PHYC30170 Physics with Astronomy and Space Science Lab 1; Compton Scattering; Statement of Intent

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I. WHAT IS THE AIM OF THE EXPERIMENT?

The aim of the experiment is to determine the energy of the scattered gamma ray and to measure the differential cross-section for Compton scattering both as a function of the scattering angle.

II. WHAT MEASUREMENTS SHOULD BE MADE AND HOW?

The spectra of the gamma ray after scattering will be measured using a NaI(Tl) detector for angles between 20° and 100° in steps of 5°. The energy and net counts under the photopeak for each angle will be recorded.

III. HOW WILL THE FINAL RESULT BE OBTAINED FROM THE EXPERIMENTAL DATA?

The inverse of the energy of the gamma ray will be plotted against $1 - \cos\theta$ and compared to the theory. The measured differential corss-section will be plotted against the scattering angle and compared to the theory.

IV. WHAT ARE THE MAIN SAFETY CONCERNS WITH THE EXPERIMENT AND PRECAUTIONS THAT SHOULD BE TAKEN?

The main safety concerns with this experiment are pertaining to dealing with radioactive components and high voltage. We are working with ^{137}Cs which emits gamma rays and the photodiode requires high voltage electricity. Care is needed to be safe with both these elements.