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Summer Thunderstorm-Induced Muon Events (TIMEs) at GRAPES-3 Experiment: A detailed investigation

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Probing solar modulation of galactic cosmic rays in the interplanetary medium and terrestrial atmosphere with muon has recently gained appreciable importance. The muons have superior penetrating power, generated at an altitude higher than the thunderclouds. Thunderstorms drastically change the atmospheric electric field, which causes variation in muon count rate. At GRAPES-3, we are observing thunderstorm-induced muon events continuously for the past two decades. With the inclusion of spatially distributed electric field mills (EFMs), the observation focused from 2011 onwards. The competitive use of EFM and muon data resulted in the detection of about half a thousand statistically significant events during 2011-2020. A better understanding of the related physical processes is possible with a thorough study of the seasonal, diurnal, and event-specific variations [1]. Here, we will present the thunderstorm-induced muon events observed during the summer and discuss the processes responsible for their formation in detail.

Reference

1. P.K. Nayak et al., Thunderstorm-Induced Muon Events (TIMEs) at GRAPES-3 Experiment, 15th Quadrennial Solar-Terrestrial Physics (STP-15) Symposium, 21 - 25 February 2022, Indian Institute of Geomagnetism, Mumbai (Virtual) (to be communicated to Journal of Atmospheric and Solar-Terrestrial Physics)

Session

Astroparticle Physics and Cosmology

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