

Results from the Pilot Run of the Pixel Luminosity Telescopes, a Luminosity Monitor for CMS Based on Single-Crystal Diamond Pixel Sensors

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The Pixel Luminosity Telescopes (PLT) is a dedicated luminosity monitor for CMS based on single-crystal diamond sensors. It is designed to measure the bunch-by-bunch relative luminosity to high precision. It consists of a set of small angle telescopes each with three planes of single-crystal diamond pixel sensors. The full PLT will be installed in CMS for the first full energy operation of the LHC in 2014. Currently, one quarter of the PLT is installed in a forward region of CMS where it has been operating since the beginning of this year's run. This is the first operation of a diamond pixel tracking detector in a high energy physics experiment and is providing the first data on diamond pixel sensors under high particle rate in a high radiation environment. We will report on the results obtained during this pilot run including the dependence of the pulse height and the efficiency on particle rates up to several tens of MHz and the long term time dependence of the detector performance under the high radiation exposure. These studies provide a unique characterization and an essential understanding of diamond detectors important both for the operation of the PLT and for the possible use of diamond sensors in the pixel detector upgrades for high luminosity running of the LHC.

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