

# The Mu2e crystal and SiPM calorimeter

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The Mu2e experiment at Fermilab will search for the charged-lepton flavour violating conversion of negative muons into electrons in the coulomb field of an Al nucleus, planning to reach a single event sensitivity of about  $3E-17$ , four orders of magnitude beyond the current best limit.

The conversion electron has a monoenergetic signature at  $\sim 105$  MeV and is identified by a high-resolution straw tracker and an electromagnetic calorimeter (EMC). The EMC is composed of 1348 pure CsI crystals, each one read by two custom SiPMs, arranged in two annular disks. It should achieve  $\sim 10\%$  energy resolution and 500 ps timing resolution for 100 MeV electrons while maintaining high levels of reliability in a harsh operating environment with high vacuum, 1 T B-field and radiation exposures up to 100 krad and  $10^{12}$  n\_1MeVeq/cm<sup>2</sup>.

The calorimeter technological choice and the design of the custom electronics, cooling and mechanical systems were validated through an electron beam test on a large-scale prototype (Module-0) and extensive test campaigns that characterised and verified the performance of crystals, photodetectors, analogue and digital electronics. This included hardware stress tests and irradiation campaigns with neutrons, protons, and photons. A series of vertical slice tests with the final electronics was carried out on the Module-0 at LNF along with implementation and validation of the relevant calibration procedures.

The production phase of all calorimeter components is completed apart for the digital electronics that is still underway. The two disks have been fully assembled, with a full integration and test of all the analogic sensors and electronics. We are now progressing on the insertion of the digital electronics. We will summarise the construction and assembly phases, the QC and the calibration tests performed in the assembly area as well as the installation and commissioning plans of the final disks in the Mu2e hall.

## Collaboration

## Role of Submitter

I am the presenter

**Primary authors:** GIOVANNELLA, Simona (INFN - LNF); MISCETTI, Stefano (Istituto Nazionale di Fisica Nucleare)

**Presenter:** GIOVANNELLA, Simona (INFN - LNF)

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