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A Ring Imaging Cherenkov Detector for CLAS12

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The energy increase of Jefferson Laboratory's Continuous Electron Beam Accelerator Facility (CEBAF) to 12GeV promises to greatly extend the physics reach of its experiments. This will include an upgrade of the CEBAF Large Acceptance Spectrometer (CLAS) to CLAS12, offering unique possibilities to study internal nucleon dynamics. For this, excellent hadron identification over the full kinematical range is essential. In the base equipment this is achieved in CLAS12 by Cherenkov and time-of-flight counters. However improved hadron identification at momenta from 3 to 8GeV/c can be obtained by the installation of a Ring Imaging Cherenkov (RICH) detector into the forward region of CLAS12. There are several design constraints imposed upon the detector, in order that it complies with geometry and performance requirements. A novel hybrid imaging design incorporating mirrors, aerogel radiators and Hamamatsu H8500 multianode photomultiplier tubes has therefore been proposed. Depending upon the incident particle track angle, Cherenkov light will either be imaged directly by a proximity imaging setup or detected after a series of reflections and multiple passes through the aerogel. This paper presents an overview of the detector design and current status, including recent small- and large-scale prototype results from cosmics and mixed hadron beam tests respectively.

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CLAS12

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