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Multiple Particle Detection in a Neutron Monitor

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Magnetic activity on the sun influences the flux of galactic cosmic rays at Earth in the process known as solar modulation. While most pronounced at 1 GeV and below, it also operates at much higher energy, still exhibiting solar magnetic polarity dependence. An observational gap exists between approximately 18 GeV (the highest geomagnetic cutoff) neutron monitor data and greater than 50 GeV muon observations. Detecting multiple neutrons from the same primary particle has recently been used to monitor the primary energy spectrum using data from a single neutron monitor. Over the past few years we have used details of the timing distribution from individual neutron detectors and pairwise correlations among adjacent detectors to improve the energy resolution of this technique. We present a further extension of our observations to pattern recognition of events comprising hits in multiple detectors in order to identify and study cases where more than one secondary particle from the same primary interacts in the neutron monitor. Our particular focus at present is to separate interactions of energetic hadrons from those generated by cores of small air showers.

Keywords

Solar Modulation; Neutron Monitor

Subcategory

Experimental Methods & Instrumentation

other Collaboration

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