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Rigidity dependence of cosmic ray diurnal anisotropy using 22 years of GRAPES-3 muon telescope data

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The GRAPES-3 muon telescope (G3MT) has been recording high statistics of muons at a rate of ~50000 per second for the past two decades allowing us to probe the tiny variations in the muon flux caused by solar phenomena. The directional capabilities of G3MT enable us to look into 169 independent directions with a large median rigidity ranging from 64 to 141 GV. We have examined the 22 years (2000-2021) of G3MT data using the Fourier series technique to obtain the daily SDA amplitude and phase. The measured SDA amplitude and phase show a strong rigidity dependence. We found that the phase dominantly has the 22-year variation controlled by the drift effect due to solar polar magnetic field reversal, regardless of their rigidity. However, the higher rigidity bin phase variation shows an additional component of the 11 years controlled by the diffusion. The details of this work will be discussed during the talk.

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