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Response of Galactic Cosmic Rays to Solar Disturbances: A Study of the May 2024 Forbush Decrease with GRAPES-3 Muon Telescope

We have studied the propagation of galactic cosmic rays in the heliosphere using data from the large-area multi-directional muon telescope of GRAPES-3 during periods of relatively normal solar activity and have investigated the rigidity or solar activity dependence of the diffusion coefficient of the solar radial component. This is done to get an average picture of the propagation of galactic cosmic rays in the heliosphere.

On the other hand, the interplanetary space near the Earth can change its state very quickly compared to the ordinary solar cycle due to transient activities on the solar surface, such as solar flares and coronal mass ejections.

The intensity of galactic cosmic rays then undergoes abrupt fluctuations, such as the Forbush decrease.

In this study, we investigate how the intensity and anisotropy of galactic cosmic rays observed from Earth respond to such rapid changes in the state of interplanetary space, focusing on the large-scale Forbush decrease that occurred in May 2024, taking advantage of the capabilities of the large-area multi-directional muon telescope of GRAPES-3.

We report on the results of this study.

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