

Development of a gamma-ray detector sensitive to only high-energy gamma-rays/高エネルギーガンマ線にのみ感度を持つ検出器の開発

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Measurement of high-energy gamma radiation in high-dose-rate environments is difficult due to problems such as the dead time of a detector. However, there is a need for measurement techniques under high dose rates, such as radiation detection and nuclear data measurement inside nuclear reactors and in radiation contaminated areas. In particular, this issue must be solved in applications such as critical monitoring in handling nuclear debris and neutron cross section measurement of radionuclides. Major component of gamma-rays in these applications is relatively low energy gamma-rays (several hundred keV). Thus, this research project is to solve the issue by developing a gamma-ray detector that is sensitive to only high energy gamma-rays based on a new detection principle that employs electron-positron pair production induced by high-energy gamma-rays and detects annihilation gamma-rays. The detector system consists of a pair-production target and a pair of gamma-ray detectors which detect annihilation gamma-rays from the pair production target. In the present work, the geometrical configuration and the pair production target were optimized by Monte Carlo simulation.

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