

The Mechanical Design of the Belle II Silicon Vertex Detector

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Belle II will be the only experiment at the SuperKEKB collider in Tsukuba, Japan. Its innermost part surrounding the beam pipe - the "Vertex Detector" (VXD) - is composed of a 2-layer "Pixel Detector" (PXD) and a 4-layer "Silicon Vertex Detector" (SVD) made from double-sided silicon strip detectors. Because of the relatively low collision energy (10.58 GeV), multiple scattering and thus material budget are of utmost importance.

The Belle II SVD uses the largest available silicon sensors (made from 6" wafers) in order to reduce the number of structural elements. The sensors are mounted onto ladders, which are cylindrically arranged around the collision point. The main structure of the ladders are "ribs" made from a sandwich composite of carbon fiber plies with an Airex foam core. All the heavy materials are assembled outside of the 17...150° polar angle acceptance region. Inside, the averaged material budget of the ladders is 0.6% X₀, which is dominated by the sensor material and also includes the highly efficient two-phase CO₂ cooling.

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