

Test beam results of irradiated silicon sensor with modified ATLAS pixel implantations

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Planar n⁺-in-n silicon pixel sensors with modified n⁺-implantations were designed in Dortmund to cause electrical field strength maxima to increase charge collection after irradiation and thus increase particle detection efficiency. Baseline for the pixel designs was the pixel layout of the IBL planar silicon pixel sensor with a 250 μm × 50 μm pitch.

The modified pixel designs and the standard IBL design are placed on one sensor which can be read out by an FE-I4 to test and compare the different pixel designs.

After irradiation with protons and neutrons respectively the performance of several sensors is tested in test beam measurements.

The relative performance of the pixel designs is different for sensors irradiated to the same fluence with neutrons in Sandia compared to sensors irradiated with neutrons in Ljubljana or with protons at CERN PS.

In this talk the current status of our investigation is presented to explain these significant differences which are visible in in-pixel efficiency maps.

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