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Monitoring the upper atmosphere and Interplanetary magnetic field (IMF) using atmospheric muons at GRAPES-3

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Galactic cosmic rays are deflected by the Sun's magnetic field, leading to significant energy-dependent temporal and spatial variations in their intensity. The muons observed at GRAPES-3 arise from extensive air showers as cosmic ray secondaries originating in the interactions of these cosmic rays with the upper atmosphere. We observe strong correlations between the muon flux measured by GRAPES-3 and the upper atmospheric temperature, as well as the Interplanetary magnetic field (at Lagrange point L1). These correlations make the atmospheric muon flux a promising tool for monitoring both the upper atmosphere temperature and the interplanetary magnetic field in real time. I will present the detailed analysis technique and results of data from more than 17 years of operation of the GRAPES-3 muon telescope, as well as plans for a future live monitoring system using atmospheric muons and data from the Aditya L1 experiment by ISRO.

Session

Astroparticle Physics and Cosmology

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