

Performance evaluation of a CMS Outer Tracker PS module before and after irradiation

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The LHC is about to enter the High Luminosity phase (HL-LHC) with a luminosity of $5\text{--}7.5 \times 10^{34} \text{ cm}^{-2} \text{s}^{-1}$ and a center-of-mass energy of 14 TeV. This phase will significantly increase the available data and impose tougher conditions on the detectors. To meet these new challenges, the CMS outer tracker will be updated with the new 2S and PS modules. Each module consists of a pair of silicon sensors: two strip sensors for the 2S module and one pixel and one strip sensor for the PS module. These modules are designed to withstand radiation and provide transverse momentum information to the L1 trigger. A PS module was studied at Fermilab to evaluate its efficiency, noise, and transverse momentum selection before and after exposure to radiation levels comparable to those expected in CMS during the HL phase. The most significant results from recent test beams are presented here, highlighting the module's performance both pre- and post-irradiation.

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