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## Development of Radiation Damage Model using TCAD tools for Irradiated Silicon Sensors

During the high luminosity upgrade of LHC the CMS tracking system consisting of silicon pixel and strip sensors will face intense radiation environment than the present system was designed for. It is important to complement the measurements of the irradiated Si strip sensors with device simulation, which helps in both the understanding of the device behavior and optimizing the design parameters needed for future CMS Tracker Upgrade. Thus, one of the important ingredient of the device simulation is to develop a radiation damage model incorporating both bulk and surface damage. In this work, we demonstrate the development of radiation damage model using TCAD tools, which successfully explains the recent measurements like leakage current, depletion voltage, interstrip capacitance and interstrip resistance, and provides an insight into the performance of irradiated Si strip sensors.

### Summary

A systematic development of a new radiation damage model, for hadron irradiation, will be presented. This model consider surface and bulk damage simultaneously and is capable of explaining the strip sensors and diode measurements like, leakage current, depletion voltage, interstrip resistance, interstrip capacitance etc. It further provide insight into observed good interstrip resistance with low p-stop/p-spray insulation structures for proton irradiated n+p strip sensors. This model was used to simulate the sensor properties for CMS Phase-II tracker upgrade campaign.

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