

Home task 4 – The efficiency in the coincidence channel

In the PET each crystal (detector) is electronically coupled in coincidence with a large number of opposite crystals. Each pair of crystal forms a coincidence channel or a line of response (LOR).

If no object is in the field of view the efficiency of a coincidence channel can be written as

$$\text{Eff (LOR)} = \text{Eff (Detector 1)} * \text{Eff (Detector 2)}$$

Typical detector efficiency of a modern PET is 70%.

If you place a patient in the field of view the efficiency in the coincidence channel will decrease since some of the 511 keV photons will be absorbed or scattered away.

For a patient that is 30 cm wide and 20 cm thick, calculate the efficiencies in the coincidence channels. You can assume that the patient body is equivalent to water. You can find attenuation coefficients in

<http://physics.nist.gov/PhysRefData/XrayMassCoef/cover.html>

