



Contribution ID: 428

Type: Oral contribution

Observations and Monte Carlo Simulation of the Princess Sirindhorn Neutron Monitor at a Vertical Rigidity Cutoff of 16.8 GV

Monday 3 August 2015 14:15 (15 minutes)

Neutron monitors (NMs) are large ground-based instruments for precise time tracking of the variations in the Galactic cosmic ray (GCR) flux at the GeV-range. NMs count the secondary particles (mostly neutrons) issued from the interaction of the cosmic rays in the Earth's atmosphere. The sensitivity to GCR variations depends on the geomagnetic cutoff at the location of measurement as well as on the altitude of detection. Since late 2007, the Princess Sirindhorn Neutron Monitor (PSNM), at the summit of Doi Inthanon, Thailand's highest mountain (2565 m altitude), has recorded the flux of galactic cosmic rays with the world's highest vertical rigidity cutoff for a fixed station, 16.8 GV. We present here the observations of PSNM since the beginning of its operation. We have also developed Monte Carlo simulations of cosmic ray interactions in the atmosphere and in PSNM (with its surroundings), that includes the tracing of cosmic ray trajectories through Earth's magnetic field to model the cosmic ray suppression at low rigidity at the location of PSNM. The simulation shows a fairly good agreement with the data and the variations of the GCR spectrum, such as the solar modulation, are investigated for the first time with a fixed ground-based NM at a such high geomagnetic cutoff. That expands the range in energy of the worldwide NM network's sensitivity. Partially supported by a postdoctoral fellowship from Mahidol University and the Thailand Research Fund.

Collaboration

– not specified –

Registration number following "ICRC2015-I"

399

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Session Classification: Parallel SH05 GLEs & FDs

Track Classification: SH-EX