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Ultra-transparent DEPFET pixel detectors for future electron-positron experiments

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The DEPFET Collaboration develops highly granular, ultra-thin pixel detectors for outstanding vertex reconstruction at future collider experiments. A DEPFET sensor, by the integration of a field effect transistor on a fully depleted silicon bulk, provides simultaneously position sensitive detector capabilities and in-pixel amplification. The characterization of the latest DEPFET prototypes has proven that a comfortable signal to noise ratio and excellent single point resolution can be achieved for a sensor thickness of 50 micrometers. The close to final auxiliary ASICs have been produced and found to operate a DEPFET pixel detector of the latest generation with the required read-out speed. A complete detector concept is being developed for the Belle II experiment at the new Japanese super flavor factory. DEPFET is not only the technology of choice for the Belle II vertex detector, but also a solid candidate for the ILC. Therefore, in this paper, the status of DEPFET R&D project is reviewed in the light of the requirements of the vertex detector at a future electron-positron collider.

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