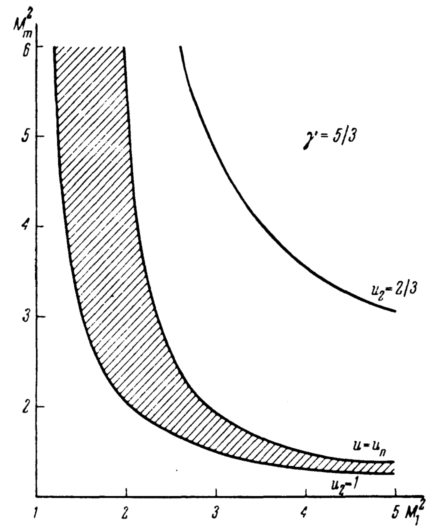

place smoothly. The drawing shows that the magnetic field creates more favorable conditions for the formation of an isothermal discontinuity: the isothermal discontinuity appears for smaller amplitudes of the waves the larger the field in the medium.

It is easy to obtain values of quantities characterizing the wave directly in front of the jump. For example, the velocity is

$$u = 1/2\{1/\gamma M_1^2 + 1/2\,M_m^2 + 1 - u_2 + [(1/\gamma M_1^2 + 1/2\,M_m^2 + 1 - u_2)^2 + 2/u_2 M_m^2]^{1/2}\}. \quad (4)$$

I thank K. P. Stanyukovich for discussions.

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NUMBER OF EXTENSIVE ATMOSPHERIC SHOWERS OF COSMIC RAYS NEAR SEA LEVEL

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THE frequency of extensive atmospheric showers with different numbers of charged particles was investigated by many researchers at different altitudes.[1] The most widely used research method consists of measuring the dependence of the number of multiple coincidences of discharges in counters on the effective area of the counters (the so called "density spectrum"). The value spectrum of extensive atmospheric showers can be obtained from the density spectrum by using the well known lateral distribution function of particles in the shower (in the particular case when this function is independent of the number of particles in the shower) and under the assumption that the value spectrum of the showers obeys a power law with a constant or slowly-varying exponent (see the paper by Migdal[2]). The latter assumption is connected with the fact that the axes of the registered showers may pass at varying distances from the particle flux-density detector; when counters are used it is also connected with the random character of the registration of the shower particle flux density.

With the development of methods for the registration and investigation of individual extensive atmospheric showers, direct data have appeared on the value spectrum of showers.[3,5] However, when the number of shower particles is small, it becomes difficult to register individual showers and determine subsequently the number of particles by comparing the particle flux density at certain points at the level of observation. In this connection we used a modification of the method of measuring the density spectrum of extensive atmospheric showers. The modification consisted of registering only the fourfold coincidences of counter discharges which were not accompanied by threefold coincidences in any of the three groups of counters in the same area, located ~ 6 m from the center of the array (Fig. 1). The counter area σ in all the registration channels, including the anticoincidence channels, was changed simultaneously ($\sigma = 0.4\,m^2$; $0.2\,m^2$, $990\,cm^2$, $330\,cm^2$, and $165\,cm^2$). This method of registration, while not differing in principle from the measurement of the density spectrum, makes it possible to reduce substantially the difference between the number of particles in the showers causing operation of the setup at a given counter area. This is

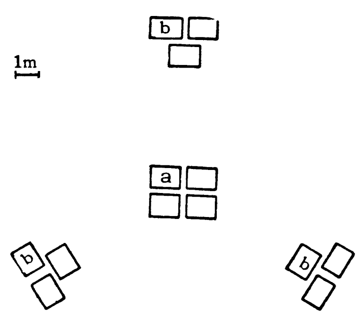

FIG. 1. Plan of the array: a – group of counters connected for fourfold coincidence, b – group of counters connected for threefold coincidence.

due to the fact that the probability of registering showers whose axes pass outside the center group of the counters of the array is considerably reduced, because of the conditions of anticoincidence of the discharges in the central group of counters with the discharges in any peripheral group.

Numerical calculations of the number of registered showers were performed under the assumption that the integral spectrum of extensive atmospheric showers has the form $f(>N) = A/N^{1.45}$, and the function of lateral distribution of the charged particles does not depend on the number of particles in the shower and corresponds to the experimental data of Abrosimov, Goryunov, et al.[6] The results of calculations for the counter areas $\sigma = 0.4\,\mathrm{m}^2$ are given in Fig. 2. To reconcile the calculated number of showers with the experimentally observed one (H = 200 m above sea level) it is necessary to assume in the foregoing spectrum a value $A = 9 \times 10^4\,\mathrm{m}^{-2}\mathrm{hr}^{-1}$, which differs somewhat from the corresponding value given by Norman[7] ($1.15 \times 10^5\,\mathrm{m}^{-2}\mathrm{hr}^{-1}$), but is in better agreement with the data obtained by individual investigations of extensive atmospheric showers.[3]

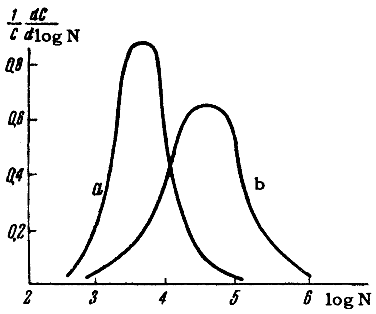

FIG. 2. a – shower spectrum by number of particles N, registered by the array at $\sigma = 0.4$ m^2; b – number of showers causing coincidence of discharges in counters of the same area.

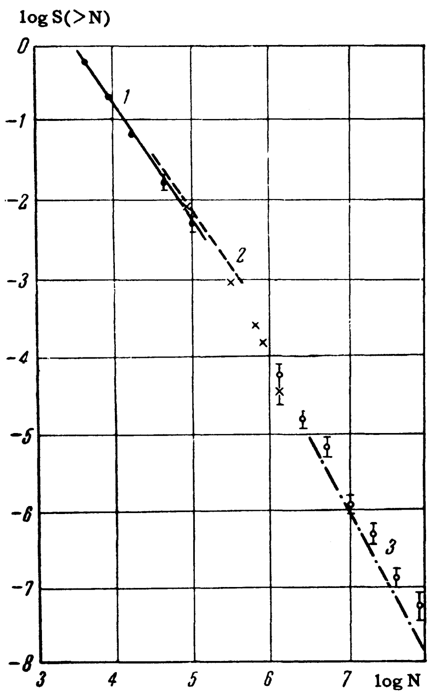

FIG. 3. Intensity of extensive atmospheric showers S (in $\mathrm{m}^{-2}\,\mathrm{hr}^{-1}$) with different number of particles N: 1 – data of present investigation (H = 200 m), 2 – data of reference 7 (H = 60 m), 3 – data of reference 5 (H = 60 m), × – data of reference 3 (H = 200 m), o – data of reference 4 (H = 180 m).

Comparison of the shower spectrum by number of particles which we obtained with data of other authors is given in Fig. 3.

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INVERSE DISPERSION RELATIONS FOR PHOTOPRODUCTION OF PIONS ON NUCLEONS

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It has been emphasized by Blank and Shirkov[1] that it is inconvenient to use conventional ("direct") dispersion relations when the imaginary part of the amplitude for some process becomes larger than the real part since one then deals with a small integral of a large (and generally speaking, alternating in sign) quantity. To overcome this difficulty Blank and Shirkov proposed "inverse" dispersion relations and derived them explicitly for the pion-nucleon scattering process. In contrast to direct