



Contribution ID: 136

Type: Oral Presentation

Characterization of high aspect ratio TiAu TES X-ray microcalorimeters array using the X-IFU Frequency Domain Multiplexing readout

Monday, July 22, 2019 11:40 AM (15 minutes)

At SRON Netherlands Institute for Space Research, we are developing X-ray microcalorimeters as backup option for the baseline detectors in the X-IFU instrument on board of the ATHENA space mission led by ESA and to be launched in the early 2030s.

New, mixed 5X5 TiAu Transition Edge Sensor (TES) arrays where TESs have different high aspect ratios and high resistance have been fabricated to meet the requirement of the X-IFU instruments. Such arrays can also be used to optimize the performances of the Frequency Domain Multiplexing (FDM) readout and eventually can lead to large detector arrays.

In this work we present the results obtained on tens of devices with an aspect ratio ranging from 1-to-1 up to 1-to-5 measured in the single pixel mode, with the FDM readout developed at SRON/VTT. We observed a nominal energy resolution of about 2.5 eV at 5.9 keV and at bias frequencies from 1 to 5 MHz. The measurements have been done in the high inductance limit regime, implying that we are still far from their intrinsic energy resolutions. Thermal and electrical parameters have been compared by means of AC complex impedance and noise spectra measurements to have a clear picture of the performances of these arrays.

These detectors are proving to be the best TES microcalorimeters ever reported in Europe, being able to accomplish not only the specifications of the X-IFU instrument, but also those ones for other future challenging X-ray space missions, fundamental physics experiments, plasma characterization and material analysis.

We are now ready to test the uniform kilo pixels array in combination with the FDM readout in multi pixels mode.

Acknowledgment

This work is partly funded by European Space Agency (ESA) under ESA CTP contract ITT AO/1-7947/14/NL/BW, and is partly by the European Union's Horizon 2020 Programme under the AHEAD project with grant agreement number 654215.

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

N

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

N

Primary authors: Dr TARALLI, Emanuele (SRON); GOTTARDI, Luciano (SRON - Netherlands Institute for Space Research); Mr NAGAYOSHI, Kenichiro (SRON Netherlands Institute for Space Research); Mr RIDDER, Marcel (SRON Netherlands Institute for Space Research); VISSER, Sven (SRON - Netherlands Institute for Space Research); Dr KHOSROPANAH, Pourya (SRON - Netherlands Institute for Space Research); Dr BRUIJN, Marcel (SRON - Netherlands Institute for Space Research); Dr GAO, Jian-Rong (SRON - Netherlands Institute for Space Research)

Presenter: Dr TARALLI, Emanuele (SRON)

Session Classification: Orals LM 001

Track Classification: Low Temperature Detector Development and Physics