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R&D efforts to mitigate radiation damage in SiPMs for the dual-radiator RICH at the EIC

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SiPMs are the baseline photodetector technology for the dual-radiator RICH detector at the EIC. They offer significant advantages being insensitive to the high magnetic field at the expected location. However, SiPMs are not radiation tolerant.

The current R&D tests whether the increase in DCR can be mitigated to maintain single-photon performance with current SiPM technology in a moderately hostile (< 10^{11} 1-MeV n_{eq}/cm^2) radiation environment . Irradiation campaigns have been performed on commercial and prototype sensors to quantify radiation damage and recovery. Different mitigation strategies (cooling, annealing, gating) have been tested. The main recovery strategy plans to use high-temperature cycles delivered via SiPM Joule self-heating.

Upcoming and future R&D will consolidate the strategies towards the successful exploitation of SiPMs for RICH at the EIC. These activities could be considered within DRD4. There is also significant interest in R&D contributions on new SiPM developments (ie. backside illumination, 3D integration).

Requested length

10 minutes

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