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Buried plastic scintillator muon telescope

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Abstract content

Muon telescopes can have several applications, ranging from astrophysical to solar-terrestrial interaction studies, and fundamental particle physics. We show the design parameters, characterization and end-to-end simulations of a detector composed by a set of three parallel dual-layer scintillator planes, buried at fix depths ranging from 0.30 m to 3 m. Each layer is 4 m2 and is composed by 50 rectangular pixels of 4cm x 2 m, oriented at a 90 deg angle with respect to its companion layer. The scintillators are MINOS extruded polystyrene strips with two Bicron wavelength shifting fibers mounted on machined grooves. Scintillation light is collected by multi-anode PMTs of 64 pixels, accommodating two fibers per pixel. The front-end electronics has a time resolution of 7.5 nsec. Any strip signal above threshold opens a GPS-tagged 2 micro-seconds data collection window. All data, including signal and background, are saved to hard disk. Separation of extensive air shower signals from secondary cosmic-ray background muons and electrons is done offline using the GPS-tagged threefold coincidence signal from surface water cerenkov detectors located nearby in a triangular array. Cosmic-ray showers above 6 PeV are selected. The data acquisition system is designed to keep both, background and signals from extensive air showers for a detailed offline data.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 5 (HE part 2), pages 1179-1182

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