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Enhanced lateral drift sensors: simulation and production.

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One of the main goals in the R&D of tracker sensors technology is to improve the position resolution of the particle detector. There are two ways to achieve this. The most common way is to decrease the size of the read-out cell, i.e. to decrease the pixel or strip pitch. But in this case, the number of channels increases, which requires an increased bandwidth for the read-out. The other possibility to improve the position resolution of sensors is to increase the lateral size of the charge distribution already during the drift in the sensor material. In this case, it is necessary to carefully engineer the electric field in the bulk of this so-called enhanced lateral drift (ELAD) sensor. This new design is using implants deep inside the bulk. Implants constitute volumes with different values of doping concentration in comparison to the concentration in the bulk. This allows for modification of the drift path of the charge carriers in the sensor. The development of such a detector requires a good understanding of the entire production process. In order to find an optimal geometry and design of the detector, it is necessary to make reliable simulations, which are conducted using SYNOPSYS TCAD. The parameters that need to be defined are the geometry of the implants, their doping concentration and the position inside the sensor. For a realistic modeling of such implants, process simulations are used to provide input of their production-determined shapes. The production of these sensors will be based on the simulations results. In this talk, the concept of ELAD is described. TCAD simulations and a description of the production process are presented.

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