Special Issue

3D Pixel Sensors and Detectors

Message from the Guest Editors

In order to increase the radiation hardness of silicon radiation detectors, sensors with a three-dimensional array of electrodes that penetrate into the detector bulk were proposed by S. Parker et al. in 1999. The advantage of this geometry is to set the maximum drift and depletion distance by the electrode spacing rather than by the detector thickness as in the more conventional planar technology. The advantage of this structure includes short collection distances, fast collection times, and low depletion voltages, depending on the electrode diameter and pitch chosen. The success of this geometry obtained combining VLSI and MEMS (Micro Electro Mechanical Systems) technologies was clear when they were selected for the innermost layer of the ATLAS IBL experiment. The detectors were produced matching the pixel readout electronic geometry and have been in use since 2014 at CERN experiments.

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