

## CPT symmetry test in positronium annihilations with the J-PET detector

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Discrete symmetry under the combined transformation of charge, parity, and time reversal (CPT) can be tested in the decays of positronium atom, the lightest bound system built of charged leptons.

Jagiellonian Positron Emission Tomograph (J-PET) device constructed from plastic scintillators, detects the photons originating from electron positron annihilation. This feature enables J-PET to study CPT symmetry in the three photon annihilations of the triplet state of positronium. Signs of violation of the CPT symmetry can be sought as a non-vanishing expectation value of an angular correlation operator that is odd under CPT transformation. Technique to estimate the spin of ortho-positronium and momenta of annihilation photons for single recorded ortho-positronium event allows J-PET to measure the expectation value of CPT symmetry odd angular correlation operator. J-PET measures a broad range of kinematical configurations of ortho-positronium annihilation to three photons and is the first experiment to determine the full range of the CPT-odd angular correlation. The presentation will include the methods of performing the CPT symmetry test using an angular correlation operator which involves the spin and momenta of photons originating from  $o\text{-Ps} \rightarrow 3\gamma$  decay using extensive size positronium production and annihilation chambers with the J-PET detector.

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