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## CMS Outer Tracker Upgrade

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The LHC machine is planning an upgrade program which will smoothly bring the luminosity to about  $5 - 7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$  in 2028, to possibly reach an integrated luminosity of  $3000 - 4500 \text{ fb}^{-1}$  by the end of 2039. This High Luminosity LHC scenario, HL-LHC, will require an upgrade program of the LHC detectors known as Phase-2 upgrade. The current CMS Outer Tracker, already running beyond design specifications, and CMS Phase-1 Pixel Detector will not be able to survive HL-LHC radiation conditions and CMS will need completely new devices, in order to fully exploit the highly demanding conditions and the delivered luminosity.

The Phase-2 Outer Tracker (OT) is designed in order to ensure at least the same performances of the Phase-1, in terms of tracking and vertexing capabilities, at the high pileup (100-200 collisions per bunch crossing) expected at HL-LHC. The Phase-2 OT will have higher radiation tolerance, granularity and track separation power with respect to the Phase-1. Moreover the Phase-2 OT will have also trigger capabilities since tracking information will be used at L1 trigger stage. In order to achieve such capabilities Phase-2 OT should be able to perform a data reduction directly on front end electronics. This has been implemented through the  $p_T$  discriminating module concept, each OT module will be composed by two silicon sensors, with a small spacing, read out by a single ASIC which correlates data from both sensors selecting tracker "stubs". These stubs will then be used to perform the tracking for L1 trigger.

This report is focusing on the replacement of the CMS Outer Tracker system, describing new layout and technological choices together with some highlights of research and development activities.

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