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# Enhanced Lateral Drift Sensors: resolution studies

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Future experiments in particle physics need a few-micrometer position resolution in their tracker and vertex detectors. Silicon is today's material of choice for high-precision detectors and offers a high grade of engineering possibilities. Instead of scaling down pitch sizes, which comes at a high price for an increased number of channels, our new sensor concept seeks to improve the position resolution by increasing the lateral size of the charge distribution already during the drift in the sensor material. To this end, it is necessary to carefully engineer the electric field in the bulk of this so-called enhanced lateral drift (ELAD) sensor. This is achieved by implants deep inside the bulk which influence the charge carriers' drift paths.

In order to find an optimal sensor design, detailed simulation studies were conducted using SYNOPSIS TCAD. The geometry of the implants, their doping concentration and the position inside the sensor were optimised. The electric field simulation shows that the deep p- and n- implants create repulsive and attractive areas inside the bulk of the sensor.

Finally, to estimate the position resolution of an ELAD sensor, test beam simulations using the AllPix2 software have been performed using the realistic electric field profile from the TCAD simulations.

Results of the geometry optimisation are shown realising an optimal charge sharing and hence position resolution. A position resolution of a few micrometers is expected by using deep implants without relying on a Lorentz drift or tilted incident angle. Results on the resolution studies are presented.

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