

Using precision timing information in high rate and high pileup conditions

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High energy particle collider experiments are facing ever more challenging conditions, operating at today's accelerators capable of providing instantaneous luminosity of $10^{34} \text{ cm}^{-2}\text{s}^{-1}$ and above. The high center of mass energy, the large number of simultaneous collision of beam particles in the experiments and the very high repetition rates of the collision events pose huge challenges. They result in extremely high particle fluxes, causing very high occupancy in the particle physics detectors operating at these machines. A precise timing information with a precision of around 10 ps and below is seen as a major aid in the reconstruction of the physics events under such challenging conditions. In this talk I will review the efforts of the LHC collaborations to augment the timing performance of their detectors during future upgrade campaigns. To utilize precision timing for the event reconstruction in a high rate and high pileup environment as expected at the high luminosity LHC and at future hadron colliders. Different detector technologies allowing precision timing measurements will be discussed and their potential benefit will be illustrated with a particular focus on tracking.

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