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Towards improving the sensitivity of testing CPT symmetry in positronium decays with the Modular J-PET detector

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The Jagiellonian Positron Emission Tomograph is the first plastic scintillator based tomographic device used to test discrete symmetries in the charged leptonic sector [1]. One of such tests is for CPT symmetry, under the combined transformation of charge, parity and time reversal, in the decays of positronium atoms [2]. J-PET performed its first measurement for CPT symmetry test by searching for non vanishing CPT-violating angular correlations between the spin and orientation of decay plane of ortho-positronium (o-Ps) atoms, which is the triplet state of positronium [3, 4]. Sensitivity of testing CPT symmetry with the J-PET detector reaches the precision level of 10^{-4} [4]. Here we will discuss the prospects of improving the sensitivity of this test beyond the level of 10^{-4} by enhancing the photon registration efficiency using a new layer of densely packed plastic scintillators and a spherical annihilation chamber as a positronium production medium [5].

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