Performance Evaluation of Mirror for Imaging Detector

Research Center for Neutrino Science, Tohoku University, Keigo Soma

Motivation

```
"Improve measurement accuracy of
geo-neutrino to understand internal
structure of the Earth"
```

» Anti-neutrino is generated in the Earth's interior

β -decay

 $^{238}U \rightarrow ^{206}Pb + 8^{4}He + 6e^{-} + 6\overline{v_e} + 51.7[MeV]$ 232 Th $\rightarrow ^{208}$ Pb + 6⁴He + 4e⁻ + 4 \overline{v}_e + 42.7[MeV]

Large Detector

O Geo-neutrino is separated from reactor-neutrino



O Creation points of geo-neutrino are identified

Upper Continental Crust

Lower Continental Crust

Oceanic Crust

Upper Mantle

ower Mantle





Developing Imaging Detector

"We produced two optics"

 \rightarrow evaluated these optics and checked individual differences

Setup

Primary Mirror





Secondary mirror





Take images (focused light) with CCD camera Evaluate the spread (RMS) of these images • Check these images and compere data with the simulation

Primary mirror Thickness Radius **Focal Material** Plating Reflectance Data Length Primary Secondary Primary Secondary Point-Aluminum 145mm 1000mm Chrome 75mm 50mm 30mm 55~65[%] data

Produce

*About surface : It was polished by human's hand



Image's shape is nearly consistent It's spread is slightly larger than the simulation results Image is distorted

International Workshop : Neutrino Research and Thermal Evolution of the Earth 2016/Oct/25~27 @ Tohoku University

performance (under requirement) There are not individual differences

• We will think about a better method to analyze

• We will try to use the optics for other experiment