

The ultralight mechanics and cooling system of a DEPFET-based pixel detector for future colliders

Wednesday 17 June 2015 11:00 (30 minutes)

The DEPFET Collaboration develops highly granular, ultra-thin active pixel detectors for high-performance vertex reconstruction at future e+e- collider experiments. A fully engineered vertex detector design, including all the necessary supports and services and a novel ladder design with excellent thermo-mechanical properties, is being developed for the Belle II experiment. The self-supporting all-silicon ladder combined with the low power density of the DEPFET array and a cooling strategy that relies on forced convection of cold air to cool the active area allow for a very thin detector (0.2% X0). In the contribution, a detailed description of the full engineering system will be explained, including the latest finite-element simulations as well as thermal mockup measurements. In addition, a novel cooling concept based on wafer integrated micro-mechanized channel cooling and a low mass petal solution for the forward region of the ILC detector concepts will be presented.

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