

Development of surface alpha ray detector with a low alpha-emitting μ -PIC

In a direct search for the dark matter, leading experiments makes use of massive and low background detectors. Particularly, the detector is required to design with low radio purity materials, whose impurities such as U-238 and Th-232 are in the ppb level. We have been developing a new detector of alpha-rays emitted from the material surface based on a time projection chamber technology. NEWAGE-0.3a, which was used to a direction-sensitive dark matter direct search in Kamioka mine underground, was modified and used. The detector has an advantage of a position sensitivity in comparison with a conventional alpha-ray detector, thus it is possible to obtain alpha-rays' emission distribution in the sample surface. NEWAGE-0.3a was upgraded with a low alpha-emitting μ -PIC, whose impurities were reduced less than 10^{-4} alphas/hr/cm². Furthermore, a new algorithm to determine the sense of the alpha-ray track, whether from the sample or from the μ -PIC, and the sensitivity was improved by another factor 2. As a result, the sensitivity as background level was improved by factor 10, to 10^{-2} alphas/cm²/hr. Upgradable plans to achieve the goal of less than 10^{-4} alphas/cm²/hr are also presented.

Primary author: Dr ITO, Hiroshi (Graduate School of Science, Kobe University)

Co-authors: Mr ISIURA, Hirohisa (Graduate School of Science, Kobe University); Prof. MIUCHI, Kentaro (Graduate School of Science, Kobe University); Dr NAKAMURA, Kiseki (Graduate School of Science, Kobe University); Mr HASHIMOTO, Takashi (Graduate School of Science, Kobe University); Mr IKEDA, Tomonori (Graduate School of Science, Kobe University); Prof. TAKEUCHI, Yasuo (Graduate School of Science, Kobe University)

Presenter: Dr ITO, Hiroshi (Graduate School of Science, Kobe University)