Strip-PET: Concept of TOF-PET scanner based on polymer scintillator strips

Authors:

ABSTRACT
The aim of the poster is to present an idea of a new PET scanner based on strips of polymer scintillators arranged in a large acceptance detector system which may allow a simultaneous diagnostic of a large fraction of human body. Novelty of the concept lies in employing predominantly the timing of signals instead of their amplitudes and using polymer scintillators instead of crystals to detect radiation.

PRINCIPLES OF OPERATION
The proposed solution will allow for the determination of position and time of the reaction of the gamma quanta based on the time measurement. The hit position versus the center of the scintillator (ΔI) is determined based on time difference measured on both sides of the scintillation strip. The time at which gamma quantum hits the module can be determined as an arithmetic mean of times measured on both sides of the module. Position (Δx) along the line of response is determined from time difference between two modules [1].

Fig. 1. Example of the Strip PET diagnostic chamber. Patient would lie inside the barrel, along scintillation strips.

Fig. 2. Energy distribution of electrons scattered in the Compton effect by gamma quanta with an energy shown in the plot. The distributions were made without taking into account the energy resolution, which for the strip detector readout on both sides amounts to about 18% (compared to LSO blocks which energy resolution is about 12%).

REFERENCES

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