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## Searches for discrete symmetry violation signals in decays of positronium atoms at J-PET

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The Jagiellonian Positron Emission Tomograph (J-PET) was constructed as the first PET scanner using plastic scintillators. However, it also constitutes a robust photon detector useful for a broad range of experiments involving ortho-positronium (o-Ps) decays into three photons.

We will present an overview of studies performed with o-Ps $\rightarrow$ 3 $\gamma$  decays in J-PET with a view to searching for signals of discrete symmetries violation. The discussed studies will comprise measurements of angular correlations between the photons' momenta and positronium spin direction as well as a new class of operators sensitive to discrete symmetries violation involving photon polarization.

To date, the most precise tests of the CP and CPT symmetries using ortho-positronium decays reached the precision of  $3 \times 10^{-3}$  whereas effects limiting the sensitivity are only expected at the level of  $10^{-9}$ . With an angular resolution and o-Ps polarization control improved with respect to previous measurements, J-PET aims at achieving the sensitivity to CP and CPT violation signals at a precision level of at least  $10^{-4}$ .

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