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Sensor R&D for CMS Tracker upgrade

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For the luminosity upgrade of the LHC, CMS is starting ambitious and diversified sensor research and development projects. The increased particle fluence implies more stringent requirements on the radiation hardness; the increased occupancy requires higher granularity; the need of moderating the material budget while increasing the number of readout channels suggests the use of thinner detectors. Different silicon bulk materials and detector concepts are investigated. Two 6-inch multi-project wafers with two different companies are in the planning, containing dedicated strip, short strip and pixel structures; the materials under investigation are floatzone n-type, floatzone p-type, Magnetic Czochralski n- and p-type, with different thicknesses. Other projects are studying n- and p-type epitaxial structures, as well as non-planar methods like Silicon-On-Insulator and 3D structures. In parallel with the research on the sensors, different connection concepts are evaluated, especially relevant for the short strip detectors.

Author: Dr KOYBASI, Ozhan

Presenter: Dr KOYBASI, Ozhan

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