Contribution ID: **30** Type: **not specified**

# Radiation damage and mitigation strategies for the SiPM of the ePIC-dRICH detector at the EIC

The dual-radiator (dRICH) detector of the ePIC experiment at the Electron-Ion Collider (EIC) will be equipped with silicon photomultipliers (SiPM) sensors. SiPMs have excellent performance for efficient photodetection in high-magnetic field environments, but they are very sensitive to radiation damage. Rigorous testing is needed to ensure that their dark count rates (DCR) are kept under control over the years of running. The DCR can be maintained to an acceptable rate by reducing the SiPM operating temperature and by recovering the radiation damage with high-temperature annealing cycles. We present an overview of the current status of the R&D performed on significant samples of SiPM sensors. Proton and neutron irradiation tests have been performed at the Trento Proton Beamline Facility and at the INFN LNL-CN accelerator, respectively. The goal was to study the performance of the devices with increasing non-ionising energy loss (NIEL) doses up to $10^{11}$ 1-MeV neq/cm$^2$, the device recovery with long high-temperature annealing cycles and the reproducibility of the performance in repeated irradiation-annealing cycles. We also studied the use of the self-heating capabilities of the SiPM to exploit the Joule effect as an effective way to perform the high-temperature annealing "in-situ".

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