Laboratório de Instrumentação e Física Experimental de Partículas

LIP Seminar

Thursday, 4 February, 11h30

Precision Timing with the CMS MTD Barrel Timing Layer for HL-LHC

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The Compact Muon Solenoid (CMS) detector at the CERN Large Hadron Collider (LHC) is undergoing an extensive Phase II upgrade program to prepare for the challenging conditions of the High-Luminosity LHC (HL-LHC). A new timing detector in CMS will measure minimum ionizing particles (MIPs) with a time resolution of 30-40 ps for MIP signals at a rate of 2.5 Mhit/s per channel at the beginning of HL-LHC operation. The precision time information from this MIP Timing Detector (MTD) will reduce the effects of the high levels of pileup expected at the HL-LHC, bringing new capabilities to the CMS detector. The time information assigned to each track will enable the use of 4D reconstruction algorithms and will further discriminate interaction vertices within the same bunch crossing to recover the track purity of vertices in current LHC conditions. The MTD will consist of barrel and endcap timing layers, BTL and ETL respectively. The BTL sensors are based on LYSO:Ce scintillation crystals coupled to SiPMs with TOFHIR ASICs for the front-end readout. In this talk I will present motivations for precision timing at the HL-LHC and an overview of the MTD BTL design including ongoing R&D studies targeting enhanced timing performance and radiation tolerance.

Location: Videoconference - Zoom
https://indico.lip.pt/event/869/
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