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progress status for the Mu2e calorimeter system

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The Mu2e experiment at FNAL aims to measure the charged-lepton flavor violating neutrinoless conversion of a negative muon into an electron. The conversion results in a monochromatic electron with an energy slightly below the rest mass of the muon (104.97 MeV). The calorimeter should confirm that the candidates reconstructed by the extremely precise tracker system are indeed conversion electrons. We therefore look for a calorimeter with a large acceptance, good energy resolution $O(5\%)$ and a reasonable position (time) resolution of ~ 0.5 cm (<0.5 ns). Moreover, the calorimeter should also provide a trigger for the experiment and perform a powerful mu/e particle identification. Finally, it should be able to keep functionality in an environment where the background delivers a dose of ~ 200 Gy/year in the hottest area. It will also need to work immersed in 1 T axial magnetic field. The baseline version of the Mu2e calorimeter is composed by two disks, 11 cm wide, of inner (outer) radius of 360 (670) mm filled by ~ 1800 hexagonal LYSO crystals. Each crystal is readout by two large area APDs. At the moment of writing, due to the increasing cost of the LYSO, we are examining cheaper alternative based on BaF₂ or pure CsI crystals. We will report the tests done, at a dedicated cosmic rays test, with our medium size prototype that is constituted by 16 square LYSO crystals of 3x3x13 cm³ read out by Hamamatsu APDs and dedicated prototypes of the Front End electronics. We will report also on the first tests done with single BaF₂ and pure CsI crystals when readout by means of large area UV extended APD or SiPM.

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