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RCNP Week 7 Report

This week at the RCNP, we had to begin both cleaning up the H-course and returning it to the condition it was in last month, as well as begin analyzing the data that we have collected during our experimental time using the cyclotron. Along with analyzing the data that we have collected, we were also permitted to keep the germanium detector in the H-course longer so that we could conduct the efficiency calculation. To do this, we had to disassemble the end of the beam line and place, first, Europium-152, then Barium-133 sources on the target viewer to recreate the same absorption that the gamma rays coming from our initial target experienced. Once this was completed, we used the same amplifier settings we used for our experiment and recorded enough data to have $>2\%$ uncertainty in our efficiency calculation. This is important to do because it allows us to know what the efficiency curve and values would look like depending on the gamma ray energy.

After we had conducted the efficiency measurements, we had to begin cleaning and returning any wires or items we had used to set up our experiment to their respective locations. We successfully brought back the germanium detector, along with the frame and housing that has held it in place back to the room which we got it from, and we have also returned all the wires and measurement tools back to where we borrowed them from.

For our analysis, we must continue using our ROOT and Python scripts to further analyze the statistics, uncertainty, FWHM, and many other pieces of information from our data. Once we have done this, we will be able to construct a level scheme of the Dysprosium-158 that was created using the cyclotron. This can be completed once we have proven, via our data, that the different photopeaks we have detected from the Dysprosium are indeed in coincidence with each other.

Our specific experiment is brand new which means we will also be able to begin writing a paper to be published after we have finished the analysis and completed our final presentation. For the next week, which will be our last here at the RCNP, our plan is to finalize our analysis and continue to work on our final presentation which will take place on July 26th.