

## Design and construction of the CMS Outer Tracker for the HL-LHC Upgrade

*Monday 4 December 2023 17:40 (20 minutes)*

The High Luminosity LHC (HL-LHC) is expected to deliver an integrated luminosity of  $3000 - 4000 \text{ fb}^{-1}$  by the end of 2039 with peak instantaneous luminosity reaching to about  $5 - 7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ . During the Long Shutdown 3 period, several components of the CMS detector will undergo major changes, called Phase-2 upgrades, to be able to operate in the challenging environment of the HL-LHC. The current silicon outer tracker has to be replaced with a new one for operating in the HL-LHC period. The Phase-2 Outer Tracker (OT) will have high radiation tolerance, higher granularity and capability to handle higher data rates. Another key feature of the OT will be to provide tracking information to the Level-1 trigger, allowing trigger rates to be kept at a sustainable level without sacrificing physics potential. For this, the OT will be made out of modules which have two closely spaced sensors read-out by a common front-end ASIC, which can correlate hits in the two sensors creating short track segments called "stubs". The stubs will be used for tracking in the L1 trigger stage. In this contribution, the design of the CMS Phase-2 OT, the technological choices and first results with pre-production devices will be reported.

### Submission declaration

Original and unpublished

**Primary author:** ROEWERT, Nicolas Maximilian (RWTH Aachen University (DE))

**Co-author:** ECKLUND, Karl (Rice University (US))

**Presenter:** ROEWERT, Nicolas Maximilian (RWTH Aachen University (DE))

**Session Classification:** Day 1 - Session 4

**Track Classification:** Detector concepts