Neutron Scalar Polarizabilities: Background Simulations for Experimental Extraction via Compton Scattering

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The A2 collaboration at the institute for Nuclear Physics in Mainz Germany is working to experimentally determine nucleon polarizabilities using medium-energy Compton Scattering. The scalar polarizabilities of neutrons are less well known that the protons, due to several challenges; previous work using deuterium targets produced results with large uncertainties. Led by the Mount Allison and Glasgow Groups, the A2 collaboration intend to use a high-pressure, active ^{3}He target to better determine these values using elastic Compton Scattering. The experiment will be run using an incident photon range between 80-200 MeV, and in this energy range, the ^{3}He cross sections are theoretically more sensitive to scalar polarizabilities than deuteron.

In preparation for this experiment, background simulations are done to help determine the expected contamination and this simulated data allows us to optimize the analysis software. This information is used to perform a sensitivity study which allows us to determine the error we can expect from this experiment.