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Improvement of the vertex detector resolution in the Belle II experiment

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The Belle II Silicon Vertex Detector (SVD) is part of the Super B factory composed of the asymmetric energy e^+e^- collider SuperKEKB and the Belle II experiment and is used to identify decay vertices as well as reconstruct tracks and provide particle identification information.

In order to correctly reconstruct tracks, the position of the hits created by charged particles passing through the detector needs to be known with precision. It is also important to estimate the resolution of the hits position measurement, in order to correctly propagate the error on hits position to track fitting, as well as developing methods to optimize this resolution.

Since 2019 and the start of the data taking, the SVD has demonstrated a reliable and highly efficient operation, even running in an environment with harsh beam backgrounds that are induced by the world's highest instantaneous luminosity. The cluster position resolution has been estimated in simulation, then on data using a dataset of approximately 16 fb^{-1} integrated luminosity collected by Belle II. While the SVD performance is already very good, there is still room for improvement of the estimation of the cluster position resolution.

This talk will present the latest studies to improve the hit position estimation in the vertex detector by correcting charge couplings between silicon strips, a refined estimation of cluster position errors as well as the work done on simulation to better describe the detector, in order to improve data and simulation agreement.

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