



Contribution ID: 97

Type: Parallel Talk

Design and construction status of the Mu2e crystal calorimeter

Friday, 8 July 2022 14:30 (15 minutes)

The Mu2e experiment at Fermi National Accelerator Laboratory will search for charged-lepton flavour violating neutrino-less conversion of negative muons into electrons in the coulomb field of an Al nucleus. The conversion electron has a monoenergetic 104.967 MeV signature slightly below the muon mass and will be identified by a complementary measurement carried out by a high-resolution tracker and an electromagnetic calorimeter (EMC), reaching a single event sensitivity of about $3 \cdot 10^{-17}$, four orders of magnitude beyond the current best limit.

The calorimeter is composed of 1348 pure CsI crystals, each read by two custom UV-extended SiPMs, arranged in two annular disks. The EMC has high granularity, 10% energy resolution and 500 ps timing resolution for 100 MeV electrons and will need to maintain extremely high levels of reliability and stability and in a harsh operating environment with high vacuum, 1 T B-field and radiation exposures up to 100 krad and $10^{12} n_{1\text{MeV}}/\text{cm}^2$.

The calorimeter design, along with the custom front-end electronics, cooling and mechanical systems were validated through an electron beam test on a large-scale 51-crystals prototype (Module-0). Extensive test campaigns were carried out to characterise and verify the performance of crystals, photodetectors, analogue and digital electronics, including hardware stress tests and irradiation campaigns with neutrons, protons, and photons. The production and QC phases of all calorimeter components is about to be completed. A full vertical slice tests with the final electronics has been carried out on the Module-0 at LNF, along with the implementation and validation of the calibration procedures. Final assembly is due in summer 2022. Status of construction and assembly will be summarised, along with plans for commissioning and first calibration.

In-person participation

Yes

Primary author: PAESANI, Daniele (Istituto Nazionale di Fisica Nucleare)**Presenter:** PAESANI, Daniele (Istituto Nazionale di Fisica Nucleare)**Session Classification:** Detectors for Future Facilities, R&D, novel techniques**Track Classification:** Detectors for Future Facilities, R&D, novel techniques