



Contribution ID: 16

Type: **Contributed Oral Presentation**

Double beta decay search of ^{160}Gd by PIKACHU experiment

Tuesday, 27 May 2025 08:30 (15 minutes)

^{160}Gd is the candidate nucleus for double beta decay with a high natural abundance, 21.9%, and a low Q -value, 1.73 MeV, compared to other candidates. The low Q -value makes it difficult to observe even two-neutrino double beta decay ($2\nu2\beta$). The previous search using Gd_2SiO_5 (GSO) crystal [Danevich] has not observed it because of background from Uranium and Thorium (U/Th) decay series contained in GSO. They established 1.9×10^{19} year as the lower limit of $2\nu2\beta$ half-life, while the theoretical prediction of it is 7.4×10^{20} year.

The PIKACHU experiment aims to discover $2\nu2\beta$ using a large $\text{Gd}_3\text{Ga}_3\text{Al}_2\text{O}_{12}$ (GAGG) single crystal. It is superior to GSO in terms of light yield, particle identification and content of ^{160}Gd . We plan to update the lower limit of $2\nu2\beta$ half-life in Phase1 and discover $2\nu2\beta$ with superior sensitivity by approximately one order of magnitude to previous search in Phase2. In this lecture, I'll introduce the concept of PIKACHU experiment, the development of high purity GAGG, and the present status of data acquisition and analysis for Phase1.

[Danevich] F. A. Danevich, V. V. Kobychiev, O. A. Ponkratenko, V. I. Tretyak and Yu. G. Zdesenko, Nucl. Phys. A 694, 375-391 (2001).

Primary author: OMORI, Takumi (Univ. of Tsukuba)

Co-author: PIKACHU COLLABORATION

Presenter: OMORI, Takumi (Univ. of Tsukuba)

Session Classification: Parallel Session

Track Classification: Neutrinos and Nuclei