Contribution ID: **100** Type: **poster**

Random and scatter noise reduction in PET imaging using entangled annihilation gamma photons with Compton PET pixel detectors

Thursday, 16 September 2021 10:34 (1 minute)

Reduction of random and scatter events contributing to the background on the reconstructed image is important in PET imaging. Two gamma rays from annihilation of para-positronium containing anti-parallel spins are entangled and have orthogonal linear polarization. The orthogonal linear polarization in two correlated photons results in the difference between azimuthal scattering angles of two photons tend to be 90˚. Its correlation shows larger amplitude at polar scattering angle near 81˚. Non correlated photons will show no preferred azimuthal angle difference when one of the photons is scattered before reaching detectors or two photons are not originated from the same annihilation event. In the experiment we take coincidence events from double Compton scattering whose azimuthal angle difference is near 90˚ to get larger proportion of true signals with reduced random and scatter events.
Experiment was conducted to characterize the distribution of azimuthal angle differences in double Compton scattering events with pixelated Ce:GAGG-SiPM detectors forming Compton PET scanner. Octagon shaped 8 arrays were used for the experiment. Measured azimuthal angle indicates strong difference intensity at around 90˚ and low intensity at 0˚ and 180˚ as expected from the theory. These correlations can be applied to the reduction of scatter and random coincidence events and the improvement in PET imaging will be reported.

Title

Your name

Institute

email

kdhkdh0711@gmail.com

Nationality

Primary authors: KIM, Donghwan (University of Tokyo); UENOMACHI, MIZUKI (RIKEN); SHIMAZOE, Kenji (The University of Tokyo); TAKAHASHI, Hiroyuki (The University of Tokyo)

Presenter: KIM, Donghwan (University of Tokyo)

Session Classification: Poster Session 5 (Gas-based Detectors; Medical Applications of Position Sensitive Detectors)

Track Classification: Medical Applications of Position Sensitive Detectors