Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

U02-P10 Room:Poster Time:April 28 18:15-19:30

Li loaded liquid scintillator for directional measurement

SHIRAHATA, Yutaka[1*]

[1]RCNS, Tohoku University

By the detection of the electron antineutrino using the current liquid scintillator, we can suppress the large background by the delayed coincidence of positron and neutron released by the inverse β-decay that proton and electron antineutrino cause. And we can observe electron antineutrino in the low energy scale.

On the other hand, we cannot know the coming direction of the electron antineutrino like the water Cerenkov method with the existing detector.But we can know the coming direction of the electron antineutrino by observing both reaction point of positron and capture point of neutron.If we could observe the coming direction of the electron antineutrino in the low energy scale, we would distinguish a neutrino every observation object and be able to expect observation with high precision.

There are three necessary conditions to detect the coming direction of the electron antineutrino by a liquid scintillator; (i)capture a neutron before losing directional information, (ii)cause luminous phenomenon at a neutron capture point, (iii)develop a new detection technology with the high position identification performance to detect the reaction points.

In current liquid scintillator, it takes about 200μs until a positron captures a thermal neutron released by inverse β-decay and this reaction emits 2.2MeV gamma ray. The released thermal neutron scatters about 10 cm, and so the neutron loses antineutrino $'$ s directional information. The neutron produces 2.2MeV capture gamma ray and it obscures the neutron capture point. To solve this problem, we developed ^{6}Li loaded liquid scintillator. ^{6}Li has large neutron capture cross section (940barn) and when ^{6}Li captures neutron, it releases alpha ray that it cannot move a long distance in the liquid scintillator. We can expect to solve two problems by using this new liquid scintillator and also to detect the coming direction of the electron antineutrino using imaging detector that has high position resolution.

In presentation, I will talk about the lithium loaded liquid scintillator developed by an original method.

Keywords: geo-neutrino