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## Muon multiplicity determination at the GRAPES-3 experiment using pulse width for precision measurements at PeV Energies

Primary cosmic rays (PCRs), on entering the Earth's atmosphere, interact and create particle showers known as extensive air showers (EAS). EAS produced by heavier mass PCRs are observed to contain more muons than those created by lighter PCRs. As a result, muon multiplicities in EAS have often been used as an indicator for estimating the PCR composition. Thus, an accurate determination of the muon multiplicity in an EAS is imperative for composition studies. The GRAPES-3 experiment located at Ooty, Tamil Nadu, samples the muon content above 1 GeV energy in an EAS using a large area muon telescope. So far, muon multiplicities have been estimated from the number of hits in the proportional counters. We present a new method of determining muon multiplicity in an EAS based on the energy deposited by particles in the proportional counters. This energy is stored as pulse width and recorded along with the hit information. The preliminary simulation results of the analysis show that the dynamic range of detecting muons is increased by up to two orders of magnitude. Such an increase in the dynamic range is important to determine the PCR composition accurately beyond the Knee region ( $\sim 3$  PeV) of the cosmic ray spectrum using the GRAPES-3 array.

### Field of contribution

Experiment

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