



Contribution ID: 319

Type: Poster

The PANDA Barrel DIRC: From Design to Assembly

Tuesday 18 February 2025 16:10 (20 minutes)

The Barrel DIRC (Detection of internally reflected Cherenkov light) detector is a key component of the particle identification system for the PANDA experiment, designed to provide at least 3 standard deviations of separation between charged pions and kaons up to at least 3.5 GeV/c for the polar angle range of 22 to 140 degrees.

The detector consists of 16 optically independent sectors. Each sector comprises a bar box and a readout box. One bar box contains 3 radiator bars, each consisting of 2 synthetic fused silica bars of 120 cm length glued end-to-end and a flat mirror at the forward end of each bar. A three-layer spherical lens focuses the Cherenkov photons on the rear surface of a 30 cm-deep fused silica expansion volume, equipped with 8 microchannel-plate photomultiplier tubes (MCP-PMTs), read out using fast FPGA-based electronics.

Following the completion of the Technical Design Report in 2017, the component series production started in 2019. The DIRC radiator bars were fabricated by Nikon Corp., Japan in 2020/21.

While the detailed quality assurance measurements are ongoing at GSI, the focus is now on the mechanical design and assembly procedure.

A method to glue the DIRC bars to each other and to the lens has been developed and prototypes of the container for the DIRC bars and the prism expansion volume have been produced by industry from low-Z material.

The goal is to build a vertical slice of one Barrel DIRC sector in preparation for a possible beam test in 2026.

Primary experiment

PANDA at FAIR

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Session Classification: Coffee & Posters A

Track Classification: Cherenkov Detectors