

The Barrel DIRC Detector for the PANDA Experiment at FAIR

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The PANDA experiment at the international accelerator Facility for Antiproton and Ion Research in Europe (FAIR) near GSI, Darmstadt, Germany will address fundamental questions of hadron physics.

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 for the barrel region of the PANDA target spectrometer will be provided by a DIRC (Detection of Internally Reflected Cherenkov light) detector.

The PANDA Barrel DIRC will cover the polar angle range of 22-140 degrees and separate charged pions from kaons for momenta between 0.5 GeV/c and 3.5 GeV/c with a separation power of at least 3 standard deviations. The design is based on the successful BABAR DIRC and the SuperB FDIRC R&D with several important improvements to optimize the performance for PANDA, such as a focusing lens system, fast timing, a compact fused silica prism as expansion region, and lifetime-enhanced Microchannel-Plate PMTs for photon detection. We will discuss the baseline design of the PANDA Barrel DIRC, based on narrow bars made of synthetic fused silica and a complex multi-layer spherical lens system, and the potentially cost-saving design option using wide fused silica plates, and present the result of tests of a large system prototype with a mixed hadron beam at CERN.

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