Contribution ID: **30** Type: **Talk**

Pattern Recognition for Multiple Interactions in a Neutron Monitor

Tuesday, 1 February 2022 15:15 (15 minutes)

The flux of Galactic cosmic rays at Earth is modulated by the long term magnetic variations of the Sun (11-year sunspot cycle and 22-year magnetic solar cycle). This process known as Solar modulation is most pronounced at 1 GeV and below. However, it also operates at much higher energy, still exhibiting solar magnetic polarity dependence. For the last decades, ground-based neutron monitors provided valuable observations of the solar modulation up to a rigidity cutoff of about 17 GV. To extend the energy range of the neutron monitor observations, we recently upgraded the electronics of the Princess Sirindhorn Neutron Monitor in Thailand (PSNM, the operating neutron monitor at the highest geomagnetic rigidity cutoff) to record complex combinations of hits in multiple proportional counters. The variety of event topology recorded at the PSNM indicates multiple sources: energetic atmospheric nucleons (GeV-range), coincidence of secondary particles, and possibly small air-shower core passing through the detector. We discuss these observations with a preliminary analysis of a detailed Monte-Carlo simulation of energetic neutrons interacting in the detector.

Type of Contribution

talk

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Session Classification: Tuesday