this case $\nabla p_k = 0$ inside the system but at the boundary the gradient increases considerably. However, the Galaxy is hardly a closed system with sharply defined boundaries. Ginzburg and Syrovatskiy (Ref. 8) have shown that the chemical composition of cosmic rays and some of their other properties can only be explained if it is assumed that the particles do not return to the plane of the Galaxy from its boundaries, i.e. that they gradually diffuse in the outward direction. In this process, the particle density gradually decreases and $\nabla p_k \neq 0$ inside the galactic corona. Moreover this result suggests that the field inside the Galaxy is not quasiregular and curving only at the boundaries since otherwise the particles could easily be reflected back into the galactic plane. If the cosmic-ray density decreases

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gradually within the corona, then the equilibrium of the gas is only possible if the lines of force are sufficiently rigid so that the magnetic force (last term in Eq. 1) should not be smaller than ∇p_k . This defines a lower limit for the field strength and means that the field cannot be force free in the region where the cosmic-ray density is not constant. Inside a closed system the cosmic-ray pressure should be constant but should decrease within the limits of a thin transition layer. In order to retain the cosmic rays a large force concentrated in this layer and directed inwardly is necessary. If the magnetic energy is smaller than the cosmic-ray energy then even in the case where the magnetic force is concentrated in the transition layer it cannot balance the particle pressure and the latter will penetrate the layer in the outward direction. As a result, the system will cease to be stationary and closed.

The Effect of Cosmic Rays on the Character of the Magnetic Field and the Formation of Filaments in the Envelopes of Supernovae

the cosmic-ray density gradient will appear and the instability will be propagated in the inward direction. Even when the magnetic energy and the particle energy are equal, the transition layer will only be able to retain the cosmic rays when the magnetic force is comparable with the pressure gradient. A force-free field within a closed system should give rise to surface currents responsible for the discontinuity in the tangential component of the magnetic field. These currents cannot compensate the pressure due to relativistic particles since for these particles the magnetic force is also equal to zero. A single force-free field of the type described by Woltjer (Ref. 11) for the Crab nebula would be unable to retain the cosmic rays in the nebula. Retention of the cosmic rays is only possible because the filaments are massive formations capable of withstanding the pressure upon them. Thus the cosmic-ray density in the galactic corona cannot be constant because this would lead to instability

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at the boundary where all of the cosmic-ray pressure gradients would then be concentrated. Since a cosmic-ray pressure gradient should exist inside the corona, the field in that region cannot be force-free and quasiregular. In the envelopes of supernovae the cosmic rays are enclosed and their pressure gradient at the boundary is large. The main mass of the envelope is also concentrated at the periphery and if a tangential field is present a peculiar type of instability is produced, in which the field is forced out by cosmic-ray pressure in the form of isolated loops and the gas is ejected by the accelerating field along the lines of force and forms filaments. The curvature of the arcs formed by the lines of force between the filaments suggests that the magnetic and cosmic-ray energies are roughly equal. In principle, the cosmic-ray pressure can be determined from the condition that it is equal to the pressure in

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interstellar gas condensations which are observed within the envelope. Such condensations have been found in the source in Cassiopeia. However, a detailed calculation will only become possible when photometric data on the spectrum become available. There are 14 references: 5 Soviet and 9 non-Soviet.

ASSOCIATION: Gos. astronomicheskiy institut imeni P.K. Shternberga (State Astronomical Institute imeni P.K. Shternberg)

SUBMITTED: September 17, 1960

Card 8/8

SHKLOVSKIY, I.S.; PIKEL'NER, S.B.

On F. Hoyle's article "Problem of radio source." (Rus.)
Astron. zhur. 38 no. 1:196-198 Ja-F '61. (MIRA 14:1)
(Radio astronomy)

PIKEL'NER, S.B.

Formation of coronal condensations above active regions. Astron.zhur. 38 no.3:552-553 My-Je '61. (MIRA 14:6)

1. Gosudarstvennyy astronomicheskiy institut imeni P.K.Shternberga.
(Sun—Corona)

MEL'NIKOV, O.A.; PIKEL'NER, S.B.

"Course of practical astrophysics" by D.IA.Martynov. Reviewed by O.A.Mel'nikov, S.B.Pikel'ner. Astron.zhur. 38 no.5:1004-1006 S-O '61. (MIRA 14:9)

(Astrophysics)
(Martynov, D. IA.)

PIKEL'NER, S.B.; KOGAN, V.I.

"Physical processes inside stars" by D.A.Frank-Kamenetskii. Reviewed by S.B.Pikel'ner, V.I.Kogan. Usp.fiz.nauk 74 no.1:181-184 My '61. (MIRA 14:6)
(Astrophysics) (Frank-Kamenetskii, D.A.)

S/169/63/000/003/005/042
D263/D307

AUTHOR: Pikel'ner, S.B.

TITLE: Formation of active regions in the presence of a magnetic field

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 3, 1963, 14, abstract 3A66 (In collection: Vopr. magnitn. gidrodinamiki i dinamiki plazmy 2. Riga, AN LatvSSR, 1962, 243)

TEXT: Active regions on the Sun are closely connected with magnetic fields. Flares, flocculi, coronal rays, and streams of geoeffective particles occur already at 1-2 oersted. A mechanism is suggested for the increase in convection in the presence of a field, which leads to the appearance of the above phenomena. The mechanism postulates suppression of turbulence in convective streams, which decreases turbulent viscosity. High altitude flares, permanent solar wind and a number of other phenomena receive natural explanation.
[Abstracter's note: Complete translation]

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S/033/62/039/006/004/024
E032/E514

AUTHOR: Pikel'ner, S.B.

TITLE: Formation of a chromospheric network and the structure of the magnetic field

PERIODICAL: Astronomicheskiy zhurnal, v.39, no.6, 1962, 973-976

TEXT: A model is considered in which it is assumed, for the sake of simplicity, that the lines of force passing through a section of the surface are vertical. It is further supposed that there are two layers of convective cells. The upper layer gives rise to granulation and the lower one contains motions whose energy is appreciably higher than the field energy so that the lower layers deforming the lines of force, may be ignored. The gas velocities in the cells are directed from the centre to the edges forming close lines passing through the lower parts of the cells. In this way the gas flows towards the network formed by the boundaries of the convective cells. This gives rise to a displacement of the lines of force so that their number per unit area becomes greater at these boundaries. This "condensation" of lines of force is transmitted in the form of magnetohydrodynamic waves into the upper layer and then to the photosphere,

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chromosphere and corona. The waves are also propagated in a downward direction where the hydrodynamic forces are greater than the magnetic forces so that the latter do not determine the motion. Judging from the time of existence of the network, the characteristic time of existence of a cell is about 24 hours. During this time the gas in a particular cell completes a single cycle (revolution) and a new cell begins to form independently of the original cell (non-stationary convection). The lines of force then redistribute themselves again into a new network. It follows that the period of the waves propagating in the upward direction is about 24 hours. Enhanced convection gives rise to an increase in chromospheric emission and hence the network covering the surface of the sun accordance with the above model is also observed in CaII and H_α lines. The presence of cells on the entire solar surface indicates that a weak magnetic field is present everywhere.

ASSOCIATION: Gos. astronomicheskiy institut im. P.K.Shternberga
(State Astronomical Institute imeni P.K.Shternberg)

SUBMITTED: May 6, 1962

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PIKEL'NER, S.B.

"Aerodynamic phenomena in stellar atmospheres; proceedings of the Fourth Symposium on Cosmical Gas Dynamics, Bologna, 1961." Reviewed by S.B. Pikel'ner. Astron. zhur. 39 no.6:1140-1141 N-D '62. (MIRA 15:11)
(Stars--Atmosphere)

AM4036547

BOOK EXPLOITATION

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Kaplan, Samuil Aronovich; Pikel'ner, Solomon Borisovich

Interstellar medium (Mezhzvezdnaya sreda), Moscow, Fizmatgiz, 1963, 531 p. illus., biblio. Errata slip inserted. 3,500 copies printed.

TOPIC TAGS: interstellar medium, interstellar gas, interstellar hydrogen, interstellar dust, interstellar magnetic field, interstellar gas dynamics, galactic evolution, radio transmission

TABLE OF CONTENTS [abridged]:

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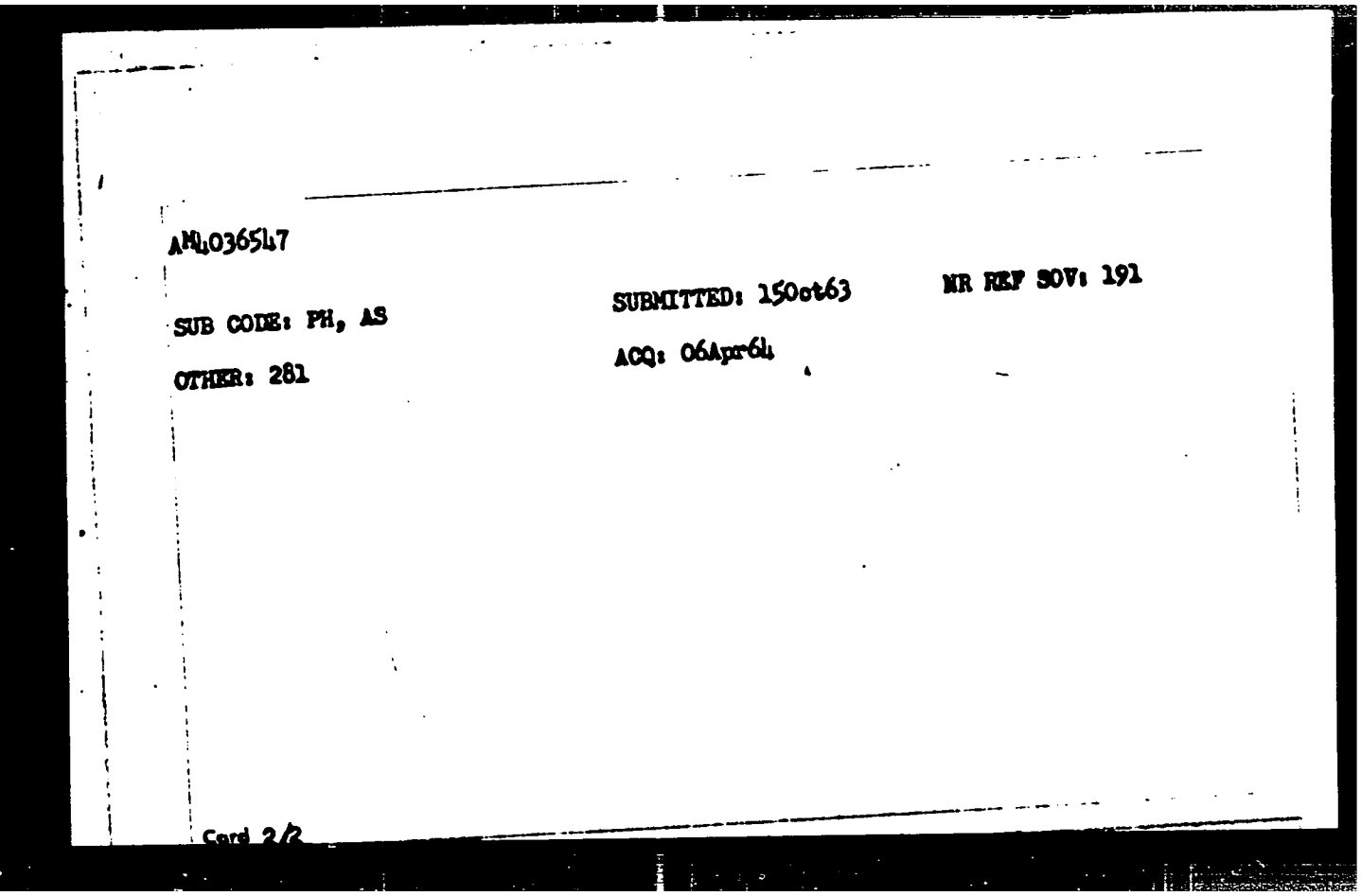

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SUB CODE: PH, AS

SUBMITTED: 15Oct63

NR REF SOV: 191

OTHER: 281

ACQ: 06Apr64

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PIKEL'NER, S.B.; GINTSBURG, M.A.

Mechanism of type-2 bursts of solar radio emission. Astron. zhur. 40 no.5:842-846 S-O '63. (MIRA 16:11)

1. Gosudarstvennyy astronomicheskiy institut im. P.K. Shternberga i Institut zemnogo magnetizma, ionosfery i radio AN SSSR.

KAPLAN, Samuil Aronovich; PIKEL'NER, Solomon Borisovich; AMBARTSUMYAN, V.A., red.; MUSTEL', E.R., red.; SEVERNYY, A.B., red.; SOBOLEV, V.V., red.; KULIKOV, G.S., red.; AKSEL'ROD, I.Sh., tekhn. red.

[Interstellar medium] Mezhzvezdnaia sreda. Moskva, Fizmatgiz, 1963. 531 p. (MIRA 17:2)

ACCESSION NR: AT4019685 S/2555/63/009/000/0060/0069

AUTHOR: Pikel'ner, S. B.

TITLE: The diffuse medium and formation of stars and stellar systems

SOURCE: AN SSSR. Astronomicheskiy sovet. Voprosy* kosmogonii (Problems of cosmogony), v. 9, 1963, 60-69

TOPIC TAGS: astronomy, astrophysics, stellar system, diffuse medium, star, star formation, hyperon star, cometary nebula, globule, galaxy

ABSTRACT: Arguments in favor of the origin of stars from gas are given. Gravitational condensation of systems of different orders is considered. The paper begins with a refutation of the Ambartsumyan hypothesis that stars are not formed from diffuse matter, but from dense bodies of an unknown nature, possibly hyperon stars. The hypothesis that stars originate from globules is explored next and it is noted that cometary nebulae are an indirect confirmation of the validity of this theory. The evolution of a compressing mass, real time of compression and intermediate and extreme cases of compression are considered. The importance of taking rotational and magnetic fields into account when computing gravitational compression is stressed. Star formation must be considered as occurring in large groups of clusters, not in an individual group of cluster; this viewpoint is emphasized.

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The breakdown of spherical clusters into a great many stars is important because the formation of stars in spherical clusters is occurring at the present time. The final problem considered is the fact that star formation is still continuing in spiral and irregular galaxies but already has virtually ended in elliptical galaxies. Orig. art. has: 2 formulas.

ASSOCIATION: ASTRONOMICHESKIY SOVET AN SSSR (Astronomical Council AN SSSR)

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Card 2/2

PIKEL'NER, S.B.

Analysis of possible mechanisms of the formation of magnetic fields in radio sources. Astron.zhur. 40 no.4:601-611 Jl-Ag '63. (MIRA 16:8)

1. Gosudarstvennyy astronomicheskiy institut im. P.K.Shternberga.
(Magnetic fields (Cosmic physics)) (Radio astronomy)