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Sommario	The second decade of Large Hadron Collider operations, from about 2020 onwards, envisages a remarkable increase in collider instantaneous luminosity, one order of magnitude above the project one. This luminosity increase presents several challenges to the LHC experiments. The present Tracker of the Compact Muon Solenoid experiment must be replaced with a system providing excellent tracking quality at higher luminosities, as well as Tracking Trigger inputs to the existing "Level 0" CMS Trigger system at the full 40 MHz bunch-crossing rate. The minimal requirements for a Tracking Trigger would be the capability to confirm the presence of high-pT tracks associated with Calorimeter and/or Muon Level 0 Triggers. The ability to provide effective isolation criteria may also be required, and would in any case substantially improve the Trigger performance. Maintaining the data rates generated by Tracking Trigger inputs within a manageable bandwidth requires sensor modules able to locally sparsify the data. Measuring at detector module level the track direction in the transverse plane, and hence deriving its transverse momentum, is the most promising solution to provide such a detector-embedded data reduction feature. These so-called "pT-modules"' would only transmit to the Level 1 Trigger "stubs", pairs of correlated hits in two closely separated sensors, derived by tracks with pT above a given threshold. To exemplify, a 2 GeV/c threshold would cut data rate of more than a factor 10, hence

	providing a data rate well within the capabilities of present data links. The pT-modules design discussed in this work consists of two, closely spaced segmented silicon sensors, featuring both pattern hit correlation across the module and a single hit position resolution high enough to compute stubs with the required accuracy to resolve track directions despite a lever arm of about only 1 mm. A concept Tracker layout, the so-called "Long Barrel", consisting in an Outer Tracker completely built out of pT-modules, has been proposed. The Long Barrel Tracker is particularly flexible in simulation studies of Tracking Trigger as it allows for information from several layers of the Tracker to be combined in a projective geometry. For this reason, it is meant as a testing ground to compare the performance of different designs and configurations. The Long Barrel layout also allows the generation of even more structured Trigger Objects such as "tracklets", consisting of pairs of stubs in opportunely paired layers, which can in turn be used as seeds to generate "Level 1 tracks", including even more stubs. The choice of stacked sensors for pT-modules has been recently strengthened by test beam results obtained with novel prototypes of Monolithic Active Pixel Sensors and reported in this thesis. The developement of Tracking Trigger simulations is also presented as a major step towards the design of a realistic Trigger capable Tracker upgrade. A particular challenge for the Trigger system is given by tau leptons produced in many rare processes searched at the LHC. The performance of a Tracking Trigger on final states with tau leptons will be crucial at very high luminosities and is presented at the and of this document as the natural step forward in the work on the subject.
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