Software Development for a Ring Imaging Cherenkov (RICH) Detector
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Introduction
The “strange” quark is being explored as a possible contributor to the spin property of the proton. A Ring Imaging Cherenkov (RICH) detector at Jefferson National Accelerator Facility (JLab) will identify kaons, which contain the strange quark, as products of proton collisions. I have assisted in developing a graphical user interface (GUI) for visual monitoring of the RICH.

Approach
The software (below) reconstructs the PMT geometry (above) and maps the hits using a color scale. It also generates histograms for the readouts of a selected PMT. The code was integrated into a monitoring software suite for the CLAS12 collection of detectors (left), where the RICH is being installed.

Outcomes
The program can connect to a database to monitor the readout in real time or import individual data files for analysis. This will provide an intuitive way for physicists at all levels of programming experience to work with RICH data.

Purpose
CHERENKOV RINGS
The RICH operates on Cherenkov radiation. A particle excites atoms in a radiator material, which emit a ring-like formation of photons. The angle of this emission is used in determining the type of particle which created it.

Future Work
I am currently at JLab performing tests on the RICH PMTs. The RICH group has received funding to build a second detector in the spring of 2018, to be installed alongside the current one. The new detector will require additional software and/or modifications to the current scripts.

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