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Thermal test and monitoring of Belle II vertex detector

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The Belle II, as an upgrade to the former Belle detector is undergoing at SuperKEKB which aims to increase the peak luminosity to 8×1035cm−2s−1. The two-layer DEPFET pixel vertex detector (PXD) and the surrounding four-layer silicon strip detector (SVD) consist the Belle II vertex detector (VXD). In order to guarantee acceptable operation conditions for the VXD and the surrounding Belle II drift-chamber (CDC) the cooling system must be capable of removing a total heat load from the very confined VXD volume of about 1 kW plus some heat intake arising from the SuperKEKB beam pipe. Evaporative two-phase CO2 cooling in combination with forced air flow has been chosen as technology for the VXD cooling system.

To verify and optimize the VXD cooling concept, we build a full VXD mock-up with the same mechanical and thermal properties as the finial detector, the humidity in the volume is monitored with fiber optical sensors. In this talk we mainly present the measurements to the PXD thermal mock-up.

Summary

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