Contribution ID: **62** Type: **Poster presentation**

Response of a modular scintillation detector to a secondary cosmic ray muon flux

Tuesday 15 November 2022 16:30 (2 hours)

Muography is a non-invasive scanning technique that uses the directional flux of secondary atmospheric muons as a source to scan the density variations of objects on scales ranging from hundreds to thousands of meters. Cosmic ray detectors for muography use two or more planar detectors divided into several detection pixels (on the order of a few square centimeters) operating in coincidence mode. To achieve the temporal and spatial resolution required for different applications, these detectors have total detection areas of, at least, a few square meters.

A modular detector was built based on earlier developments of plastic scintillation muongraphy detectors. The module consists of four small crossbars (41mm x 10mm x 82mm each) with a wavelength scintillation fiber placed on top of each bar, similar to those used by the AMIGA project.

This array generates four detection pixels. The output signals are measured by silicon photomultipliers placed at one end of each fiber, in order to maximize the collection of photons produced by charged particles passing through the array. To characterize the response of the module to the muon flux from secondary atmospheric cosmic rays, we compare a simulation based on Geant4 and CORSIKA with real data. The characterization of the module will allow us to study the modular scaling of the detector in order to increase the detection area for studies related to geophysics, civil structures, vetoes at underground laboratories, safeward and nuclear materials.

Poster fallback option for rejected abstracts for parallel oral presentations

Yes

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Session Classification: Pizza and poster session

Track Classification: Astroparticle physics