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## First Annealing Studies of Irradiated Silicon Sensors with Modified ATLAS Pixel Implantations

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In Dortmund, planar silicon pixel sensors were designed with modified n+ -implantations and produced in n+ -in-n sensor technology. Baseline for these new designs was the layout of the IBL planar silicon pixel sensor with a  $250\ \mu\text{m} \times 50\ \mu\text{m}$  pitch.

The different implantation shapes are intended to cause electrical field strength maxima to increase charge collection after irradiation and thus increase particle detection efficiency.

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

At the IWORD 2018, the measurements of sensors irradiated with neutrons at different research reactors were presented and showed different results. Unintended annealing during irradiation was considered as an explanation for the observed differences in hit detection efficiency.

In this talk, the results of first annealing studies of a neutron irradiated sensor in Ljubljana will be presented which are now in agreement with the results of a sensor irradiated at Sandia. The results of neutron irradiated sensors will be compared to measurements of proton irradiated sensors before and after annealing.

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