

# Imaging of X-rays from ortho-positronium decay with J-PET tomograph

*Friday, 19 October 2018 12:30 (30 minutes)*

Standard Positron Emission Tomography (PET) allows to determine spatial and sometimes also temporal distribution of concentrations of selected substances in the body based on production of 2 gamma quanta from  $e^+e^-$  reaction, with energies of 511 keV.

Positron emitted inside the human body can either annihilate directly with one of the electrons or it creates the quasi-bound state of electron and positron called positronium atom.

Imaging of the properties of positronium inside the body may deliver new diagnostic information. J-PET group has developed a way of measuring one of such new parameters [1], but it is necessary to detect positronium decay into 3 photons, which constitutes to about 0.5% of all annihilations.

The energy of photons, due to three body decay, varies from 0 to 511 keV, which implies that J-PET detector needs to be sensitive to hard X-ray region.

In the presentation the feasibility of imaging positronium with X-rays will be discussed as well as initial results from measurements performed during this summer.

[1] P. Moskal et al., "Feasibility study of the positronium imaging with the J-PET tomograph", submitted to PMB, HEP: arXiv:<https://arxiv.org/pdf/1805.11696.pdf>

**Primary author:** Mr NIEDŹWIECKI, Szymon (Jagiellonian University)

**Presenter:** Mr NIEDŹWIECKI, Szymon (Jagiellonian University)

**Session Classification:** X-ray applications in various fields - 1