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Design and status of the Mu2e crystal calorimeter

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The Mu2e experiment at Fermilab searches for the charged-lepton flavour violating neutrino-less conversion of a negative muon into an electron in the field of an aluminum nucleus [1]. The Mu2e detector is composed of a tracker and an electromagnetic calorimeter and an external veto for cosmic rays. The calorimeter plays an important role in providing excellent particle identification capabilities, a fast online trigger filter while aiding the track reconstruction capabilities. The calorimeter requirements are to provide a large acceptance for 100 MeV electrons and reach: (a) a time resolution better than 0.5 ns @ 100 MeV; (b) an energy resolution $O(10\%)$ @ 100 MeV and (c) a position resolution of 1 cm. The calorimeter consists of two disks, each one made of 674 pure CsI crystals readout by two large area array 2×3 of UV-extended SiPM 6×6 mm². We report here all progresses done for the construction and test of the latest large scale prototype that consists of an array of 51 pre-production crystals. Each crystal has been readout by two pre-production Mu2e SiPMs. The prototype will be exposed to an electron beam in the energy range around 100 MeV at the Beam Test Facility in Frascati (Italy). Preliminary results of timing and energy resolution will be shown.

References

[1] Mu2e Collaboration, Mu2e Technical Design Report, <http://arxiv.org/abs/1501.05241>, 2015

Primary author: DONGHIA, Rafaella (INFN Frascati, Università degli Studi Roma Tre)

Presenter: DONGHIA, Rafaella (INFN Frascati, Università degli Studi Roma Tre)

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