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A DEPFET Pixel Detector for Belle II Experiment

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The B factories BABAR and Belle made important contributions to our understanding of CP violation and confirmed the CKM mechanism. In more than ten years of successful operation, the Belle experiment at the asymmetric e^+e^- collider KEKB recorded about 10^9 $B\bar{B}$ decays and achieved a world record luminosity of $2.11 \times 10^{34} \text{ cm}^{-2}\text{s}$. The Belle II collaboration plans to upgrade the KEKB accelerator towards a Super Flavor Factory with an even 40x higher luminosity by spring 2014. A major part of the upgrade is the installation of a two layer active pixel detector based on fully depleted field effect transistors (DEPFET). The DEPFET pixel detector combines an excellent signal to noise ratio for thinned sensors with low power consumption. The current mechanical design of the detector achieves stable operating conditions with an overall material budget of 0.2% radiation length in order to minimize the impact of multiple scattering for low-pt tracking. The current background estimates indicate a pixel occupancy below 1% in the innermost layer. This presentation provides an overview of the Belle II pixel detector including results from recent irradiation campaigns and first lab measurements with thinned DEPFET sensors.

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