

R010-06

B会場：11/24 PM2 (16:05-18:05)

17:20～17:35:00

南極昭和基地における中性子計とミュオン計による同時宇宙線観測データを用いたフォーブッシュ減少時の rigidity スペクトル変動リアルタイムモニタの可能性について

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Real time monitoring of the rigidity spectrum of Forbush decreases using neutron monitor and muon detector at Syowa Station

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Large Forbush decreases (FDs) in the Galactic cosmic ray flux were observed by the paired neutron monitor (SNM) and the vertical channel of the muon detector (SMDV) at Syowa Station, Antarctica in May and October, 2024. The maximum count rate depressions in SNM and SMDV are $\sim 10\%$ and $\sim 5\%$ in the May FD, respectively. In the October FD, the observed count rates decreased in two steps following two successive interplanetary shocks. The maximum count rate depression recorded by SNM (SMDV) is $\sim 7\%$ ($\sim 3\%$) in the first step, while it is $\sim 8\%$ ($\sim 5\%$) in the second step. It is demonstrated that the count rate fraction (Fn) using paired SNM and SMDV count rate is a good real-time indicator of the temporal variation of the cosmic ray rigidity spectrum ($\Delta \Gamma(P, t)$), which is an important parameter for identifying the physical processes responsible for FDs. It is verified that the variation of Fn is consistent with $\Delta \Gamma(P, t)$ calculated from Global Fitting Analysis (GFA). Fn also shows a significant increase of $\Delta \Gamma(P, t)$ during the Ground Level Enhancement (GLE) due to solar energetic particles on May 11 superposed on the FD recovery phase, implying that the total (Galactic + solar) cosmic ray spectrum is softened due to the contribution from GLE intensity steeply increasing with decreasing rigidity. This implies that Fn can be also a good indicator of small GLEs which are sometimes difficult to identify in the count rate variation when masked by an FD and the associated diurnal anisotropy. These capabilities of Syowa cosmic ray observations have been improved by doubling the detection area of SMDV in early 2025. We are now ready to observe forthcoming FDs and GLEs with this improved observations at Syowa Station. In this talk, we will report a possibility of real time monitoring of the rigidity spectrum of Forbush decrease with the paired neutron monitor and muon detector at Syowa Station based on the analysis of large Forbush decrease in May and October, 2024.