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The Phase 2 upgrade of CMS Outer Tracker

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The Large Hadron Collider(LHC) at CERN will undergo major upgrades to be able to deliver peak instantaneous luminosities of about $5 - 7.5 \times 10^{34} \text{cm}^{-2} \text{s}^{-1}$ by 2026. This High Luminosity up-grade of the LHC (HL-LHC) is expected to deliver a total of about $3000 - 4500 \text{fb}^{-1}$ during ten years of operation. At the nominal instantaneous luminosity of the HL-LHC, a single bunch crossing will produce 140-200 proton-proton collisions. The current CMS outer tracker and the CMS Phase-1 pixel detector will not be able to survive the harsh operating conditions of the HL-LHC period.

The CMS experiment will install a new silicon tracker for HL-LHC. The Phase-2 Outer Tracker\,(OT) will have increased radiation hardness, higher granularity and track separation, compatibility with higher data rates, and a longer trigger latency. In addition, the OT will provide tracking information to the Level-1 trigger, allowing trigger rates to be kept at a sustainable level without sacrificing physics potential. To achieve this, the OT will be made up of modules with two closely spaced sensor readout by a single ASIC which can correlated data from both sensors to form short track segments called stubs which will be used in tracking at Level-1. In this contribution, the design of the CMS Phase-2 OT, the technological choices and highlights about research and development activities will be reported.

Submission declaration

Redundant (overlaps with already published)

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