

Detector study for geo-neutrino directional measurement

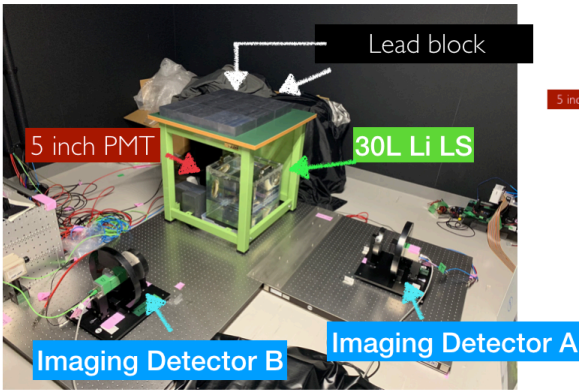
*Naoya Maemura¹, Hiroko Watanabe¹

1. Tohoku University

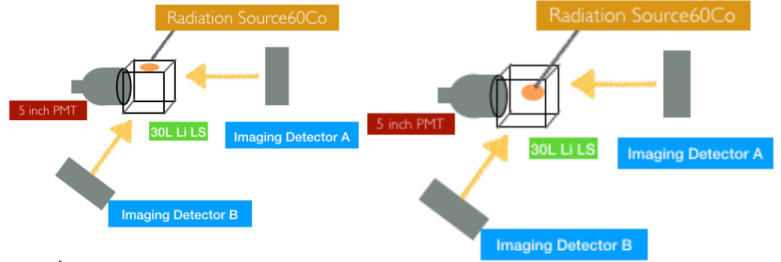
Antineutrinos are very permeable and can penetrate even astronomical objects with their source information. Observation of antineutrinos became a new tool to get unique information. Liquid scintillator (LS) detector is one of the great tools to detect antineutrinos. Although the LS detector has a power to investigate comprehensive anti-neutrino sources, such as the Earth, universe and nuclear reactors, it can not measure the direction of incoming antineutrinos in principle due to the high miss-identification in a neutrino's track reconstruction. In particular, direction-sensitive measurement of geo-neutrinos (antineutrinos emitted from radioactive isotopes in the Earth) can separate crust and mantle contributions. This technology allows us to know further information on the Earth's deep interior. The purpose of this study is to develop a new technology of anti-neutrino directional measurement. We have developed imaging detector which can improve accuracy of neutrino's track reconstruction. Three-dimensional reconstruction of the emission position in LS by gamma-rays from a ^{60}Co source was performed using a prototype detector consisting of a 30L Li-loaded LS and two imaging detectors. The three-dimensional emission points are reconstructed by the data from two imaging detectors in consideration of the attenuation length of LS and the solid angle. We did the experiment in two cases (see case1 and case2) and determined that event-by-event and integrated emission points were successfully reconstructed in the different source position cases. The three-dimensional emission points are reconstructed by the data from two imaging detectors in consideration of the attenuation length of LS and the solid angle. We determined that event-by-event and integrated emission points were successfully reconstructed in the different source position cases. (see Imaging result)

Keywords: geo-neutrino, mantle

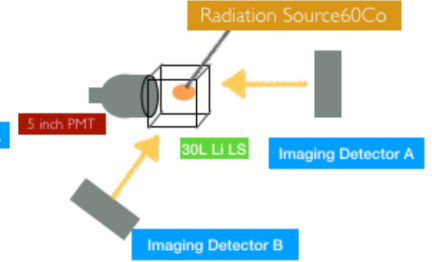
►Set up



►case1



►case2



►Imaging result

