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RCNP Week 1 report

After arriving at the RCNP facility and attending orientation and a tour of the cyclotron facility, we were all assigned our work for the next two months. My project that I will be working on is with another intern named Jacob Dulya where we will be studying the angle correlation of gamma decay from a radioactive source. This experiment consists of setting up a system with multiple scintillators placed with different angles to a radioactive source which allows us to then test the angle correlations of the gamma decay products and understand the energy levels and characteristics of the material in which we are studying.

We will be working under the supervision of Professors Shinsuka Ota, Nori Aoi, Eiji Ideguchi, as well as a PhD student named Mukul Khandelwal. Our first day consisted of discussion regarding our project as well as a retrieval of the sodium iodide scintillators that we will be using for our initial measurements. In order to understand the basics of our experiment before we continue to cobalt-60, we will be using weak radiation sources of thoriated tungsten electrodes (2% thorium) and NaI scintillators. After retrieving the high voltage power supplies and the NaI scintillators, we tested them in the oscilloscope to make sure they work. Our results showed that 1 of the detectors didn't work, whereas the other 4 worked as intended (with one being slightly more sensitive). We were then able to calibrate the detectors and test their MCA histograms to see if the voltage amplitude and "channel" axis match linearly. To calibrate the detectors, we are using multiple shaping amplifiers to compare two scintillators simultaneously and compare their readouts in the MCA. In the calibration, we were not using a source of radiation which caused the output signals to contain some small unknown peaks which negatively affected the correlation between each scintillator.

Next week, our plan is to begin using the cobalt-60 source to improve the readings we attain via the MCA and, in turn, improve our calibration technique so that we may begin setting up the next modules and the angles for our detectors so that our experiment may continue. Eventually, we are working towards using the cyclotron to study different radionuclides than the initial thoriated tungsten or cobalt-60.