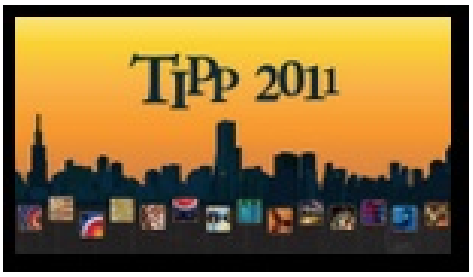

Contribution ID: **107** Type: **Oral Presentation**

Silicon sensor R&D for an upgraded CMS Tracker in HL-LHC

Thursday 9 June 2011 14:20 (20 minutes)

FNAL is participating in a CMS Tracker silicon sensor R&D project for the second phase of the planned LHC upgrade (HL-LHC). We present results from the tests conducted at Fermilab to determine the characteristics of thin, single-sided silicon sensors acquired from HPK in order to establish optimal material and strip/pixel features for the upgrade of the CMS Tracker. In addition to increased radiation hardness requirements, the HL-LHC sensors will need to be both robust and relatively low-cost given the very large number of sensors required for the full Tracker. Over one hundred 6 inch wafers were produced by HPK with substrates and thicknesses: MCZ 200 μm, FZ 200 μm, FZ 100 μm, EPI 100 μm, and EPI 75 μm. Sensor geometries included pixel, long pixel, and strips of both n-type and p-type with both p-stop and p-spray isolation. We studied capacitance (to back plane, inter-strip), depletion, and breakdown voltages of the sensors with various thickness and pitches. We also studied the signal-to-noise ratio using a radioactive source. The test setups have the option for repeating the tests at low temperatures, after irradiation of the sensors with protons and neutrons.

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Session Classification: Semiconductor Detectors

Track Classification: Semiconductor Detectors