

Ma 1 - Compton-Effect

Prerequisites:

- Compton-Effect: Some basic relativistic mechanics
- Detector: band model of insulators

Physics:

- Interaction of x-ray and gamma radiation with matter (Photoeffect, Compton Effect and Pair production)
- Inelastic, elastic scattering and absorption
- Differential/Total scattering/absorption cross sections (Klein-Nishina Formula)
- α , β , and γ radiation, electron capture

Technical:

- Handling of radioactive material / radiation safety
- Scintillation detectors (Detector response function, efficiency, resolution and response time) / Photomultiplier
- Coincidence circuits and counting statistics
- Pulse electronics, amplifier and discriminator, gating energy and time, logic modules
- Gamma spectroscopy

Data analysis:

- Energy calibration of scintillation detectors
- Fitting of Gaussian peaks and erf(x) to get peak positions and Compton edge
- Demonstration of Compton formula
- Ratio of random to true coincidences