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A DIRC-like Time-of-Flight Detector for Particle Identification

Friday 19 July 2024 17:02 (17 minutes)

In this report, we present the development of a new type of particle identification (PID) detector, the DIRC-like time-of-flight (DTOF). The DTOF detector uses the arrival time of Cherenkov photons to achieve better PID performance than a classic TOF detector with the same time resolution. It features fast response, a wide momentum range of PID, compact structure, ease of operation and maintenance. We have developed a DTOF prototype as well as its readout electronics. The prototype has a fused-silica radiator of 0.56 mˆ2 and 672 MCP-PMT readout channels. We will describe the detector design, reconstruction algorithm, radiator production, MCP-PMT base circuit , and readout electronics of the prototype. We will also present the results of cosmic ray tests of the prototype, which show a 22 ps time resolution for MIP, corresponding to a pi/K separation power of better than 4 standard deviations for momentum up to 2 GeV/c with a flight distance of 1.5m and a collision time jitter of 40ps.

Alternate track

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Yes

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