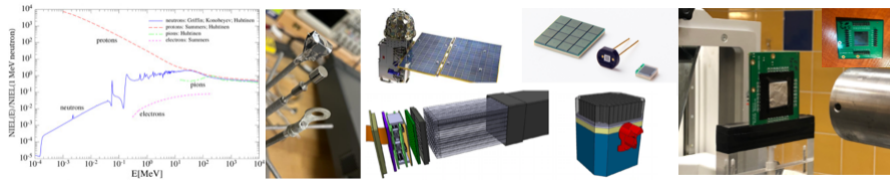


SiPM Radiation: Quantifying Light for Nuclear, Space and Medical Instruments under Harsh Radiation Conditions



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Irradiation Studies for the Mu3e Tile detector

Tuesday, 26 April 2022 13:40 (25 minutes)

The Mu3e experiment at PSI is designed to search for the CLFV decay $\mu^+ \rightarrow e^+ e^+ e^-$ with a sensitivity of 10^{-16} . To reduce the combinatorial background from muon decays while efficiently identifying 3-electron final states, a scintillating-tile detector with a required timing resolution < 100 ps and efficiency close to 100% is under development.

The Irradiation damage of SiPMs to be used in the tile detector (MPPC S13360) were investigated by exposing the sensors to the decay electrons from stopped muons at the PiE5 beamline at PSI.

For the SiPMs irradiated with a dose up to 1.57×10^{11} 1 MeV neq/cm², corresponding to 70% of the maximum dose of the Mu3e Phase I run, the dark current increased by a factor 10^3 .

We will report on the irradiation campaign performed, measurements of dark current and impact on annealing at different temperatures, as well as measurements of the time resolution of SiPM+Tile matrices after irradiation, studied in test beam measurements at DESY.

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