

Cathode Drift Chambers for the GlueX experiment at Jefferson Lab

We report on detailed studies of the performance of a 12,500-channel drift chamber system with both cathode and wire readout operational in HallD in Jefferson Lab (Virginia,USA).

The GlueX experiment uses tagged polarized photon beams from the recently upgraded 12GeV Continuous Electron Beam Accelerator Facility to search for hybrid mesons with exotic quantum numbers, as predicted by lattice QCD.

The identification of such mesons requires full reconstruction of all charged particles and photons with high position and momentum resolution. Twenty-four planar drift chambers of 1m-diameter are located within the bore of a 2T-solenoid.

The chambers have cathode strips on both sides of the wire planes, allowing to reconstruct tracks with high density close to the beam line.

The cathodes/wires are readout by 125MHz-flashADCs/F1-TDCs.

The use of only 2-micron thick copper strips and a light frame made mostly of Rohacell with g10 skin (to allow detection of low energy photons by outside e.m. calorimeters) posed technical challenges.

The emphasis of the report is on the resolution studies. As the two cathode planes and the wire register the same avalanche, this allows uniquely to study the charge induction process and the strip resolution.

In addition, we report on results with two modified chambers with a drift gap of 3cm studying the possibilities for cluster counting as PID and also to be used as a transition radiation detector for e/pi separation.

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