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The PIKACHU Experiment: Search for the Two-Neutrino Double Beta Decay of 160Gd in Kamioka

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The PIKACHU experiment is a search for the double beta decay of 160Gd using large single crystals of Ce:Gd3Al2Ga3O12 (GAGG). In particular, it aims to observe the so-far undetected two-neutrino double beta decay (2nbb) of 160Gd down to half-lives predicted by theory. We have been developing high-purity GAGG crystals, and in 2023, succeeded in producing crystals with uranium- and thorium-series impurities reduced by an order of magnitude compared to conventional ones [1]. Since late 2024, we have been establishing a low-background experimental environment at the Kamioka underground laboratory, and have commenced long-term data acquisition using the newly developed high-purity GAGG crystals. In this presentation, we will give an overview of the PIKACHU experiment and report on its current status.
[1] T. Omori, T. Iida et al., Progress of Theoretical and Experimental Physics, Volume 2024, Issue 3, March 2024, 033D01

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