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Microlens-enhanced SiPMs for the LHCb SciFi tracker Upgrade II: update and recent results

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The Scintillating Fibre (SciFi) tracker has been operated in the current LHCb experiment design during LHC Run 3 and will continue to take data until the end of Run 4. The high radiation environment damages the detector parts and reduces the over-all light yield, compromising the required hit efficiency. Moreover, the LHCb Upgrade II will see the addition of timing information in different subdetectors, with the need of an adequate amount of detected light to ensure the requested performance. Microlens-enhanced Silicon PhotoMultipliers (SiPMs) allow to improve photon-detection efficiency in the SciFi tracker upgrade. From the first prototypes and R&D phase (presented in 2022), simulation studies and new production iterations have perfected the detector design and results show an improvement up to 22% for the photon-detection efficiency and light yield, a reduction of external cross-talk by 40% and better time resolution, compared to conventional coated SiPMs.

Primary experiment

LHCb

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