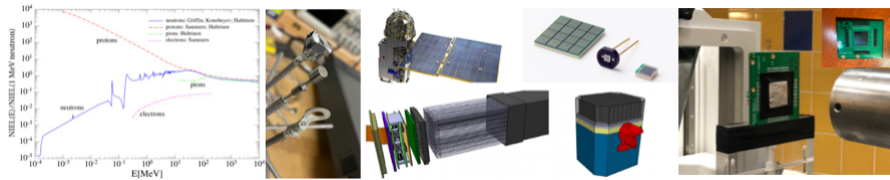


SiPM Radiation: Quantifying Light for Nuclear, Space and Medical Instruments under Harsh Radiation Conditions



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SiPM neutron hardening with Cf-252 for space environments

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A single SiPM Hamamatsu S13360-6050PE was irradiated with an isotopic Cf-252 source at the NIST Californium Neutron Irradiation Facility (CNIF) to evaluate damage for the POLAR-2 polarimeter, as a first approach to evaluate the damage produced by atmospheric neutrons in space. The source has a diameter of 7.7 mm and its activity at the time of the irradiation was 1.688×10^7 neutrons per second. The SiPM was located at 2.3 cm away from the source center in several irradiation periods without gamma shielding. The estimated neutron fluence delivered to the SiPM during the first irradiation after 1 hour of exposition was estimated to be 9.04×10^8 per cm^2 . A increase of the dark-current of the SiPM measured immediately after 1 hour of irradiation was observed to be more than 280 times in comparison with previous measurements at same temperature and polarization conditions. Additional measurements and characterization of the irradiated SiPM and a non-irradiated SiPM are also discussed in this work with the intention of providing clues about the usability of the damaged SiPM to generate the scientific results expected by the project.

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