

Stabilization heater for AMoRE

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Indroduction

- AMoRE (Advanced Mo-based Rare process Experiment) is an international project to search for neutrinoless double beta decay ($0 \nu\beta\beta$) of 100Mo.
- As the heat capacities of a crystal absorber and an MMC sensor varies with temperature. So signal amplitudes may drift over a long time constant as the base temperature fluctuates.
- We present the characterization of Joule heaters for future AMoRE runs, and test results using a molybdate crystal.

Stabilization heater

- Heater signal & Seperation with other events
- Heater pulse shape is similar to that of other event signals.
- The risetime of the heater signal is slower than that of the particle event.
- So heater events are well seperated.







Last correction method

- The internal alpha background energy of a particular crystal was used to correction the energy of other crystals.
- But, in the next experiment, it is possible not to use it as a reference crystal.



- Heater energy & risetime percent resolution
- Heater energy resolution is about 0.5% and risetime resolution is about 0.1%.



Drift correction result

- Drift correction results using stabilization heater events
- Correction of the internal alpha energy with a heater resulted in better resolution.

Experimental setup



S35 detector Heater chip

- We compared gamma(Co-60, TI-208) correction using alpha and heater.
- In case of Co-60 correction, resolution is similar.
- However, in the case of TI-208, the results with the heater were better.



Doped matarial on substrate : AuPd

• Heater size : 3.7mm × 3.8mm × 380um

Heater resistance : 6.7kOhm

Voltage source : 2.8V, 125us, 0.05Hz Epoxy : Araldite

Energy (keV) Energy (keV) Energy (keV)

Summary & Plan

• Stabilization heater chips were attached on the crystal in order to corrcetion of the change in signal size due to temperature fluctuation.

• After alpha&gamma peak correction using the heater signal, the resolution was improved.

• Next, we will correction other cryctal signals without the stabilization heater.



