

VERNIKOV, I.S.

Tractors

Dependence of the degree of sinking of a caterpillar tractor into ground upon its speed. Avt. trakt. prom., no. 6, 1952.

MONTHLY LIST OF RUSSIAN ACCESSIONS, LIBRARY OF CONGRESS., OCTOBER 1952. UNCLASSIFIED.

VERNIKOV, I.S., kand.tekhn. nauk. [deceased]

Effect of the running speed of machines on the depth of soil
cultivation. Mekh. i elek. sots. sel'khoz. 15 no.1:9-11 '58.
(MIRA 11:3)

1. Ukrainskiy nauchno-issledovatel'skiy institut mekhanizatsii i
elektrifikatsii sel'skogo khozyaystva.
(Agricultural machinery) (Tillage)

VERNIKOV, L. Ya.; DRYAKHLOVA, V., red.; MANDEL'BAUM, M., tekhn. red.

[Noble work of Moldavian builders] Blagorodnyi trud moldavskikh
stroitelei. Kishinev, Gos. izd-vo Moldavii, 1957. 56 p.

(MIRA 11:11)

(Moldavia--Building)

VERNIKOV, Samuil Markovich; CHERNYAYEVA, I.V., red.; OVECHKIN, L.T.,
tekhn. red.

[Rails go to the taiga]Rel'sy ukhodiut v taigu. Tiumen',
Tiimenskoe knizhnoe izd-vo, 1961. 42 p. (MIRA 15:12)
(Railroads--Construction)

VERNIKOV, V. [Vernykov, V.]

Gibberellin parallel. Nauka i zhyttia 12 no.4:38-41 Ap '62.
(MIRA 15:8)

(Gibberellin)

VERNIKOV, V.

Praiseworthy. Sov. profsoiuzy 17 no.14:7 J1 '61. (MIRA 14:7)

1. Zavod imeni Vladimira Il'icha, Moskva.
(Moscow—Machine-tool industry) (Engineers)

VERNIKOV, Ya.N.; KOGENMAN, A.G.

Test results of the automatic compounding of loose and liquid ingredients at the "Kauchuk" Factory. Kauch. i rez. 20 no.10: 46-50 0 '61. (MIRA 14:12)

1. Zavod "Kauchuk".

(Rubber industry—Equipment and supplies)
(Automatic control)

VAPNA, Yu.M.; VERNIKOV, Ya.N.; GEZIN, M.S.

Experiments in the use of aerosol pneumatic tube transportation
in the "Kauchuk" plant. Kauch.i rez. 21 no.3:49-51 Mr '62.
(MIRA 15:4)

1. Zavod "Kauchuk".

(Rubber industry--Equipment and supplies)
(Pneumatic-tube transportation)

PLYUSNIN, I.I., doktor geologo-mineralogicheskikh nauk, prof.;
LOBANOVA, T.A., kand. sel'skokhoz. nauk, dotsent; VERNIKOVSKAYA,
I.A., kand. sel'skokhoz. nauk, dotsent

Effect of fall and winter flooding on the properties of floodland
soils. Izv. TSKHA no.4:92-110 '63. (MIRA 17:1)

VERINKOVSKAYA, I. N.

VERNIKOVSKAYA, M., red.

[Chelyabinsk Province from the 20th to the 21st Congress of
the CPSU; figures and facts] Cheliabinskaja oblast' ot XX k
XXI s'ezdu KPSS; tsifry i fakty. Cheliabinsk, Cheliabinskoe
knizh.izd-vo, 1958. 116 p. (MIRA 12:10)
(Chelyabinsk Province--Economic conditions)

VERNIKOVSKAYA, T. N.

"The Influence Of Some Factors On The Speed Of The Diazotization Reaction Of Aromatic Amines" by T. N. Vernikovskaya, translated at the National Institutes of Health Bethesda, Maryland, from the Russian for Dr. G. . Deak. FULL TRANSLATION AVAILABLE IN ~~SECRET~~/N

SO: Soveshchanie po anilinokrasechnoi khimii i tekhnike. 8th, Moscow, 1947, pp. 56-73

9(2)

06270
SOV/107-59-6-34/50

AUTHOR: Vernikovskiy, F.

TITLE: Circuit Diagrams for Pocket-Size Receivers

PERIODICAL: Radio, 1959, Nr 6, p 36 (USSR)

ABSTRACT: The author presents two circuit diagrams for pocket-size transistorized receivers. For one receiver, one P402 transistor is used in the RF circuit while the LF amplifier stage consists of one P6V transistor. The other receiver contains one P402 transistor in the r-f circuit and two P6V transistors in the LF amplifier stages. The article also contains data for the coils of the coupling transformers. There are 2 circuit diagrams and 1 Soviet reference.

Card 1/1

6 (4)

SOV/107-59-3-42/52

AUTHOR: Vernikovskiy, F.

TITLE: A Pocket-Size Reflex Receiver (Refleksnyy karmannyy priyemnik)

PERIODICAL: Radio, 1959, Nr 3, pp 53 - 54 (USSR)

ABSTRACT: The pocket-size, straight amplification radio receiver uses a reflex circuit of type 1-V-2. It works in the range of 550 - 1800 m. A diffused base HF transistor P402 (transistors P401 or P403 may also be used) is installed in the HF amplifier which simultaneously serves as a LF preamplifier. The P402 transistor has a wide frequency range (30 - 120 mc) and is considerably better than the P6 transistor. For this reason, three amplifier stages are adequate and the application of a reflex circuit reduces the number of required transistors to two. Diode D1Ye works as a detector and transistor P6 is used in the LF amplifier. The receiver will function properly

Card 1/2

SOV/107-59-3-42/52

A Pocket-Size Reflex Receiver

when transistors are used having a current amplification factor of not less than 80 - 100. Figure 1 shows the circuit diagram and Figure 2 the interior view of the receiver. Only one circuit is to be tuned; it is composed of the ferrite antenna inductance and a KPK-2 tuning capacitor. A F-600 ferrite rod, 118 mm long, 8 mm in diameter, is used. The loudspeaker must be manufactured from a DEMSh-1 microphone. The parts of the receiver may be assembled on a pertinax board of 120x85 mm. The radio is powered by FBS batteries. There are 1 circuit diagram and 3 drawings.

Card 2/2

9(2)

SOV/107-59-4-18/45

AUTHOR: Vernikovskiy, F.

TITLE: A Very Simple Device for Checking Transistors
(Prosteyshiy pribor dlya proverki poluprovodnikovyykh triodov)

PERIODICAL: Radio, 1959, Nr 4, p 23 (USSR)

ABSTRACT: The author suggests a very simple device for comparing the initial current and the amplification factor of transistors. Figure 1 shows the circuit diagram of this device. The transistor to be tested is connected as a dc amplifier with a grounded emitter and the collector current is measured by a milliammeter. Transistors of all types, either p-n-p or n-p-n, may be checked. There is one circuit diagram.

Card 1/1

VERNIKOVSKIY, K.B.

Tight-face blasting on a large scale. Gor. zhur. no.3:29-31
Mr '63. (MIRA 16:4)

1. Glavnyy iznhenor Goroblagodatskogo radoupravleniya.

VERNIKOVSKIY, K.B.

MILLER, V.Ya.; BAZILEVICH, S.V.; RAVIKOVICH, I.M.; KHUDOROSHKOV, I.P.;
Prinimali uchastiy: Vernikovskiy, K.B.; SOTNICHENKO, A.S.;
PAKHOMOV, Ye.A.; BUNEYEVA, O.K.

Production of fluxed sinter using a high basicity sinter as flux.
Stal' 22 no.12:1057-1060 D '62. (MIRA 15:12)

1. Nizhne-Tagil'skiy metallurgicheskiy kombinat i Vsesoyuznyy
nauchno-issledovatel'skiy institut mekhanicheskoy obrabotki
poleznykh iskopayemykh.
(Sintering)

VERNIKOVSKIY, K.B.; LUBENETS, I.P.; ORLOV, V.S.; SHCHELKANOV, V.S.;
DENISOV, Ye.M.

Induced block caving at the Gora Blagodat' mine. Gor. zhur.
no. 12:29-32 D '65. (MIRA 18:12)

1. GoroBlagodat'skoye zhelezorudnoye mestorozhdeniye (for
Vernikovskiy, Lubenets, Orlov). 2. Institut gornogo dela,
Sverdlovsk (for Shchelkanov, Denisov).

VERNIKOVSKIY, M. (Minsk)

A book could be written about each one. Voen.znan. 41 no.11:29
N '65. (MIRA 18:12)

VERNIKOVSKIY, M.

Predrafts come to the House of the All-Union Volunteer Society for
Assistance to the Army, Navy, and Air Force. Voen. znan. 41 no.8:29-
30 Ag '65. (MIRA 18:7)

VERNIKOVSKIY, M.

The main concern. Voenn. znan. 41 no.1:30-31 Ja '65.

(MIRA 18:2)

VERNIKOVSKIY, M.

Preparing for military service. Voenn. znani. 40 no.12:30-32
D '62 (MIRA 18:1)

VERNIKOVSKIY, M.; NEKRASOV, T.

Friends meet once more. Voen.znan. 36 no.12:4-5 D'60.

(MIRA 13:11)

(Poland--Veterans, Russian)

VERNIKOVSKIY, M.; FROLOV, S. (Moskovskaya oblast')

Make military science attractive to everyone. Voen. znan. 35
no.5:24-26 My '59. (MIRA 12:12)
(Moscow Province--Military education)

VERNIKOVSKIY, M.

3125 VERNIKOVSKIY, M and ROGACHEVSKIY, L

Ob SchchestvennyI Instruktor DOSAAF. Kazan', Tatknigoizdat. 1954. 44 S. 20 SM.
(Vsesoyuz, ordena Krasnogo Znameni Dobrovl'noye O-vo Sodeystviya armii, aviatsii
i flotu. 1.500 ekz. Bespl. - Na Tatar. Yaz. - (54-55024) 355.58 (062)(47)

VERNIKOVSKIY, M.

Strengthen discipline and improve organization. Voen.znan. 31 no.8:
18 Ag '56.

(MLBA 9:11)

(Military education)

VERNIKOVSKIY, M. (Minsk).

A lag which must be overcome. Voenn. 32 no.10:24
0 '56.

(MLBA 10:2)

(Military education)

VERNIKOVSKIY, M.

Leadership must be expert. Voen.snan. 29 no.6:6-7 Je '53. (MLBA 7:11)
(Military education)

VERNIKOVSKIY, M.

Sentry. Voen. znan. 42 no.2:6-7 F '66.

(MIRA 19:1)

VERNIKOVSKIY, V.V.

✓ Stabilization of the Temperature Conditions of Electric Resistance Furnaces. V. V. Vernikovskii and I. I. Yamanin. (Zavodskaya Laboratoriya, 1956, 21, (-), 492-493. [In Russian]. A temperature regulating arrangement, suitable for resistance furnaces working at high temperatures (1500-2500° C), is described. For a carbon-element furnace the power was kept within $\pm 0.5\%$ of the required mean value. 3-

Inst. Cryptology AS USSR

YAM, V.M.; VERNIKOVSKIY, V.Ye.

Performance of charging hoppers during the filling of pressure
molding dies for large-block products. Ogneupory 30 no.8:11-16
'65. (MIFA 18:8)

1. Vsesoyuznyy institut ogneuporov.

VERNIKOVSKIY, V.Ye.

Determining the pressure of refractory mixture at feeder
pipe outlets. Ogneupory 30 no.4:13-16 1965.

(MIRA 18:6)

1. Vsesoyuznyy institut ogneuporov.

VERNIKOVSKIY, V.Ye., inzh.

Investigating the charging of semidry masses into press molds. Trudy
Inst. ognep. no.35:117-126 '63. (MIRA 17:12)

Filling press molds with semidry refractory masses with the help of
compressed air. Ibid.:159-170

VERNIKOVSKIY, V. Ye.

Determining the accuracy of proportioning in the compressed
air handling of semidry refractory materials. Ogneupory 29
no.3:113-116 '64 (MIRA 17:3)

1. Vsesoyuznyy institut ogneuporov.

VERNIKOVSKIY, V.Ye., inzh.

Studying by means of a model the charging of semidry mixtures from wagon to mold for the manufacture of regular brick. Trudy Inst. ogneup. no.34:122-140 '63. (MFA 17:10)

VERNIKOVSKIY, V.Ye.

Characteristics of charging arrangements in refractories. Ognepory
28 no.3:106-111 '63. (MIRA 16:2)

1. Vsesoyuznyy institut ogneporov. (Feed mechanisms)
(Power presses)

L 39725-66 ENT(d)/ENP(k)/ENP(h)/ENP(v)/ENP(l) OE-2

ACC NR: AP6007167

SOURCE CODE: UR/0115/65/000/012/3043/0044

AUTHOR: Vernikovskiy, V. Ye.

ORG: none

TITLE: Determination of compressed-air flow by oscillographic means

SOURCE: Izmeritel'naya tekhnika, no. 12, 1965, 43-44

TOPIC TAGS: refractory product, air flow, oscillograph

ABSTRACT: Filling compression molds with semidry refractory materials by a compressed-air jet was experimentally tried at the All-Union Institute of Refractories. As the filling process was transient and transpired quickly (0.1-1 sec), it was impossible to determine the airflow by conventional flow-meters. Hence, the air pressure was measured by a special plexiglas cup with a wire strainometer cemented to it; the airflow was determined by a normal

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UDC: 531.733

L 39725-66

ACC NR: AP6007167

diaphragm, on both sides of which the pressure-measuring cups were connected. The strainometers were connected to an 8-galvanometer electromagnetic oscillograph. Several hundred mold fillings were tested, and the compressed-air consumption was determined from the oscillograms with an error of $\pm 1.4\%$. Orig. art. has: 3 figures and 2 formulas.

SUB CODE: 13, 09 / SUBM DATE: none / ORIG REF: 001

Card 2/2

VERNIKOVSKIY, Yu., kand. tekhn. nauk

Oil paint on a freshly plastered surface. Sel'. stroi.
no.12:21 D '62. (MIRA 16:1)

(Painting, Industrial)

VERNIKOVSKIY, Yu., kand. tekhn. nauk

Mortar for waterproofing concrete walls. Sel'. stroi. 18
no.5:23 My '63. (MIRA 16:6)
(Waterproofing)

VERNIKOVSKIY, Yu., kand.tekhn.nauk

Organization of the production of "borulin." Sel'. stroi. 17
no.2:16 F '63. (MIRA 16:3)

(Roofs--Maintenance and repair)

VERNIKOVSKIY, Yu., inzh.

Artificial construction chalk. Sel'. stroi. 13 no.10:15 0 '58.
(Chalk) (MIRA 11:10)

VERNIKOVSKIY, Yu., kand.tekhn.nauk

Light-duty building crane. Sel'. stroi. 15 no.12:23 D '60.
(MIRA 13:12)
(Cranes, derricks, etc.)

VERNIKOVSKIY, Yu., inzh.

Submerged working of ground. Sel'.stoi. 14 no.12:16 D '59.
(MIRA 13:4)

(Caucasus--Wells)

VERNIKOVSKIY, Yu., inzh.

Reasons for strength in bricklaying. Sel'.stroil. 13 no.6:27-29

Je '58.

(MIRA 11:6)

(Bricklaying)

VERNIKOVSKIY, Yu., kand. tekhn. nauk

Concreting in the winter. Sel'.stroi. 18 no.11:19 N '63.
(MIRA 17:3)

VERNIKOVSKIY, Yu., kand.tekhn.nauk

Bucket or container. Sel'. stroi. 16 no.10:27 0 '61.

(Containers)

(MIRA 14:11)

VERNIKOVSKIY, Yu., kand.tekhn.nauk

Nonsettling fillers. Sel'. stroi. 16 no.1:26-27 Ja '62.
(Insulating materials) (MIRA 16:1)

VERNIKOVSKIY, Yu., inzh.

Swinging cranes. Sel'.stroï. 15 no.6:25 Je '60.
(MIRA 13:8)

(Cranes, derricks, etc.)

VERNIKOVSKIY, Yu., insh.

Thin-walled hollow gypsum blocks. Sel'.stroï. 15
no.7:16 J1 '60. (MIRA 13:8)
(Gypsum) (Building blocks)

VERNIKOVSKIY, Yu., kand. tekhn. nauk

Glazing window casements without using putty. Sel'. stroi. 16 no. 12:
24 D '61. (MIRA 15:2)

VERNIKOVSKIY, Yu., kand.tekhn.nauk

Simplified water-supply and sewerage structures. Sel'.stroi.
no.8:18 Ag '62. (MIRA 15:11)
(Sewerage, Rural) (Water supply, Rural)

VERNIKOVSKIY, Yu., kand. tekhn. nauk

Repairing the roof for winter. Sel'. stroi. no.9:18-19 S '62.
(MIRA 15:10)

(Roofs--Maintenance and repair)

VERNIKOVSKIY, Ya., kand. tekhn. nauk; TOLSTONOG, Ya., inzhener-ekonomist;
MIKHAYLOV, I.; NATANOV, V., inzhener-stroitel'

Readers' letters. Sel'. stori. no. 6:30 Je '62.
(Building—Technological innovations)

(MIRA 15:7)

VERNIKOVSKIY, Yu., kand.tekhn.nauk

Rice hulls as building material. Sel'. stroi. 15 no.4:17 Ap '61.
(MIRA 14:6)

(Insulating materials)
(Rice)

VERNIKOVSKIY, Yu., insh.

Anhydride cement made with gypsum refuse. Sel'.stro1.
15 no.8:20 Ag '60. (MIRA 13:8)
(Cement) (Gypsum)

VERNIKOVSKIY, Yu., kand.tekhn.nauk

Extraction of clay with scrapers. Sel'. stroi. 15 no. 3:13 Mr '61.
(MIRA 14:5)

(Clay industries) (Scrapers)

VERNIKOVSKIY, Yu., kand.tekhn.nauk

Working trenches with the help of a moveable crane. Sel'.
stroil. 16 no.6:27 Je '61. (MIRA 14:7)
(Cranes, derricks, etc.)

VERNIKOVSKIY, Yu.S., inzh.

Work practices in underwater earthwork. Gidr.i mel. 12
no.7:53-54 J1 '60. (MIRA 13:7)
(Wells)

VERNIKOVSKIY, Yu.S., kand.tekhn.nauk

Chemical soil stabilization in the practice of hydraulic engineering.

Gidr.i mel. 14 no.11:57-60 N '62. (MIRA 15:12)

(Soil stabilization) (Hydraulic engineering)

VERNIKOVSKIY, Yu., kand. tekhn. nauk

Insulation slabs for roofs. Sel'. stroi. 17 no.4:23 Ap '63.
(MIRA 16:7)

(Insulating materials)

Vernikovskiy, Yu. Yu.

VERNIKOVSKIY, Yu., Yu., inzh.

Excavator bucket with vibrating teeth. Stroitel' no.11:11 N '57.
(MIRA 10:12)

(Excavating machinery)
(Earthwork--Cold weather conditions)

VERNOCZI, Gyorgy

"Tabulations in the machine industry" by Dr. Lorand Kismarty.
Reviewed by Gyorgy Vernoczi. Gep 15 no.4:170 Ap '63.

Country : Hungary H-26
 Category= :
 Abs. Jour. : 47440
 Author : Vernois, G.
 Institut. :
 Title : Continuous Purification of Juice

Orig. Pub. : Cukoripar, 1958, 11, No 8, 198-203

Abstract : Juice, from a continuous-operation Olier dif-
 fuser passes for a preliminary defecation into a Briegel-
 Muller apparatus, temperature of juice 38-45°, duration of
 passage 15-20 minutes, then is adjusted in the defecator, at
 80-85°, to an alkalinity of 15-20 g/liter CaO at the outflow;
 pH is determined continuously. Thereafter the subjected to
 continuous carbonation with recirculation (duration of
 passage 8-10 minutes), the carbonated juice has 0.05-0.1%
 CaO, pH 10.7-10.9. Then the juice goes to a settling tank at
 92-98°, where 75-80% of the juice are decanted while the
 residue is forwarded for filtration to chamberless vacuum
 filters. Thickness of cake layer on the filter drum is
 Card: 1/2

Country : Hungary
Category :

H-26

Abs. Jour. :

47440

Author :
Institut. :
Title :

Orig Pub. :

Abstract : 10-15 mm and washing consumes 70-80 liters water per 100 kg cake. After an additional filtration the purified juice is forwarded at 92° for a second carbonization. Calculations are given for the products being obtained. The equipment used is described, flow sheets and cross section views of decantation tank and chamberless vacuum filters, are included.

Card: 2/2

L 25772-66 - EWT(m)/FCC/T IJP(c)

ACC NR: AP6016380

SOURCE CODE: UR/0048/65/029/010/1876/1880

AUTHOR: Vernov, S. N.; Khristiansen, G. B.; Abrosimov, A. T.; Atrashkevich, V. B.; Belyayeva, I. F.; Kulikov, G. V.; Solov'yeva, V. I.; Pomin, Yu. A.; Khrenov, B. A.

ORG: Scientific Research Institute of Nuclear Physics, Moscow State University im. M. V. Lomonosov (Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta)

TITLE: Primary superhigh-energy cosmic radiation according to data on extensive atmospheric showers

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 10, 1965, 1876-1880

TOPIC TAGS: cosmic radiation, muon

ABSTRACT: Of interest in the investigation of the primary energy spectrum of cosmic rays and their composition is the knowledge of the spectrum of extensive atmospheric showers (e.a.s.) with respect to the total number N_μ of high energy muons ($E_\mu \geq 10^{10}$ eV) and the distribution of e.a.s. over the total number of the particles N_e for a given N_μ . In this connection the authors analyze the primary energy spectrum of cosmic rays on the basis of experimental data obtained with a special device for investigating e.a.s. recorded with a probability of $W \geq 0.95$. This device makes it possible to determine the total number of charged particles in an e.a.s.

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L 25772-66

ACC NR: AP6016380

at the observation level. An averaged function $\rho_{\mu}(R)$ is plotted to determine the spatial distribution N_{μ} of the muons, and, thus, the total number of these muons is determined. The distribution of N_e for a given N_{μ} is evaluated on the basis of data on an e.a.s. with $N_{\mu} = (1-2) \cdot 10^4$. The experimental findings are found to be in satisfactory agreement with theory. Thus, on the basis of the complex whole of the experimental findings, it may be concluded that the composition of primary cosmic rays in the superhigh-energy region apparently does not significantly differ from the composition in the low-energy region, and the γ -index of the primary energy spectrum is variable rather than constant. Orig. art. has: 5 figures. [JPRS]

SUB CODE: 20, 04 / SUBM DATE: none / ORIG REF: 009 / OTH REF: 002

Card 2/2

ACC NR: AP7001549

SOURCE CODE: UR/0020/66/171/003/0583/0586

AUTHOR: Vernov S. N. (Corresponding member AN SSSR); Chudakov, A. Ye. (Corresponding member AN SSSR); Vakulov, P. V.; Logachev, Yu. I.; Lyubimov, G. P.; Pereslegina, N. V.

ORG: Moscow State University im. M. V. Lomonosov (Moskovsky gosudarstvennyy universitet)

TITLE: Cosmic ray variations according to data from Zond-3 and Venera-2

SOURCE: AN SSSR. Doklady, v. 171, no. 3, 1966, 583-586

TOPIC TAGS: cosmic ray, cosmic ray intensity, cosmic ray measurement

ABSTRACT: At the end of 1965 and beginning of 1966 two Soviet space stations, Zond-3 and Venera-2, were in space simultaneously measuring cosmic ray intensity. The first was in motion away from the Sun and the second toward the Sun, which made it possible to determine both variations in the intensity of cosmic rays and their dependance on the distance from the Sun (i.e., their radial gradient). Data obtained by STS-4-type gas-discharge counters onboard the spacecraft revealed the radial gradient as $\delta = (3.1 \pm 0.4)\%$ per 1 astronomic unit. The radial

Card 1/2

ACC NR: AP7001549

gradient was irregular; this phenomenon was attributed to changes in the character and magnitude of the Forbush effect. Detectors of the n-p type onboard the space stations measured the radial gradient of protons with energies of 1—5 Mev. In addition to a sharp temperature increase, the detectors revealed a very stable and time-independent noise which exceeded by about 10 times the possible noise of high-energy particles. It was also found that the intensity of protons increased in moving away from the Sun. When the distance from the Sun was increased from 130×10^6 to 190×10^6 km, the intensity of 1—5-Mev protons, whose origin is known to be solar, increased 5 times. A mechanism is proposed for explaining this paradox. The nature of the radial gradient may possibly be explained by Parker's diffusion theory. Orig. art. has: 4 figures.

[WA-75]

SUB CODE: 04/
OTH REF: 002

SUBM DATE: 11Aug66/
ATD PRESS: 5111

ORIG REF: 002/

Card - 2/2

ACC NR: AP7001894

SOURCE CODE: UR/0020/66/171/004/0847/0850

AUTHOR: Vernov, S.N. (Corresponding member AN SSSR); Chudakov, A.Ye. (Corresponding member AN SSSR); Vakulov, P.V.; Logachev, Yu.I.; Lobimov, G.P.; Nikolayev, A.G.; Perslegina, N.V.

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

TITLE: Measurement of solar protons with energies of 1-5 Mev by the Venera-2, Venera-3, and Zond-3 space probes

SOURCE: AN SSSR. Doklady, v. 171, no. 4, 1966, 847-850

TOPIC TAGS: solar radiation, solar radiation intensity, proton counter

ABSTRACT: During the flights of the Zond-3, Venera-2, and Venera-3 space probes, the counting rate of proton detectors and Geiger counters on board increased markedly on six occasions. The semiconductor surface-barrier proton detectors had an area of about 0.2 cm²; the p-n junction was 35 μ thick. On the side of free space within a solid angle of ~1 sterad, the detectors were shielded with 2 mg/cm²-thick aluminum foil; on other sides the shielding was more than 1 g/cm² thick. The detectors were tuned to record protons with energies varying from 1 to 5 Mev. The intensity range measured corresponded to 1.1 x 10⁻³ to 1.1 pulse/sec.

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UDC: none

ACC NR: AP7001894

An analysis of the recorded data indicates that the protons are accelerated on the Sun and are propagated without hindrance along the magnetic force lines in interplanetary space. The width of proton fluxes with energies of 1—5 Mev was estimated at 3×10^{12} cm. It is concluded that these protons of comparatively low energies are generated periodically from the active areas on the Sun. They reach distant regions in interplanetary space through a "tunnel" produced by the corpuscular streams.

[WA-75]

SUB CODE: 04/ SUBM DATE: 11Jul66/ ORIG REF: 002/ OTH REF: 002/
 ATD PRESS: 5113

Card 2/2

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

120 AND 4TH ORDERS

5A

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2077. Cosmic Rays in Stratosphere. B. N. Vernov. *Comptes Rendus (Doklady) de l'Acad. des Sciences, U.S.S.R.* 16. 6. pp. 863-866, 1937. In English.—Results are given for the variation of intensity with height, up to 22 km., at 35° N. magnetic latitude; they were obtained with single counters in an unmanned balloon, the results being transmitted to earth by radio. The increase of intensity with height was not so rapid as in a trial flight at Leningrad. The experimental errors do not allow a definite difference in intensity at the two places to be discerned at heights below 9 km., but at 18 km. the intensity at 35° N. is only 2/5 that at Leningrad. The results are discussed and it is argued that the rate of increase of intensity with height at 35° N. lends probability to the assumption of the existence of a photon component in cosmic radiation. D. H. P.

COMMON ELEMENTS

NATIONAL INDEX

ASS-55A METALLURGICAL LITERATURE CLASSIFICATION

FROM SYMBIOTIC

101000 HEP ONE QM

COLLECTION

FROM BOMBY

COLLECT ONE ONE 101

BC

Study of cosmic rays in the stratosphere in the vicinity of the magnetic equator. S. N. Vasylov and A. V. Mironov (Compt. rend. Acad. Sci. U.R.S.S., 1930, 23, 137-139). - The altitude distribution of cosmic rays has been studied by recording radio signals automatically transmitted from the impulses of a Geiger counter in a balloon. The energy spectrum of cosmic particles deduced from the results can be interpreted by assuming that in any latitude all particles with energy $>$ the limiting energy for the vertical distance are present. J. A. K.

1ST AND 2ND QUANT										PROCESS AND PROPERTIES INDEX										3RD AND 4TH QUANT									
COMMON ELEMENTS										COMMON VARIABLES INDEX																			
BC Certain divergences between experimental data and deductions from the Ekshin-Ettler-Arley cascade theory. S. M. Yagov (Compt. rend. Acad. Sci. U.R.S.S., 1959, 24, 543-547).—By taking scattering and the presence of a large no. of low-energy electrons in the spectrum of particles in the cascade into account, it is concluded that the discrepancy (cf. preceding abstract) between experimental and theoretical results can be explained, while still retaining the physical basis of the cascade theory. Other effects are also explained. W. R. A.																													
A 58-51 A METALLURGICAL LITERATURE CLASSIFICATION										GENERAL INDEX										GENERAL INDEX									
1ST QUANT										2ND QUANT										3RD QUANT									
1ST QUANT										2ND QUANT										3RD QUANT									

24

5

THE TRANSITION MAXIMUM according to observations in the upper troposphere. S. N. Yermov. *Compt. rend. acad. sci. U. R. S. S.* 24, 62 (1949); *Chem. Zvesti.* 1949, 11, 109-9. --In altitudes between 8 and 10 km. 80% of the cosmic rays probably consist of electrons; in these altitudes, therefore, conditions are exceptionally favorable for a study by means of absorption curves for electrons passing through Pb plates. In two airplane ascents above 8 km, the decrease in corpuscle no. behind 1.5 cm. of Pb was found to amount to 20%, whereas behind a Pb plate of 0.6 cm. thickness an increase of 18% was observed. The results are in pronounced disagreement with the Bhattacharya (C. A. 31, 7749) and Arley (C. A. 33, 3679) theories, according to which a 0.6-cm. plate should raise the corpuscle no. 3.5 times, and a 1.5-cm. plate 3 times. Even the assumption that a considerable no. of photons are present in the radiation penetrating the Pb does not affect the disagreement considerably. W. Lesonski

D. N. Vekshen Phys. Inst.; Meln. Acad. Sci. 1939-

PROCESSES AND PROPERTIES INDEX																									
1ST AND 2ND GROUPS													3RD AND 4TH GROUPS												
1ST AND 2ND GROUPS													3RD AND 4TH GROUPS												
CA Comparison of the cascade theory with experimental data. S. N. Vernov. <i>Bull. Acad. Sci. R. S. S., Ser. phys.</i> 4, 254-8 (in English, 254-9) (1940). Experimental data concerning the transmission of high-energy electrons through lead are compared with the predictions of cascade theory and are shown to be in disagreement unless account is taken of the scattering of electrons in the transmitting medium. If the influence of such scattering is taken into account and the presence of a greater no. of penetrating photons in the showers is assumed, a good agreement can be obtained. Roksalana Gamow																									
ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION																									
1ST AND 2ND GROUPS																									
3RD AND 4TH GROUPS																									

PROCESSES AND PROPERTIES INDEX

3

The soft component of cosmic radiation in connection with the problem of mesotron disintegration. D. V. Skobel'tsyn and S. N. Vermyov. *Compt. rend. acad. sci. U. R. S. S.* 26, 316(1940)(in English); cf. preceding abstr. The no. of secondaries in equl. with a mesotron is shown theoretically to be independent of the energy of the mesotron and inversely proportional to the d. of the medium. From this relation, the increase of these secondaries with altitude is calcd., and found to be much less than the observed increase of the soft cosmic-ray component; if the difference were due to the cascade effect, the energy of the primary cascade-producing electrons would be at least 10¹¹ e. v., an inadmissibly high value. The observation of Young and Street (*C. A.* 32, 40^a), that the hard and soft components vary in the same way with latitude, shows the components to be closely assc'd. "Some essentially new fundamental assumptions as to the mechanism of absorption should be made." A. O. A.

ASB.SLA METALLURGICAL LITERATURE CLASSIFICATION

VERNOU S.V.

USSR/Nuclear Physics - Cosmic Rays
Nuclear Physics - Ionization Chambers
Jul 1947

60179
"Study of the Transitional Effect of Cosmic Rays in
the Stratosphere With an Ionization Chamber," S. N.
Vernov, M. I. Gligorov, F. D. Savin, Phys Inst Imeni
P. N. Lebedev, Acad Sci USSR, and Moscow State U Imeni
M. V. Lomonosov, 4 pp

"Dokl Akad Nauk SSSR, Nova Ser" Vol LVII, No 2

Gives results of measurements of transitional effects
of cosmic rays in stratosphere with aid of ionization
chamber and calculating machine, utilizing special
pibal equipment, which permitted measurements of ion-

60179

USSR/Nuclear Physics - Cosmic Rays (Contd) Jul 1947
ization or number of particles in the 1 cm lead
covering of apparatus. Submitted by Academician
S. I. Vavilov, 12 May 1947.

60179

VERNOV, S. N.

VERNOV, S.N.

PA 24/197102

USSR/Nuclear Physics - Ionization Chamber Aug 48
Nuclear Physics - Cosmic Rays

"Use of an Ionization Chamber to Study the Number
of Impulses by Cosmic Rays in the Stratosphere,"
S. N. Vernov, M. L. Grigorov, F. D. Savin, Phys
Inst imeni P. M. Lebedev, Acad Sci USSR, Moscow
State U imeni M. V. Lomonosov, 2 pp

"Dok Ak Nauk SSSR" Vol LXI, No 5

Experiment to determine number of nuclear divi-
sions as a function of the height of observation.
A high degree of functional dependency is found,
showing that nuclear divisions depend mainly on
secondary particles created as result of primary
cosmic rays in the atmosphere.

24/197102

VERNOV, S. N.

USSR/Nuclear Physics - Cosmic Radiation Sep 48
Nuclear Physics - Particles, Elementary

"Studies of Cosmic Ray Showers Which Accompany
Penetrating Particles," K. I. Alekseyeva, S. N.
Vernov, Phys Inst Imeni P. N. Lebedev, Acad Sci
USSR, 4 pp

"Dokl Ak Nauk SSSR" Vol LXII, No 2

Investigated formation in the stratosphere of cosmic
ray showers in a lead filter 4 cm thick. Two
flights were carried out with special, small-
dimension sounding balloons. These permitted
simultaneous counting of penetrating particles pass-
ing through 4 cm of lead in a solid angle, formed
36/49167

USSR/Nuclear Physics - Cosmic Sep 48
Radiation (Contd)

from the counters by the telescope. Also counted
are particles created by these penetrating particles
in the lead, with the aid of counters, surrounding
the lead on all sides. Submitted by Acad S. I.
Vavilov, 13 Jul 1948.

P.N. Alekseyeva Physics Institute,
USSR (Acad. Sci.) ~1948-

36/49167

VERNOV, S. N.

USSR/Nuclear Physics - Cosmic Radiation
Nuclear Physics - Elementary Particles
Sep 48

"Use of a Hodoscope to Study Particle Showers
Generated in Lead by Cosmic Rays in the Strato-
sphere," S. N. Vernov, A. N. Charekhch'yan, Phys
Inst Imeni P. N. Lebedev, Acad Sci USSR, 3 pp

"Dok Ak Nauk SSSR" Vol XLII, No 3

Diagram shows arrangement of counters. Three
counters form the so-called telescope, and nine
are secondary counters. Hodoscope consisted of
necessary number of independent amplifying channels,
connected to each secondary counter. Amplifying

36/49769

Sep 48

USSR/Nuclear Physics - Cosmic
Radiation (Contd)

circuits of secondary counters were generally
closed, and discharges in one of the counters
were not registered unless the necessary triple
concurrence occurred in the telescope. Sub-
mitted by Acad S. I. Vavilov, 13 Jul 48.

36/49769

VERNOV, S. N.

Oct 48

USSR/Nuclear Physics - Cosmic Radiation
Nuclear Physics - Particles

"Studies of the Soft and Hard Components of Stratospheric Cosmic Showers," L. R. Baradzey, S. N. Vernov, Yu. A. Smorodin, Phys Inst imeni P. N. Lebedev, Acad Sci USSR, Moscow State U imeni M. V. Lomonosov, 3 pp

"Dok Ak Nauk SSSR" Vol LXII, No 4

Gives graphic results of five sounding-balloon flights to determine the number of cosmic particles by a telescope with various filters at heights up to 30 km in summer and fall 1947 over Moscow. Gives the physical arrangement, and describes counters and absorbents. Submitted by Acad S. I. Vavilov, 13 Jul 48.

PA 33/49493

VERNOV, S. M.

Nov 48

USSR/Nuclear Physics - Cosmic Rays
Nuclear Physics - Particles

"Disintegrating Particles in the Composition of Cosmic Rays in the Stratosphere,"
L. T. Baradzey, S. N. Vernov, Yu. A. Smorodin, Phys Inst imeni P. N. Lebedev,
Acad Sci USSR, Moscow State U imeni M. V. Lomonosov, 2 pp

"Dok Ak Nauk SSSR: Vol LXIII, No 3

Up to 25-km altitude, measured intensity of radiation at a zenith angle of 60°
and intensity of vertically-directed radiation in the stratosphere of penetrating
8 cm of lead. Difference in intensity for various zenith angles gave difference
in the number of mesons disintegrating above the observation point. Registry of
the number of coincidences in outer counters of the telescope and counters moved
beyond its solid angle permitted establishing the number of rays. Submitted by
Acad S. I. Vavilov 30 Sep 48.

PA 55/49T73

FA 51/49T46

USSR/Nuclear Physics - Cosmic Rays May 49
Nuclear Physics - Mesons

"Study of Interactions of the Primary Component
of Cosmic Rays with Matter in the Stratosphere,"
S. N. Vernov, Phys Inst Imeni P. N. Lebedev,
Acad Sci USSR, 6 pp

"Zhur Eksp 1 Teoret Fiz" Vol XIX, No 7

Measurements made during sounding balloon flights
up to 30 km showed soft component of cosmic rays
in stratosphere has electron properties. Studies
of hard component in stratosphere and structure
of showers created by primary cosmic particles
51/49T46

USSR/Nuclear Physics - Cosmic (Contd) May 49
Rays

indicated that an intensive electron-photon com-
ponent is created in the absorption of primary
particles. If this component is due to decay
of fast-disintegrating mesons, lifetime of these
mesons is less than 10-10 sec. Submitted
10 Mar 49.

51/49T46

VERNOV, S. N.

VERNOV, S.N.
C.A.

Determination of the sign of primary particles of cosmic rays by measurements of the azimuthal asymmetry in the stratosphere at the equator. S. N. Vernov, N. L. Grigorov, N. A. Dobrotin, S. P. Sokolov, P. D. Savin, and A. I. Kurakin (Moscow State Univ.). *Doklady Akad. Nauk S.S.S.R.* 68, 251-5 (1949).—The east-west asymmetry is detected by means of a counter telescope inclined 60° from the vertical and maintained in the east-west plane by a motor activated by photoelements attached to the telescope. Curves are given for pulses per min. vs. g. cm.² of atm. penetrated. Without shielding the av. of 8 flights indicates 45.5%; greater activity from the west. With Pb shielding, the western asymmetry is about 70%. The max. asymmetry and max. activity occur at about 120 g./cm.². The asymmetry is consistent with Johnson's calens. assuming the primary cosmic particles to be pos. M. J. Sienko (cf. C.A. 33, 9123).

CA

Absorption of primary cosmic rays in the stratosphere.
K. I. Alekseeva and B. N. Vernov. *Doklady Akad. Nauk S.S.S.R.* 69, 317-19 (1949); cf. C.A. 43, 37034. — Measurements of cosmic radiation up to 24.5 km. above sea level were made in 1948 with app. carried by a sounding balloon. Counters A, B, C and 2 Pb blocks 4 cm. thick formed a vertical sequence A, Pb, B, Pb, C; on each side of this telescope 5 counters formed a vertical sequence, and all 10 were connected in parallel. Triple coincidences between A, B, C and quadruple coincidences between A, B, C and the set of 10 formed impulses of lengths 0.03 and 0.1 sec., resp., which produced signals of 1000 cycles/sec. for a transmitter on a wave length of 4.5 m. Triple coincidences represent penetrating particles; and 4-ply coincidences, showers generated by them in 8 cm. Pb. The no. of penetrating particles per min. not creating showers in Pb is plotted vs. height; excellent agreement with the results of Vernov and Chetakhich'as is obtained. Shower-producing particles show an exponential law of absorption with depth, with absorption coeff. (1/120) sq.cm./g. below 20 km.; this increases to (1/60). Discussion indicates that the primary particles are absorbed in matter with a coeff. varying as $A^{1/2}$ (A = mass no.).
P. H. Murray

1ST AND 2ND ORDERS										3RD AND 4TH ORDERS									
PROCESSING AND PROPERTY INDEX																			
1730 A Study of the Altitude Curve of Showers Generated by Primary Cosmic Rays in the Atmosphere. S. N. Verpov and T. N. Charakhch'yan. Doklady Akad. Nauk S.S.S.R. 69, 629-30(1949)(in Russian). Measurements are described of the altitude distribution in the stratosphere of penetrating particles that generate showers in lead. The instrument's geometry permitted the recording of showers composed of greatly diverging particles, thus increasing the efficiency of the instrument. A rapid increase of the number of showers with the altitude was observed and interpreted as a proof that the generating particles were the primary cosmic rays. It follows from the shape of the curve that up to ~20 km the absorption in the air is expressed by $1/\mu = 100 \text{ g/cm}^2$, while beyond that altitude $1/\mu = 50 \text{ g/cm}^2$. This change may point to the presence of a considerable number of α particles among the primary rays. <i>Moscow State Univ. M.V. Molotov</i> <i>Phys. and Chem. P.N. Lebedev</i> <i>msu, AS c.1949-</i>																			
ASB-56A METALLURGICAL LITERATURE CLASSIFICATION																			

VERNOV, S. N.

USSR/Nuclear Physics - Cosmic Rays
Hodoscopes

Dec 49

"Investigation of the Structure of Showers Created by Primary Cosmic Rays in the Stratosphere,"
S. N. Vernov, A. N. Chakhch'yan, Phys Inst
Imeni P. N. Lebedev, 3 pp

"Dokl Ak Nauk SSSR" Vol LXIX, No 4

Gives results of studying structure of showers created by primary cosmic rays in lead and aluminum. Specially constructed portable hodoscopes raised to the stratosphere in sounding balloons used for measurements. Data

155th9

USSR/Nuclear Physics - Cosmic Rays
(Contd)

Dec 49

transmitted by radio and recorded on fast-moving film at receiving point. Showers created by primary cosmic rays in lead contained considerably more particles than showers formed in aluminum. This difference in number of particles indicates electron-photon component is present in showers. Submitted by Acad D. V. Skobel'tsyn
20 Aug 49.

155th9

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537,591.1
1959. Investigation of cosmic rays in the stratosphere. S. N. VARNYAN, N. L. CHIRAKOVY AND A. N. CHIRAKOVITSA. *Izv. Akad. Nauk, SSSR, Ser. Fiz.* 14 (No. 1) 51-63 (1950) In Russian.
Surveys the observations at balloon heights by Vernet over several years, using counter systems. Results are given for telescopes at various inclinations, with and without Pb absorbers, showers, and finally showers produced by penetrating particles, identified as primary protons. For the latter investigation, a 3 fold telescope containing 10 cm Pb, gave master pulses serving a hodoscope of 12 Geiger counters, arranged in 2 arcs below the telescope. The records were produced at ground level by radio. The effects attributable to electrons, mesons and protons are separately evaluated. S. P. GROMOS

1667102

USSR/Physics - Cosmic Rays
Counters

21 Jul 50

"Angular Distribution of Cosmic Rays in the Stratosphere," S. N. Vernov, A. M. Kulikov

"Dok Ak Nauk BSSR" Vol LXXIII, No 3, pp 483-486

Discusses data obtained in 1948 from studies of subject distribution, in which intensity was measured for various angles by rotating telescope of three self-quenching counters 3 cm in diameter and 14 cm long (8 cm Pb or 4 cm Al between them). Small motor rotated telescope continuously from 0 to 900 in 2-min cycle. Data consists of triple coincidences

1667102

USSR/Physics - Cosmic Rays (Contd) 21 Jul 50

M123, M134. Graphs show pulses/min.sq cm.sterad versus angle (0 - 900) for various heights (10, 15, 20, 25 km). Submitted 22 May 50 by Acad D. V. Skobel'tsyn.

1667102

VERNOV, S. N.

S.A.
Section A.

4772. On the existence of the "varitrons." *S. P. VERNY, N. A. DOROSHIN AND G. T. ZATSEPIN. Zh. Eksp. Teor. Fiz.*, 21, 1045-48 (No. 9, 1951) in Russian.

Criticism the experimental results obtained by Alkhazov and Alkhazov in their work on cosmic rays, and more particularly their conclusions about the existence of many kinds of fundamental particles which they called "varitrons" (preceding abstract). In the opinion of the authors, the "showers" and spurious trajectories, and also the electrons resulting from the ionization and from the nuclear disintegration in the absorbing screens, which, in particular, can be caused by the π -mesons, have not been adequately eliminated, not only in the first series of the experiments, whose results, in a considerable proportion, were not borne out by the later experiments with the aid of an improved mass spectrometer, but also in the latter set, in spite of the improvements in the apparatus. Furthermore, it is their opinion that after the proper elimination of these obscuring factors, the apparent maxima in the mass spectroscopic curve, which were interpreted as the records of the varitrons, will not go beyond the limits of statistical distribution of deviations and errors, so that in reality they should not be interpreted as a proof of the presence of particles of corresponding masses. *M. S. JAPOLSKY*

Physics Inst. im.

P. N. LEGBLEV

S.B.
Section A

339.18 : 537.591.1

6773. On the article by S. Venger, N. Dobrota and G. Zehnpfe. A. I. ALKEMANYAN. Zh. Eksp. Teor. Fiz., 21, 1063-7 (No. 9, 1951) in Russian.

A detailed answer to the criticism of the experimental work by the author and Alkhanov on "varitrons" (preceding abstracts). The author, in his counter-argument, points out that some of the criticized results obtained by himself and his associate in 1946 were later independently confirmed by quite different methods (photographic emulsion) by Powell, who detected exactly the same particles as they did and gave them the same of the "v-mesons," while the improved experimental methods, which they used in 1950, has also been followed on similar lines, by the team of physicists headed by Blackett. Furthermore, the author argues that his critics quite arbitrarily eliminated some of the experimental results, and that this led to wrong conclusions. While the improved method of observations showed the necessity of revising some of the initial results, as had been readily admitted in the criticized paper, the essence of the conclusions about the nature of the varitrons has been borne out. Many of the new results, however, still remain unexplained and require further investigation.

H. S. JAPOLSKY

SSR/Nuclear Physics - Cosmic Rays,
Penetrating

11 Oct 51

Investigations in the Stratosphere of the Properties
of Penetrating Cosmic-Ray Particles, "K. I. Alekseyeva,
S. N. Vernov, R. M. Osolina

"Dok Ak Nauk SSSR" Vol LXXX, No 5, pp 725-728

Describes scheme of disposition of counters and fil-
ters, altitude dependence of number of cosmic-ray
particles with various flight paths in lead (4-8 cm).
Discussed expts were conducted in 1947-48 in the
stratosphere, on the formation of showers by cosmic-
ray particles in a lead filter 4-8 cm thick. Con-
clude that there is a considerable number of electrons
221T79

among the cosmic-ray particles possessing flight
paths R between 4 and 8 cm in lead, from a compari-
son of the probability of formation of showers by
particles with shower paths of $R=4$ cm and $R=8$ cm
in lead. Submitted 27 Jul 51 by Acad D. V. Skobel'-
tsyn.

221T79

VERNOV, S. N.

USSR/Physics - Cosmic Rays

21 Oct 51

"Angular Distribution of the Energy of Secondary
Radiation Created by Primary Cosmic Particles,"
S. M. Vernov, A. M. Kulikov, Ye. L. Feynberg, Phys
Inst Imeni Lebedev, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXX, No 6, pp 871-874

Propounds claims that permit one to evaluate the
angular distribution of the energy of secondary
radiation relative to the direction of the primary
particles. Measurements of the number of cosmic

217592

particles for various zenith angles in the
stratosphere show that secondary radiation created
by primary particles maintain in the main the
direction of the primary particles. Submitted
31 Jul 51 by Acad D. V. Skobel'tsyn.

217592

VERNOV, S. M.

VERNOV, S. ^(*) DOBROTIN, N., ZATSEPIN, G.

NUCLEAR PHYSICS

Again on the existence of varitrons (concerning A.I. Alikhanyan's reply to our article on varitrons). Zhur. eksp. i teor. fiz. 22 no. 4, 1952.

Physics Inst.

Monthly List of Russian Accessions, Library of Congress. November 1952. Unclassified.

VERBOV, S. M.
SERGEY Nikolayevich

400-200

551 528 64
horizontal data asymmetry in cosmic
with many long and short range
equator. Subject heading: 1. Cosmic ray asymmetry

