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The PANDA Barrel DIRC

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The PANDA experiment at the international accelerator Facility for Antiproton and Ion Research in Europe (FAIR), Darmstadt, Germany, will address fundamental questions of hadron physics using $\bar{p}p$ annihilations. Excellent Particle Identification (PID) over a large range of solid angles and particle momenta will be essential to meet the objectives of the rich physics program. Charged PID in the target region will be provided by a Barrel DIRC (Detection of Internally Reflected Cherenkov light) counter.
The Barrel DIRC, covering the polar angle range of 22-140 degrees, will provide a π/K separation power of at least 3 standard deviations (s.d.) for charged particle momenta up to 3.5 GeV/c. The design of the Barrel DIRC features narrow radiator bars made from synthetic fused silica, an innovative multi-layer spherical lens focusing system, a prism-shaped synthetic fused silica expansion volume, and an array of lifetime-enhanced Microchannel Plate PMTs (MCP-PMTs) to detect the hit location and arrival time of the Cherenkov photons. Detailed Monte-Carlo simulations were performed, and reconstruction methods were developed to study the performance of the system. All critical aspects of the design and the performance were validated with system prototypes in a mixed hadron beam at CERN. In 2020 the PANDA Barrel DIRC project advanced from the design stage to component fabrication. The series production of the fused silica bars was completed in 2021 and the first MCP-PMTs were delivered in 2022.
We will discuss the validation of the technical design using prototypes and present results from the quality assurance measurements for the bars and MCP-PMTs.

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