



Contribution ID: 135

Type: **not specified**

Phase-2 Upgrade of the CMS Tracker

Monday 2 July 2018 16:25 (15 minutes)

The Large Hadron Collider (LHC), which is the world's largest and most powerful particle accelerator, will be upgraded from 2024 to mid 2026 to become the High Luminosity LHC (HL-LHC). This will enable instantaneous peak luminosities of $7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ and allow CMS to collect integrated luminosities of the order of 300 fb^{-1} per year and up to 3000 fb^{-1} during the HL-LHC projected lifetime of ten years. The HL-LHC is expected to run at a centre-of-mass energy of 14 TeV and with a bunch spacing of 25 ns. The CMS detector needs to be substantially upgraded during LS3 in order to exploit the increase in luminosity provided by the HL-LHC. This upgrade is referred to as the CMS Phase-2 Upgrade. The increase in radiation levels requires improved radiation hardness, while the larger pileup and associated increase in particle density requires higher detector granularity to reduce occupancy, increased bandwidth to accommodate higher data rates, and improved trigger capability to keep the trigger rate at an acceptable level while not compromising physics potential. The entire silicon tracking system, presently consisting of pixel and strip detectors, will be replaced.

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Session Classification: Nuclear and Particle physics