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Towards the integration of the MicroVertex Detector in the PANDA experiment.

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The fixed target experiment PANDA is one essential part of the FAIR facility in Darmstadt and is going to study the interactions of antiproton beams, featuring unprecedented quality and intensity, on protons and on nuclei. It includes the Micro Vertex Detector (MVD) [1], as innermost detector of the tracking system, specially able to detect secondary vertices of short-live particles. Due to the forward boost the MVD layout is asymmetric with four barrels surrounding the interaction point and six disks in the forward direction. The innermost layers are composed of hybrid epitaxial silicon pixels and the outermost ones of double sided silicon strips, with about 10^7 pixels and 2×10^5 strips channels.

PANDA features a triggerless architecture, therefore the MVD has to run with a continuous data transmission at a high interaction rate (about 10^7 int./s) where hits have precise timestamps (the experiment clock is 155.52 MHz). In addition the energy loss of the particles in the sensor should be measured.

To cope with these requirements custom readout chips are under development for both pixel and strip devices. The powering and cooling of the readout are challenging since the MVD volume is limited by the surrounding detectors and the routing is only foreseen in the backward direction. Support structures are made of carbon fibers and high thermally conductive carbon foam with embedded cooling pipes beneath the readout chips is integrated.

The presentation is focused on the technological aspects of the design and the integration of this detector in PANDA.

[1] PANDA Collaboration, Technical Design report for the PANDA Micro Vertex Detector, arXiv:1207.6581 v2, 2011

Summary

The presentation is focused on the technological aspects of the design and the integration of the Micro Vertex Detector in the PANDA experiment.

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