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Development and Production of Modular Cosmic Ray Telescopes

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While the quest of searching for the origins of the most energetic cosmic rays and the associated dynamics continues, there is a growing interest in recent years of the use of the cosmic rays for practical applications following the advancement of particle detection technologies. One of these important applications is to study the correlations between the cosmic ray flux variations and the space and earth weather at global scale in real-time at low cost. Key to these efforts is improving the understanding the correlation patterns to increase the accuracy, reliability, and timeliness of space-earth-weather forecasts. A state-of-the-art portable and modular cosmic ray muon and neutron detector prototype has been developed at Georgia State University for the measurement of cosmic ray muon and neutron flux variations simultaneously. The detector consists of three layers of plastic scintillator and a neutron-cell with liquid scintillator mounted on an extruded aluminum frame. The scintillation light is collected through embedded wavelength shifting fibers which are coupled to silicon photomultipliers (SiPM) for signal readout. The modular, portable and low cost nature of this cosmic ray telescope provides a technological choice to quantify the cosmic ray flux variation around the globe in an unprecedented spacial and time resolution. In the talk, we will highlight the details of the detector design, assembly and mass production. An initial test result will also be presented.

Keywords

portable cosmic ray detector; space and earth weather monitoring; global detector network; low cost cosmic ray detector

Collaboration

other (fill field below)

other Collaboration

to be established as a consortium of global cosmic ray detector network

Subcategory

Experimental Methods & Instrumentation

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