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Design and status of the Mu2e electromagnetic calorimeter

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he Mu2e experiment at FNAL aims to measure the conversion of a μ^- to an electron, resulting in a mono-chromatic e^- signal with an energy of $\sim$ 105 MeV, and reach a single event sensitivity of ~ 2.5×10^{-17} in three years of running.
The calorimeter has to perform μ/e particle identification, support/improve the tracking pattern recognition and provide a tracking independent software trigger for the experiment.
It should be able to keep functionality in an environment where the n, p and γ background, from muon capture processes and beam flash events, deliver a maximum dose of ~ 120 Gy/year. It should also work in 1 T axial magnetic field and a 10^{-4} torr vacuum.
These requirements ask for a calorimeter with large acceptance for signal events and a reasonable energy O(5\%) and time O($<$ 500 ps) resolution. Due to the sudden LYSO cost increase, the baseline calorimeter version is now composed of two disks of $\sim$ 900 BaF_2 crystals. This choice matches the requirement of fast, high resolution and radiation hardness crystals. Each cell is read out by two APDs whose signals are amplified, shaped and readout through 200 msps waveform digitizers.
We show the calorimeter design, the results obtained at 100 MeV with a small size LYSO prototype, to test a first version of calorimeter system integration, and the $R\&D$ and simulation carried out to prove the validity of the new baseline.

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