

Exploring the quality of latest sensor prototypes for the CMS Outer Tracker Upgrade

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The LHC will reach its nominal luminosity soon which will be further increased by a factor of five to seven during the third Long Shutdown (LS3) around 2024. This significant increase in luminosity along with the increasing radiation damage requires a complete renewal of the CMS Outer Tracker, the Tracker Phase-2 Upgrade, during the LS3. Two types of modules named PS- and 2S-module, both featuring trigger capabilities, will be implemented during this upgrade.

Milestones in the sensor R&D for the 2S-modules as well as first characterisation results are presented. AC-coupled silicon strip sensors of two vendors, produced on 6-inch as well as on 8-inch wafers, are considered. Both of them feature the demanded n-in-p technology. The wafer layout is presented which features new test structures improving the quality assurance at the manufacturer and in the laboratory is described. Results from the electrical characterization as well as first beam test results comprising full scale 2S-module prototypes are discussed. Concluding long-term behaviour studies under varying temperatures and humidities provide insights into the robustness under environmental stress.

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