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INVESTIGATION OF COSMIC RADIATION ON THE AMS "L U N A-10"

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SUMMARY

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On the basis of observations from the AMS Luna-10, the magnitude of the flux of primary cosmic radiation remains fairly high in spite of solar activity rise begun in 1966, maintaining a value characteristic for solar activity minimum. These data agree well with those obtained two months earlier with the aid of another type of spacecraft — LUNA-9.

* * *

Author

Two end-window gas-dicharge counters, located in sequence in the upper part of satellite's cone, were part of the instrumentation aboard LUNA-10 designed to investigate the cosmic radiation by means of the first satellite of the Moon. The axes of the counters were oriented parallelwise to the axis of the satellite. In order to separate cosmic radiation by hardness, the counter had different shielding. The one designed to register the hard cosmic radiation (of galactic cosmic rays, and of cosmic rays of solar origin) was closed from all sides by a copper screen of 2.5 g cm^{-2} thickness. Protons with energies greater than 50 Mev and electrons with energies greater than 5 Mev, could penetrate through such a shielding. The indicated particles were registered with efficiency near the unity. The counter destined to register the feebly-penetrating cosmic radiation, with solid angle near 10 ster was closed by exactly the same shielding, but from the end it had a thin window made of 1.2 milligrams of mica + 0.3 mg gold per 1 cm^2. The width was 0.5 cm in diameter, the solid viewing angle had near 2 ster. Protons with energies greater than 0.5 Mev and electrons with energies greater than 40 kev could pass through the window.

The global geometric factor of each of the counters for the isotropic hard radiation constitutes 2.6 $\pm$0.2 cm . The counter registering the feebly-penetrating radiation had a geometrical factor of 0.4 $\pm$0.1 cm ster. The counters were fed from the general voltage transformer. The counting rate was measured with the aid of logarithmic discrete count circuits. The mantissa and the characteristic number of pulses, registered by each counter, were transmitted to the Earth every two minutes during sessions. During the first cycle of a session data on the number of pulses computed during the previous seesion were transmitted to Earth. The precision of transmission of numbers, determined by the accuracy of transmission of mantissa, was always better than 3 percent. The capacity of the logarithmic circuit constituted $5 \cdot 10^8$ pulses. The information received covered the period from 31 March to 29 May.

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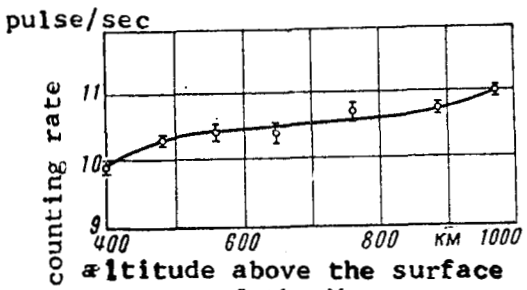
* Issledovaniye kosmicheskogo izlucheniya na iskusstvennom sputnike Luna-10.

Observations of the integral level of cosmic radiation in free interplanetary space were conducted in the period from 31 March to 3 April 1966. We dispose of data for three sessions, of 30 minutes duration each. The mean rate of hard electrons' counting by the shielded counter constituted 12.2 $\pm$0.1 sec^{-1}, which corresponds to a flux of 4.7 $\pm$ 0.4 cm^{-2} sec^{-1}.

The value of the flux of primary cosmic radiation is evidence that despite the already increased solar acticity, having begun to rise in 1966, the intensity of primary cosmic radiation continues to maintain a sufficiently high value characteristic of for the period of solar activity minimum. The value of the flux, as brought out here, coincides with the data obtained two months earlier with the help of a counter installed on board of Luna-9, quite different in its type. Refer to [1].

The satellite LUNA-10 entered a selenocentrical orbit on 3 April 1966, with aposelion at 1000 km, periselion at 350 km, and an inclination angle to the axis of rotation of the Moon, 72°. A depedence was obtained of the counting rate of the shielded counter on height above the surface of the Moon. This dependence is shown in Fig. 1.



Altitude above the surface of the Moon

The experimentally measured variation of the counting rate of the shielded counter between aposelion and periselion constitutes 11 $\pm$ 3°. The shielding by the Moon for an albedo equal to zero must give a variation near 15 percent.

Contribution to the counting rate of the nonshielded counter was made by feebly-penetrating cosmic rays of solar origin and the soft radiation in the region of the assumed boundary of the Earth's magnetosphere tail (see the immediately following paper by N. L. Grigorov, B. L. Maduyev, et al ST – PF – LPS-10 528)

**** THE END ****

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