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IN ORBIT AROUND THE MOON  
FIRST SCIENTIFIC RESULTS OF THE FLIGHT OF LUNA-10

TASS  
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A TASS COMMUNIQUE

SUMMARY

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This scientific communique of the TASS AGENCY gives a brief description of the apparatus installed aboard LUNA-10, now orbiting around the Moon. Some preliminary results of observations are also given.

AUTHOR

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On 3 April 1966 the automatic station LUNA-10 was put into orbit around the Moon. With the creation of the first AMS in the world a new stage has begun for the direct study of the physical properties of the Moon and of the near-lunar space.

The following scientific apparatus is installed on LUNA-10:

- a three-component magnetometer for ascertaining more precisely the lower limit of the possible magnetic field of the Moon;
- a gamma-spectrometer for the investigation of the intensity and of the spectral composition of lunar surface's  $\gamma$  - emission;
- counters for the registration of solar corpuscular and cosmic radiations and for the investigation of soft electrons with the view of detecting the lunar ionosphere and studying the charged particles of the Earth's magnetosphere tail in the vicinity of Moon's orbit;
- ion traps for the registration of the total flux of ions and electrons of the solar<sup>wind</sup> and for searching for the Moon's ionosphere;

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(\*\*) NA ORBITE VOKRUG LUNY

Pervyye nauchnyye rezul'taty poleta stantsii "Luna-10".

—piezoelectric pickups for the registration in interplanetary and near-lunar space of meteoric particles with a mass exceeding one hundred-millionth of g.;

— an infrared pickup for the determination of the integral thermal radiation of the Moon;

— soft X-ray photon counters for the measurement of the Roentgen fluorescent radiation of the rocks of lunar surface.

As is well known, it was shown in 1959 with the aid of Luna-2 that the value of the Moon's magnetic field does not exceed one thousandth of the geomagnetic field. This was the first investigation of the magnetic properties of the Moon.

The threshold response of the magnetometer established on Luna-10 exceeds by a factor of 15 that of Luna-2. This will allow to estimate more accurately the value of the intensity of the magnetic field in the vicinity of the Moon;

A preliminary analysis of the measurements already conducted shows that on 5 April the intensity of the magnetic field was within the limits 15 — 20 gammas and varied little within the various points of the orbit.

The measured values of the Moon's magnetic field exceed somewhat the level of magnetic fields in the free interplanetary space in a magneto-quiet period. However, it cannot yet be asserted that this is related to the presence of the Moon's proper magnetic field.

As is well known, a continuous flux of particles moves from the Sun — the solar wind. As a result of its interaction with the Earth's magnetic field it is significantly distorted and the lines of force elongate toward the side opposite to the Sun, thus forming the so-called Earth's magnetic tail.

If the Earth's magnetic tail spreads to the Moon's orbit, LUNA-10 should have been inside the Earth's magnetic tail during the first measurements, and this might have conditioned the overrated value of the magnetic field intensity. Subsequently, the Moon will emerge from the magnetic tail region. Measurements beyond the magnetic tail will allow the solution of the question as to what induces the variations in the magnetic field intensity, the magnetic field of the Moon or the magnetic tail of the Earth!

The acquaintance with the first results of measurements carried out with the help of charged particle traps will allow a preliminary conclusion about the fact that over flight portions between the Earth and the Moon and on the orbit of the AMS fluxes of negative as well as positive particles were registered (including positive low-energy ions).

The cosmic radiation counters registered cosmic background between the Earth and the Moon. The latter is at present somewhat overrated ( five particles per square centimeter per second), as was to be expected in the period of solar activity minimum.

The data obtained around the Moon may indeed be interpreted as the presence in the near-lunar space of fluxes of electrons with energy of tens of thousand electronvolt. By their intensity these fluxes exceed the cosmic background by a factor of 70 — 100. It is possible that this is induced by the Earth's magnetic tail. Subsequent measurements will allow more specific conclusions on the radiation setup near the Moon.

Gamma ray spectra, obtained over various regions of lunar surface, are transmitted from Luna-10. At the same time an increased intensity of  $\gamma$ -emission is revealed; it is principally conditioned by interaction of cosmic rays with the superficial layer of lunar matter. According to the first data, the level of natural radioactive emission of lunar rocks, linked with the radioactivity of uranium, thorium and potassium, draws nearer to the radioactivity of the basic rocks — basalts, when compared with the analogous radioactivity of terrestrial rocks.

The piezoelectric pickups are fastened on the station's envelope. The area sensitive to meteoric particle impacts constituted about a square meter. According to preliminary data, the spatial density of meteoric particles on AMS orbit is higher than in interplanetary space.

The infrared pickup consists of two receivers of radiation, constituting flat plates disposed in series.

The first data on thermal radiation and fluorescence emission of lunar surface are obtained and are being processed.

LUNA-10, the first AMS, pursues its investigations.

\*\*\*\* THE END \*\*\*\*