Contribution ID: **106** Type: **Poster**

Design and construction status of the Mu2e crystal calorimeter

Tuesday 7 September 2021 11:11 (1 minute)

The Mu2e experiment at Fermi National Accelerator Laboratory (Batavia, Illinois, USA) searches for the charged-lepton flavor violating neutrino-less conversion of a negative muon into an electron in the field of an aluminum nucleus. The dynamics of such a process is well modelled by a two-body decay, resulting in a mono-energetic electron with energy slightly below the muon rest mass (104.967 MeV). Mu2e will reach a single event sensitivity of about 3x10−17 that corresponds to four orders of magnitude improvement with respect to the current best limit.

The calorimeter plays an important role to provide excellent particle identification capabilities and an online trigger filter while aiding the track reconstruction capabilities, asking for 10% energy resolution and 500 ps timing resolution for 100 Mev electrons. It consists of two disks, each one made by 674 un-doped CsI crystals, read out by two large area UV-extended SiPMs. In order to match the requirements of reliability, a fast and stable response, high resolution and radiation hardness (100 krad, 10^12 n/cm^2) that are needed to operate inside the evacuated bore of a long solenoid (providing 1 T magnetic field) and in the presence of a really harsh radiation environment, fast and radiation hard analog and digital electronics has been developed. To support these crystals, cool the SiPMs and support and cool the electronics, a sophisticated mechanical and cooling system has been also designed and realized.

In this paper, we present the status of construction and QC performed on the produced crystals and photosensors, the development of the rad-hard electronics and the most important results of the irradiation tests done on the different components. Production of electronics is also started and we summarize the QC in progress on the analog electronics and on the integrated SIPM+FEE units. Construction of the mechanical parts are also well underway. Status and plans for the final assembly are also described.

Moreover, a large calorimeter prototype (dubbed Module-0) has been tested with an electron beam between 60 and 120 MeV at different impact angles and the obtained results are summarized. Finally, a full vertical slice test with the final electronics is in progress on Module-0 at the Frascati Cosmic Rays test setup. First calibration results are shown.

Primary author: Mr HAPPACHER, fabio (infn)

Presenter: Mr HAPPACHER, fabio (infn)

Session Classification: Poster Session I

Track Classification: Energy frontier physics beyond the standard model