



Contribution ID: 125

Type: Poster

The DEPFET Active Pixels for Belle II - Resolution in 50 micron Thinned Sensor

Thursday, 24 May 2012 13:31 (0 minutes)

Detectors for experiments at future colliders –e.g. the Super B-factories or the ILC –require excellent vertexing performance for the layers close to primary interaction region. These detectors need to enable excellent vertex reconstruction, achievable by a highly granular pixel detector, together with fast readout and minimum material budget to reduce the impact on the measurement due to multiple Coulomb scattering. The latter requirement severely constrains the sensor thickness, power consumption, and the design of the detector services.

The DEPFET technology of active pixel sensors is among the frontier detector concepts for high energy physics at high luminosities. It has been chosen by the new Belle II experiment for the SuperKEKB collider at KEK. In-pixel amplification enables to use very thin low noise sensors. The frontend electronics and the data acquisition concepts supporting the integration into Belle II are finalized and the two-layer detector (PXD) will be ready for acquiring data from 7.6 million pixels in 2015.

The operating principle of the PXD with its expected performance in Belle II will be presented, focusing on the resolution properties of the planned 75 micron sensor. First successful tests in pion beams at CERN with prototype DEPFET pixel matrices, thinned down to 50 microns, show that the target resolution requirements are met. These results will be presented, together with a detailed analysis of the in-pixel resolution distributions.

for the collaboration

On behalf of the DEPFET Collaboration

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Session Classification: Solid State Detectors - Poster Session

Track Classification: P5 - Solid State Detectors