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The DIRC Detectors at the PANDA Experiment

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The PANDA experiment at the new FAIR facility at GSI will perform charmonium spectroscopy and search for gluonic excitations using high luminosity antiproton beams from 1.5 to 15 GeV/c. To accomplish the scientific goals a high performance kaon/pion separation up to 4 GeV/c is mandatory. Because of space limitations the main components of the particle identification system will consist of DIRC (Detection of Internally Reflected Cherenkov light) detectors residing inside a magnetic field of up to 2 Tesla. A barrel DIRC with fused silica radiator bars will surround the target at a radial distance of 48 cm and will cover a polar angle range of 22 to 140 degrees; an endcap DIRC built of a segmented fused silica disc of 210 cm diameter will be installed in the forward region to cover the polar angles from 5 to 22 degrees.

There are several challenging issues with the PANDA DIRCs to be discussed in this presentation: the photon rates can reach a few MHz/cm² and photon detection inside the magnetic field is required. The limited space available for both DIRCs enforces the use of special optics to focus the Cherenkov photons onto the readout planes, its final choice being still under investigation. For the high rate signal readout several frontend options are being studied.

The different design and readout options for both DIRCs were investigated with small scale prototypes using particle beams at CERN, DESY and GSI. Important results of these test runs will be presented and compared to simulations.

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