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Forbush decrease spectrum in a magnetic cloud in the 2004 July 27 event

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Magnetic clouds affect the intensity of galactic cosmic rays. The diffusion mechanism is usually considered as the formation mechanism for Forbush decrease (FD) in a magnetic cloud. An FD is an observed decrease in the intensity of cosmic rays. There is a new theory of FD formation, in which the mechanism is the loss of particle energy in the electromagnetic field of a magnetic cloud. The shape of the FD spectrum is calculated for a wide range of particle energies in the 2004 July 27 event. According to the measurements of the global networks of ground-based neutron monitors and muon telescopes, synchronous changes in the FD amplitude in time indicate that the FD is formed in a magnetic cloud for all energies. However, the calculated FD spectrum differs from the obtained one from measurements. The reasons for the difference can be: 1) the mechanism of formation is the diffusion mechanism; 2) the method for determining the spectrum, using the notion of mean or median energy, needs additional studies.

Primary author(s) : PETUKHOVA, Anastasia (Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy of SB RAS); Dr. PETUKHOV, Ivan (Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy of SB RAS); Dr. PETUKHOV, Stanislav (1Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy of SB RAS)

Presenter(s) : PETUKHOVA, Anastasia (Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy of SB RAS)

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