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Spatial polarization distribution measurements of gamma rays produced by inverse Compton scattering

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Highly polarized MeV gamma rays, produced by Laser Compton Scattered (LCS) of a polarized laser with an electron beam, offer a unique probe for basic and applied physics research. As the polarization characteristics of these gamma rays vary with the position of the beam cross section, it is essential to understand the polarization properties when using polarized gamma rays * . However, detailed measurements of the two-dimensional spatial polarization distribution have not yet been conducted. In the UVSOR synchrotron facility, a polarimeter was developed to measure the spatial polarization distribution of linearly polarized gamma rays. The polarimeter is based on asymmetry measurements of the Compton scattering cross section. In this conference, we will report on measurement results of the spatial polarization distribution of linearly and circularly polarized LCS gamma-rays. The polarization axis of the polarized gamma rays was clearly measured to vary with scattering and azimuth angle. In the near future, we plan to use the developed polarimeter to also measure the spatial polarization distribution of gamma rays generated by an axially symmetric polarized laser ** .

Footnotes

- Y. Taira, S. Endo, S. Kawamura, et.al, "Measurement of the spatial polarization distribution of circularly polarized gamma rays produced by inverse Compton scattering", Phys. Rev. A 107, 063503 (2023). ** Y. Taira. "Spatial distribution of gamma rays produced by axially symmetric polarized and optical vortex lasers." Phys. Rev. A 110, 043525 (2024).

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