Implementing a Java Based GUI for RICH Detector Analysis

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Motivation

The CLAS12 detector at Jefferson Lab is undergoing an upgrade. One of the improvements is the addition of a Ring Imaging Cherenkov (RICH) detector to improve particle identification in the 3-8 GeV/c momentum range. Approximately 400 multi anode photomultiplier tubes (MAPMTs) are going to be used to detect Cherenkov Radiation in the single photoelectron spectra (SPS). The SPS of each pixel of all MAPMTs have been fitted to a mathematical model of multiple parameters for 4 HVs and 3 ODs. Some of these parameters can be used to evaluate the PMTs performance and placement in the detector. To help analyze data when the RICH is operational, a GUI application was written in Java. The GUI pulls the values from the a database and produces histograms and graphs for a selected PMT at a specific HV and OD. This way we can easily view a PMT's performance and help with data analysis and ring reconstruction once the RICH is functional.

MySql Database

Classes:
- Database.java – used to abstract the JDBC functions from the user. Basic database manipulation (add, remove, create tables, etc.)
- DatabasePMT.java – subclass of the Database class. Used primarily to access the MAPMT database and manipulate the data.
- DBAnalysisGraphs.java – used to plot the parameters from a DatabasePMT object.

Methods from the Database class used to add, delete, and create database entries.

GUI Implementation

Below: Simulated Cherenkov ring overlaid on the developed GUI.

Future Work

The next step is to move the MAPMT data from the MySQL database to the CLAS12 Calibration Constants Database (CCDB) and connect it with the GUI so that scientists at TJNAF can easily view and use the data when the RICH is operational.

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