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CMS Physics Performance with Precision Timing

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As part of the Phase II upgrade program, the Compact Muon Solenoid (CMS) detector will incorporate a new timing layer designed to measure minimum ionizing particles (MIPs) with a time resolution of ∼30 ps. Precision timing will mitigate the impact of the challenging levels of pileup expected at the High Luminosity LHC. The time information assigned to each track will enable the use of 4D-vertexing which will render a 5-fold pile-up reduction, thus recovering the current conditions. Precision timing will also enable new time-based isolations and improved b-tagging algorithms. All of this translates into a ∼20% gain in effective luminosity when looking at di-Higgs boson events decaying to a pair of b-quarks and two photons. We present the expected improvements in physics performance with precision timing with the upgraded CMS detector.

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