COM - Compton Scattering

Signature Sheet

Student's Name _____ Partner's Name _____

Pre-Lab Discussion Questions

It is your responsibility to discuss this lab with an instructor before your first day of your scheduled lab period. This signed sheet must be included as the first page of your report. Without it you will lose grade points. You should be prepared to discuss at least the following before you come to lab:

1. What is Compton scattering? How does the Compton formula relate to a laboratory experiment?

2. To get an idea of the maximum Compton energy shift for the 59.54 keV photons from the 241Am source, calculate the energy shift for a back-scattered photon off of a free electron.

3. Calculate the energy shift for a back-scattered photon off of an aluminum nucleus. How does this compare to the shift from scattering off of an electron?

4. What is a scattering cross-section? How does the Klein-Nishina formula relate to a laboratory experiment?

5. Use the (classical) Thomson total cross section for scattering to estimate the probability of scattering off of a nucleus compared to the probability of scattering off of an electron. [See Melissinos for information on the Thomson cross-section and cross sections in general.]

6. By what means does the CdTe detector detect photons? (Photoelectric effect? Compton scattering? Pair production? Bremsstrahlung?)

Staff Signature _____ Date _____

Completed before the first day of lab? (Circle one) Yes / No

Mid-Lab Discussion Questions

1. On day 5 of this lab, you should have produced a plot of scattered peak energies versus scattering angle, and made an estimate of the electron mass. Show them to a GSI and ask for a signature.

Staff Signature _____ Date _____

Completed by day 5 of lab? (Circle one) Yes / No

Checkpoint Signatures

1. Optimal Energy Range

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2. Apparatus Safety

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3. Data Collection

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4. Radiation Flux

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5. Over-the-Weekend Measurement

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