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ABSTRACT
In recent years, silicon photomultiplier (SiPM) technology is getting attention from various applications due to its low cost, immunity to magnetic field, compactness and ruggedness. However, its applicability in experiments with harsh radiation environments is still limited due to lack of corresponding radiation damage studies. A typical 10-year lifetime operation in a typical Small Angle Neutron Scattering experiment [1] with an acceptable PDE degradation [2] has already been reported, and in this study, the timing resolutions of SiPMs before and after exposure with cold neutrons (5 Å) were compared. For this purpose, two analog SiPMs, developed by SensL and Hamamatsu, and a digital SiPM manufactured by Philips Digital Photon Counting were irradiated up to a dose of 6E12n/cm2 at the KWS-1 instrument of the Heinz Maier-Leibnitz Zentrum (MLZ) in Garching.
The used measurement system consists of a 403 nm Laser with a pulse width of 45 ps FWHM, and an oscilloscope (40 GS/s, 14 GHz) for data acquisition. During the characterization campaign, a time resolutions has been measured using ˜500 photon pulses impinging on the SiPMs, which were kept under constant temperature of 21 ℃. The first result of SensL SiPM show no significant difference in jitter values before and after irradiation up to a dose of 1.9E12 n/cm2. The performed tests provide an insight into feasibility of implementing SiPM based fast and efficient scintillation light detectors for applications such as neutron time-of-flight scattering experiments.

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