

Precision timing detectors for high luminosity hadron colliders

Adi Bornheim
Caltech

Current and future high energy physics particle colliders are capable to provide instantaneous luminosities 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 occupancies in the particle physics detectors operating at these machines. To reconstruct the physics events, the detectors have to make as much information as possible available on the final state particles. I will discuss how timing information with a precision of around 10 ps and below can aid the reconstruction of the physics events under such challenging conditions. I will discuss various options how the CMS detector could be upgraded to achieve such a timing performance. In particular I will describe how the calorimeter upgrades could be utilized to enhance the timing precision of the detectors to the level of a few 10 ps.