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The Phase-2 upgrade of the CMS Outer Tracker

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The Large Hadron Collider at CERN will undergo a major upgrade in the Long Shutdown 2 from 2025-2027. The so-called High Luminosity LHC (HL-LHC) is expected to deliver peak instantaneous luminosities of about $5-7.5 \times 10^{34}$ cm⁻²s⁻¹ and an integrated luminosity of about 3000-4500 fb⁻¹ during ten years of operation. In order to fully exploit the delivered luminosity and to cope with the demanding operating conditions, the whole silicon tracking system of the CMS experiment will have to be replaced. The Phase-2 Outer Tracker (OT) will have an increased radiation hardness, a higher granularity, and will be able to cope with larger data rates. In addition, the OT will provide tracking information to the Level-1 trigger. To achieve this, each module will consist of two closely spaced sensors, which are connected to the same readout chips. The readout chips correlate data from both sensors for a rough transverse momentum measurement. This novel concept allows to keep trigger rates at a sustainable level without sacrificing physics potential. Furthermore, the Phase-2 OT will use evaporative CO₂ cooling and a DC-DC conversion based powering scheme to keep the material budget small. In this contribution, the design of the CMS Phase-2 Outer Tracker, highlights about research and development activities, and the present status of the project will be presented.

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Collaboration / Activity

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