

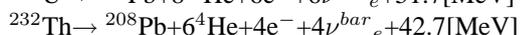
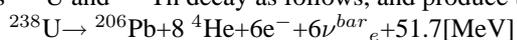
## Upgrade plan of the KamLAND detector for improvement of sensitivity to geo-neutrino

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Neutrino, which is a kind of elementary particles, interacts with other particles only via weak interaction. RCNS, Tohoku University, researches the neutrino science with the large neutrino detector, KamLAND. Measuring the geo-neutrinos that are produced in beta decays within the Earth's interior, is only way to estimate the Earth's radiogenic heats production and constrain composition models of the Earth.

The KamLAND detector is marked by the ability to detect low energy electron-type anti-neutrinos. Radioactive isotopes, such as <sup>238</sup>U and <sup>232</sup>Th decay as follows, and produce the electron-type (anti-) neutrinos (geo-neutrino).



Geo-neutrino flux directly informs us the radiogenic heat generation. In fact, previously, the KamLAND experiment has given the result; the radiogenic heat production in the Earth's interior by <sup>238</sup>U and <sup>232</sup>Th is estimated to be  $20.1_{-9.1}^{+9.1}$  TW through measuring the geo-neutrinos, and it is obviously smaller than the Earth's total heat flow ( $44 \pm 1$  TW).

In order to improve the sensitivity of the KamLAND detector, the upgrade plans (KamLAND2 experiment) are in progress. Large light intensity liquid scintillator, light collection mirror, high quantum efficiency photomultiplier, imaging device, scintillation film, etc...

In the KamLAND2 experiment, improving energy and vertex resolution are expected. Therefore it will be possible to observe geo-neutrinos with higher accuracy and statistics. This experimental improvement will have higher ability to discriminate between models and separate contributions from <sup>238</sup>U and <sup>232</sup>Th. The KamLAND2 will play a contribution to the geo physics in that way.

In this presentation, future prospects and R&D are discussed.

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