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Calibration and alignment of the Belle II tracker

The physics goals the Belle II experiment require an exceptionally good alignment of all the components of the Belle II tracker. The Belle II tracker is composed of the DEPFET based pixel silicon detector, four layers of double sided silicon strip detector, a low material budget drift chamber, all three operating in a solenoidal 1.5 T B field, which is affected by the final focusing system of the accelerator. Each component of these three components must be aligned with an accuracy significantly better than the point resolution of the detector that for the PXD is order of 10 microns. The Belle II alignment software is based on the Millepede II package and uses cosmics and collision data to constrain the weak modes. The performance of the alignment algorithms was tested on the phase 2 collision data collected during spring 2018. Good alignment of the vertex detector was essential to demonstrate the nano-beam collision scheme of the accelerator and check the quality of the impact parameter resolution, which is essential for time-dependent CP violation studies at the B factory.

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Track Classification: 3: Advanced usage of tracks