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RCNP Week 3 Report

The focus of this week's work was to work on getting the coincidence circuit for our angle correlation experiment working. We started the week by testing the modules at hand to understand their processing time, as well as the delay produced by each cable. We did this because when we create our gate with the constant fraction discriminator, we need the signal from the shaping amplifier to be contained within the gate. The delay and processing time from the modules will directly affect this so we had to make sure we could account for any timing changes. We encountered some issues along the way and tested our coincidence circuit with a pulser to see if it worked. The pulser acted as a "fake" source and was used with the CFD to the MCA connected to our PC. After understanding how the circuit worked with the pulser, we used the CFD along with a timing filter amplifier to create the gate which was the correct voltage and time to contain our shaping amplifier signal.

Another method that we used for the coincidence circuit was the MCA setting called "coincidence". In this setting, the MCA accepts 2 channels directly from the PMT to the shaping amplifier and creates a 2D histogram which depicts the coincidence readings, as well as the number of times in which the same two voltages are in coincidence. This method is useful because it eliminates the need for many modules and simplifies the mechanical process. Once we had created several test trials to ensure that we fully understood the processes of each method for coincidence, we decided to test the background rates, coincidence rates, and single channel count rates all with and without the Cobalt-60 source. We chose a distance of 3cm from scintillator to source and made measurements with the scintillators being 180º and 90º from each other to investigate the differences when choosing angles.

This week consisted of many different tests and calibrations to ensure that our settings and methods were both working well and were understood by Jacob, Mukul, and I. We have learned that the beam time for our project will be held on July 12th and we will have access to the germanium detector from July 8th-July 12th. Before we do this part of the experiment, however, we must complete our angle correlation experiment and write a proposal for the next stage.