Contribution ID: **75** Type: **poster**

Development, construction and qualification tests of the Mu2e electromagnetic calorimeter mechanical structures

Friday, 17 September 2021 10:39 (1 minute)

The Mu2e experiment at Fermilab will search for the CLFV neutrino-less coherent conversion of a muon into an electron in the field of an aluminum nucleus. The observation of this process would be the evidence of physics beyond the Standard Model. Mu2e comprises a straw-tracker, an electromagnetic calorimeter and an external veto for cosmic rays. The calorimeter provides electron identification, a fast trigger and aids track reconstruction. It is a state-of-the-art crystal calorimeter and employs 1340 pure CsI crystals readout by UV-extended SiPM and fast electronics. The design consists of two identical annular disks positioned at the relative distance of 70 cm downstream the target.
The hostile Mu2e conditions (total ionizing dose of 12 krad and a neutron fluence of 5x1010 n/cm2 @ 1 MeVeq (Si)/y, 1 T magnetic field and vacuum level of 10ˆ-4 Torr) posed tight constraints on the mechanical structures and materials choice. The support structure of the two crystal matrices employs two aluminum hollow rings and parts made of open-cell vacuum-compatible carbon fiber. SiPMs and front-end electronics for each crystal are assembled in one mechanical unit inserted in a machined copper holder. The units are supported by a plate made of vacuum-compatible material. The plate integrates the cooling system made of a network of copper lines flowing a low temperature fluid and placed in thermal contact with the copper holders. The DAQ is hosted in aluminum crates positioned on the lateral surface of the disks. The crates also integrate the DAQ electronics cooling system. We review the constraints on the calorimeter structures design, the development of all the structural components, including the simulations that have determined the materials and technological choices and the specifications of the cooling station, components production and quality assurance tests, the procedures for detector assembly, transportation and installation in the experimental area.

Institute

University of Pisa and Istituto Nazionale di Fisica Nucleare - Pisa (Italy)

Your name

Simone Donati

email

simone.donati@pi.infn.it

Title

Nationality

Italian

Primary author: PASCIUTO, Daniele

Co-author: DONATI, Simone (University of Pisa and Istituto Nazionale di Fisica Nucleare)

Presenter: PASCIUTO, Daniele

Session Classification: Poster Session 7 (Detectors for High Radiation and Extreme Environments)

Track Classification: Detectors for High Radiation and Extreme Environments