



Contribution ID: 35

Type: Poster

Production and Quality Assurance of Mu2e Silicon PhotoMultipliers

Thursday, 20 September 2018 17:30 (15 minutes)

The Mu2e electromagnetic calorimeter is composed of un-doped CsI crystals coupled to large area Silicon Photomultipliers (SiPMs). A custom SiPM layout consisting of 2 series of $3 \times 6 \times 6 \text{ mm}^2$ UV-extended monolithic SiPMs has been developed. So far, the production of 4000 pieces is ongoing and a detailed Quality Assurance (QA) process is being carried out on each monolithic SiPMs with an automatized test station that allows to test up to 20 photosensors together. We present the design of the test station and the measurement techniques, as well as a summary of the results obtained from the first tested batches.

Summary

The Mu2e electromagnetic calorimeter provides precise information on energy ($\sigma_E/E < 10\%$), time ($\sigma_t < 500 \text{ ps}$) and position ($\sigma_x \sim 1 \text{ cm}$) for 100 MeV electrons. It is composed of 1348 un-doped CsI crystals of $34 \times 34 \times 200 \text{ mm}^3$ dimension, each coupled to two large area Silicon Photomultipliers (SiPMs). A modular and custom SiPM layout consisting of a 3×2 array of $6 \times 6 \text{ mm}^2$ UV-extended monolithic SiPMs has been developed to fulfill the Mu2e calorimeter requirements. The configuration readout of 2 series of three monolithic SiPMs has been selected to overcome the issues related to the parallel connection that, due to the large capacitance, could spoil the pileup rejection and the energy and time measurements. After pre-production, we have selected Hamamatsu as vendor and the production of 4000 pieces is ongoing. A detailed Quality Assurance (QA) process is being carried out on each monolithic SiPMs with an automatized test station, designed by INFN Pisa, used for the determination of the breakdown voltage, the gain and the dark current at three temperatures (-10 C , 0 C and 20 C). Up to 20 SiPMs can be tested at the same time. We present the design of the test station and the measurement techniques, as well as a summary of the results obtained from the first tested batches of photosensors.

Primary author: MORESCALCHI, Luca (INFN - Pisa)

Presenter: MORESCALCHI, Luca (INFN - Pisa)

Session Classification: Posters

Track Classification: Production, Testing and Reliability