

Homework#5

1) The magnitude of the charge pulse from proportional counter fluctuates in value from one incident X ray to another, even when the incident X rays all have the same energy, E , those obtained from iron 55 radioactive source.

- a) Consider the detection of 6.0 keV X-rays in an argon- filled PC. What is the standard deviation in the units of keV of these fluctuations if they arise mostly from Poisson fluctuations in a number of ion pairs created by the initial photo-electrons? Assume that these are no escape photons, and consider only the first generation of ion pairs, those created by the several initial photo-electrons with a combined energy of 6.0 keV. What is the fractional energy resolution defined as the FWHM of the response curve divided by the mean energy, at this X-ray energy?
- b) What are the fractional energy resolutions at energies 2 keV and 30 keV?