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## **Modular and Custom SiPM for the Mu2e Electromagnetic Calorimeter**

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The Mu2e electromagnetic calorimeter has to provide precise information on energy, time and position for  $\sim 100$  MeV electrons. It is composed of 1348 un-doped CsI crystals, each coupled to two large area Silicon Photomultipliers (SiPMs). A modular and custom SiPM layout, consisting of a  $3 \times 2$  array of  $6 \times 6$  mm<sup>2</sup> UV-extended monolithic SiPMs, has been developed to fulfill the calorimeter requirements and a pre-production of 150 prototypes has been provided by three international firms (Hamamatsu, SensL and Advansid). A detailed quality assurance process has been carried out on the photosensor pre-production and on the first production batches: the breakdown voltage, the gain, the quenching time, the dark current and the Photon Detection Efficiency (PDE) have been determined for each monolithic cell of each SiPMs array.

A sample from each vendor has been then exposed to neutrons generated by the Elbe Positron Source facility (Dresden), up to a total fluency of  $\sim 8.5 \times 10^{11}$  n<sub>1 MeV</sub>/cm<sup>2</sup>. The test results are also shown. The dependence of the dark current on the device temperature and on the applied bias voltage has been evaluated as well.

This paper also presents an electrically induced annealing technique that provides a partial recovery of the SiPMs damaged by neutrons.

**Primary author:** Dr SARRA, Ivano (INFN)

**Presenter:** Dr SARRA, Ivano (INFN)

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