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Development of Gamma-Ray Transition-Edge-Sensor Microcalorimeters on Thick Membranes

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We are challenging to measure gamma rays in the high energy band of 200 keV-2 MeV. For this purpose, our gamma-ray transition-edge-sensor (TES) microcalorimeters have a large absorber (1mm×1mm×1mm). For mechanical robustness and fast decay time, the membrane of our gamma-ray TES microcalorimeters are made of silicon and at present ten times thicker than those of X-ray TES microcalorimeters. However, if the thermal conductance of the membrane is too high, thermal noise arising from Compton scattering on the silicon substrates degrades the energy resolution.

Therefore, it is necessary to select an appropriate thermal conductance of the membrane. We fabricated various TES microcalorimeters in which we changed the shape and the size of the membranes and measured the thermal conductance of them. Also, we are trying to reduce the influence of Compton scattering by reducing the volume of silicon substrate.

Less than 5 years of experience since completion of Ph.D

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Student (Ph.D., M.Sc. or B.Sc.)

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