

Compton scattering of entangled and decoherent annihilation photons

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At present, positron emission tomography (PET) is one of the most effective instruments for the medical diagnostics. This method is based on detection of two 511 keV gammas produced in positron-electron annihilation in organic tissue. According to the theory, these annihilation photons are in entangled quantum state and have mutually perpendicular linear polarizations. This feature is suggested to be used in future generation of PET-scanners, where the angular correlations of scattered annihilation photons can be applied for suppression of backgrounds and improvement of image quality. It is supposed that the angular correlations are quite different for the scattered annihilation photons in entangled and decoherent quantum states that allows the rejection of decoherent photons and hence to improve the signal/noise factor. Nevertheless, the experimental comparison of Compton scattering of entangled and decoherent annihilation photons was not done till now. We constructed the setup that allows the identification of the quantum state and the study of angular correlations of scattered annihilation photons. First experimental results on Compton scattering of entangled and decoherent annihilation photons are presented.

The speaker is a student or young scientist

Yes

Section

1. Applications of nuclear methods in science and technology

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