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The Endcap Disc DIRC for PANDA at FAIR

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The PANDA detector at the future FAIR facility at GSI is planned as a fixed-target experiment for proton-antiproton collisions at momenta between 1.5 and 15 GeV/c. It will be used to address open questions in hadronic physics. In order to achieve a sufficient particle identification, two different DIRC detector concepts have been developed. This talk will cover the Endcap Disc DIRC detector which is placed at the forward endcap of the PANDA target spectrometer and will provide a separation of pions and kaons with a separation power of 3 standard deviations up to a momentum of 4 GeV/c for polar angles from 5° to 22°.

The most important component of the DIRC detector is a 2cm thin fused silica radiator plate that is divided into 4 identical quadrants. The surfaces are polished with high precision in order to guarantee little photon losses by total reflection and conserve the Cherenkov angle during propagation through the optical system. Intrinsic chromatic errors will be minimized by the implementation of an optical filter. The readout system consists of 96 readout elements with focusing optics and attached MCP-PMTs to focus the photons that are produced by the Cherenkov cone of the traversing particle and acquire their position and timing information.

This new detector concept requires the development of dedicated reconstruction and particle identification algorithms which permit an efficient analysis of the measured time-correlated photon patterns. Time and event based simulations with a Monte-Carlo simulation framework have been used to validate the PID requirements of the DIRC counter. Additionally, an online reconstruction algorithm prototype for the purpose of event-filtering has been designed and tested in combination with an FPGA board. For analyzing the detector performance, the decay of a glueball candidate into two kaons resp. pions has been studied.

Selected session

Instrumentation

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