

Alignment and Calibration of the Belle II Detector

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In spring 2018 the SuperKEKB electron-positron collider at High Energy Accelerator Research Organization (KEK, Tsukuba, Japan) will deliver its first collisions to the Belle II experiment. The aim of Belle II is to collect a data sample 50 times larger than the previous generation of B-Factories taking advantage of the unprecedented SuperKEKB design luminosity of $8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$. The Belle II detector will allow to conduct precise measurements in the harsh collider environment, probing for signs of physics beyond the standard model at the precision frontier.

In order to deliver data suitable for physics analysis, the detector has to be properly calibrated on a regular basis. Among other calibrations the detector alignment plays a key role. For example, precise measurements of time dependent CP-violation rely on the accurate alignment of the new vertex detector, as well as on the determination of the beamspot position and size. To automatize the calibration procedures and manage the large amount of data and processing power needed for detector calibration, a software framework has been developed which allows to define the complete workflow and to execute it on a computing cluster. The framework integrates the Millepede II algorithm to solve the large minimization problem emerging in the track-based alignment and calibration of the pixel and strip detector, the central drift chamber, and the muon system.

The first collision data will allow to test and to further improve and tune the alignment and calibration procedures. Although the vertexing capabilities will be limited due to the installation of only a small slice of the full vertex detector, the commissioning phase will allow to test most of the alignment procedure features and to prepare for the full operation.

We will present the results achieved during the first data taking, the experience gained and the plans for the first physics run with the full detector.

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