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Particle Identification Using a Ring Imaging Cherenkov Counter[1]
JUSTIN GOODWILL, FATIHA BENMOKHTAR, Duquesne University, ANDREY KIM, Jefferson Lab, RICH COLLABORATION — The construction of the Ring Imaging Cherenkov Counter (RICH) at Jefferson Lab aims to significantly enhance the particle identification capabilities of Hall B's CLAS12 spectrometer, particularly with respect to the separation of pions, kaons, and protons in the 3-8 GeV/c momentum range. The RICH functions by detecting a ring of Cherenkov radiation emitted by particles going faster than the speed of light in an aerogel radiator using a vast array of 8x8 multi-anode photomultiplier tubes (MAPMTs). More specifically, using a time-to-digital converter (TDC), each pixel in the 8x8 grid of the MAPMTs will measure whether or not there is a photon hit and will subsequently time-stamp it. My work in this project consisted of implementing parts of the RICH geometry in Geant4 Monte-Carlo (GEMC) simulation software. With the output from the simulation of particles passing through the detector, I built a graphical user interface (GUI) monitoring system that can display the TDC data on the RICH detector. Based on the output of the GEMC simulations, this GUI will show the location and number of hits for each pixel. Once the actual detector is constructed, the monitoring system will be used to record the hits on the detector.

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