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Characterization of prototype silicon microstrip detectors for the CMS Tracker upgrade

Plans are being made to upgrade the LHC luminosity above the design value of 1034cm-2s-1. At this level the existing silicon microstrip modules (outside of the pixel volumes) will no longer be able to cope with the increased occupancy and long-term radiation damage. The proposed poster outlines an extensive program by the CMS collaboration to identify a suitable replacement for the existing sensors. As part of this effort a large number of wafers have been procured from a leading vendor. These include both 200 μm thick FZ and MCz wafers as well as 150, 100, and 75 μm epitaxially-grown wafers, all with n-bulk and p-bulk versions. A variety of sensor geometries including pixel, long pixel, and strip, with different choices for pitch and implant widths, have been included each wafer. In preparation for irradiating a large number of sensors with protons and neutrons, the sensors are currently being characterized (IV, depletion voltage, breakdown voltage, inter-strip capacitance, signal-to-noise, etc.) in a number of laboratories. This work describes the effort at the Fermi National Accelerator Laboratory, which includes probing of individual sensors, source testing of sensors that have been bonded to CMS hybrids, and a recent study in the Fermilab Beam Test Facility.

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