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Performance of the PS module for particle pT discrimination in the CMS Phase-2 Outer Tracker

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The Large Hadron Collider will undergo a luminosity upgrade targeting a peak instantaneous luminosity ranging from 5 to 7.5x10^{34}cm^{-2}. The overall goal of the High Luminosity LHC (HL-LHC) is to achieve 3000 to 4000 fb^{-1} proton collisions at a 13 to14 TeV center of mass energy. Due to the hard environmental condition in the HL-LHC, the outer tracker of the CMS experiment will also require adequate changes called Phase-2 upgrades. The strip tracker that is currently in the detector will be replaced with new modules, one of which is the pixel-strip (PS) module. This module features both a pixel and a strip silicon sensor.
The module can correlate hits from high momentum particles on the two sensors in order to create short track segments called stubs. The PS module was tested at the Fermilab Test Beam Facility, where half of each sensor was irradiated in order to mimic the harsh conditions found in the HL-LHC. The experiment was designed in order to evaluate the module's accuracy in presenting tracking information, p_T discrimination capabilities, and performance at the irradiation levels found in the HL-LHC. In this talk, I will present the results from the test beam that took place at Fermilab. I will also discuss the performance of the module before and after irradiation above the target fluence 1.4x10^{15} $_{neq} \cdot$ cm^2, and a special focus will be given to the stub reconstruction efficiency.

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