Data Analysis of Neutron Capture on 134Xe

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Neutrinoless double beta decay is a theorized decay process that, if discovered, would lead to a better understanding of the matter-antimatter imbalance in the universe. 136Xe is one of several studied isotopes known to exhibit double beta decay. All of these isotopes have half-lives for double beta decay on the order of 10^{24} years or higher, making the process very rare, additionally complicated by many various other decays possible at the same time. Each of these individual lower decays, with sufficient study, can be excluded from the larger searches for the specific, rare decays. One of these 'background' decays is 134Xe to 135Xe neutron capture. Data for this was taken using the Tandem Accelerator at Triangle Universities Nuclear Laboratory, firing 4.2 MeV and 5.5 MeV neutrons at a Xenon gas. After being irradiated, the gas was taken to the Low Background Counting Facility in the Duke Physics building, placed in front of a detector. The decays were counted using germanium detectors, which are also studied to improve the results of these decay searches. Data analysis was conducted with ROOT and Excel, with the goal of finding a cross-section for that specific interaction.