

博士論文公聴会の公示（物理学専攻）

学位申請者：前田 剛

論文題目： Study of Ca-49 Background in Neutrinoless Double Beta Decay of Ca-48

(Ca-48 のニュートリノを伴わない二重ベータ崩壊探索のための Ca-49 の背景事象の研究)

日時：201X年 X月 X日 (X) XX:XX-XX:XX

場所：理学研究科 H棟 7階 7階セミナー室 (H701 号室)

主査：能町 正治

副査：岸本 忠史、野海 博之、嶋 達志、小田原 厚子

論文要旨：

Next-generation experiments for neutrinoless double beta decay ($0\nu\beta\beta$ decay) search are planned over the world. CANDLES experiment is challenging the first discovery by promoting enrichment of ^{48}Ca . In parallel with development of enrichment method, research on background events is progressed for the future detector using enriched $^{48}\text{CaF}_2$ crystals.

For $0\nu\beta\beta$ decay of ^{48}Ca ($Q_{\beta\beta}=4.3\text{MeV}$), high energy events by ^{49}Ca decays ($Q_{\beta}=5.3\text{MeV}$) inside the crystals are concerned as inevitable cosmogenic effect. In order to estimate the effect, a measurement was done from December 2016 at Kamioka Underground Laboratory. By analyzing data of live time 267 days and a simulation, it was estimated that generated rate of ^{49}Ca would be 2×10^2 counts/year and the background rate would be 0.8 counts/year for $0\nu\beta\beta$ decay from planned amount of ^{48}Ca . In addition that, it was found that it could be reduced to one or more order of magnitude by preparing reduction methods. From these studies, it was turned out that ^{49}Ca background would be remain as sever background for $0\nu\beta\beta$ decay of ^{48}Ca , but, by preparing the reduction methods before start measurement, it would be possible to search for $0\nu\beta\beta$ decay of ^{48}Ca .