Josh Kaisen   12 August 10

Sumer Internship Summary

I spent 8 weeks in Virginia working at Thomas Jefferson National Accelerator Facility. While at JLab, I assisted the Qweak collaboration on their study of the weak charge of the proton. Qweak is comprised of nearly one hundred physicists. The group I specifically worked for had six members including myself, this was the OU group. The OU group's main focus is the data analysis (DAQ) and analysis software development, I worked on both aspects.

For the first half of my internship however, I found myself working purely on the analysis software development portion. More specifically I worked on the analysis of data from a device called the BPM Cavity, by adding it to the analysis program the entire collaboration uses in the C++ programming language. At the time I had very little experience programming (one entry level programming in C class and work under Ken Hicks, during this I didn't really program but learned a lot of Linux commands), but I picked it up quickly and gained a fairly acute understanding of the language, a very useful skill to have acquired.

After working on the Cavity I programmed a GUI (Graphical User Interface) to show raw data histograms in a simple to use format. Next, I worked entirely on root scripts and calibration aspects of the experiment. My first script was originally meant to extract pedestal values from the electronics. Pedestal values are the noise that the electronics detect when there is actually no physical event occurring, so removing this excess noise helps create more precise measurements. This script evolved into a script that could pull out what ever information the user desired from devices in their map file of choice. This script was used to get the pedestal of about fifty devices and can continue to be used in the future because the program isn't hardcoded.

After working on this script I came to my final project and last script. This script was designed to calibrate the BCMs (Beam Current Monitors) in order to evaluate the rates of electrons hitting the target. Because this script needed to be completed very quickly I worked with the OU group's post doc Jeong Han Lee. Han and I also helped take the data for this calibration while working under the local expert in calibration from midnight to six. Intermittent with working on these scripts I plotted data for the run coordinator Dave Mack. This data was used to gain an understanding of the noise in the BCMs and the difference in noise between the BCMs that were meant to be correlated.

I also took 4 shifts at the Counting House, the facility that monitors the beam and where data is taken and analyzed. Most of my shifts were from 4 PM to midnight and during one of my shifts I got to take the position of shift leader. While I was shift leader I had to answer phones and communicate back and forth with the Machine Control Center, the place in charge of managing the accelerator beam. I also had to monitor when the beam was on, off, acceptable, or unacceptable and whether the experiment was ready or not.

I really enjoyed my summer at JLab and would gladly come back again in the future. My favorite part of the experience was my time in the counting house because of the amount of energy there due to the experiment going wrong every other hour. The people were all amazingly nice and taught me a lot about experimental physics. I think the most valuable knowledge I gained from this summer was the knowledge of exactly how an experiment is conducted and how it is an active process during which a great deal can go incredibly wrong or fantastically right.