

# The PANDA MVD Strip Detector

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The PANDA experiment at the future FAIR facility will study annihilation reactions of antiprotons. The Micro-Vertex-Detector as part of the tracking system will permit precise tracking and detection of secondary vertices. It is made of silicon pixel detectors and double-sided silicon strip detectors.

Aspects of the development for the strip detector will be presented: Evaluation of prototype sensors as well as the readout chain, ranging from the front-end for the trigger-less readout concept of PANDA over the Module-Data-Concentrator ASIC at stave level to the off-detector electronics will be shown.

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## Summary

The future international accelerator facility FAIR (Facility for Antiproton and Ion Research) at GSI, Darmstadt will host multiple experiments. A focus will be on experiments with antiprotons. The PANDA (antiProton ANnihilation at DArmstadt) experiment will study annihilation reactions between an antiproton beam and a stationary gas target. The PANDA detector, composed of a target and forward spectrometer to nearly cover the full solid angle, consists of different sub-detectors for tracking, particle identification and calorimetry. The Micro-Vertex-Detector (MVD) as part of the tracking system will facilitate precise tracking and detection of secondary vertices.

The MVD will be composed of silicon pixel detectors and double-sided silicon strip detectors. The strip part will contain approximately 200,000 channels that need to be read out with highly integrated front-ends. The unique data acquisition concept of the PANDA detector demands that every sub-detector is able to detect hits without requiring an external trigger. Hence the deployed front-end electronic shall be qualified to distinguish physical events from noise and send digital hit information along with a precise time stamp to the event builder. Moreover the detector must be capable to sustain and handle high interaction rates of up to 20 million collisions per second.

Several aspects of the development for the MVD strip detector will be presented: Prototypes of double-sided strip sensors were evaluated in beam tests, electrical characterization measurements at probe stations as well as irradiation tests for radiation hardness. The readout chain for the strip detector will be composed of the self-triggering front-end chip, a Module Data Concentrator ASIC at the stave level and the GigaBit Transceiver (GBT) link to send the data via optical link to the off-detector site. There, the  $\mu$ TCA based MVD Multiplexer Board (MMB) further concentrates the data to be send to FPGA-based compute nodes for data processing.

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