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Anisotropic Effect of ZnWO4 Scintillator for Direction-Sensitive Dark Matter Search

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Direction-sensitive detector with solid-state target is expected to have higher sensitivity for WIMPs window compared to conventional dark matter search using Tl:NaI and other scintillators. ZnWO₄ was reported to have anisotropic of light outputs for each crystal surface excited by alpha rays. In this study, we evaluated such anisotropic effect for several crystals such as PbWO₄ with a size of 10 cm $\times$ 10 cm $\times$ 10 cm $\times$. Since these crystals have no cubic structure, crystal orientations did not correspond to the cutting surface. PbWO₄ was found to have the different light output and α/γ ratios for each surface as well as ZnWO₄ had. Moreover, such samples were irradiated with single electron and proton, and the result of proton irradiation showed the anisotropic effect. On the other hand, the difference was not observed clearly for electron irradiation.

Submitted on behalf of a Collaboration?

No

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