Measuring the neutrino mass is one of the most compelling issues in particle physics. HOLMES is an experiment funded by the European Research Council for a direct measurement of neutrino mass. HOLMES will perform a precise measurement of the endpoint of the Electron Capture decay spectrum of $^{163}$Ho in order to extract information on neutrino mass with a sensitivity as low as 1 eV.

In its final configuration, HOLMES will deploy a 1000 pixel array of low temperature microcalorimeters: each calorimeter consists of an absorber, where the Ho atoms will be implanted, coupled to a Transition Edge Sensor thermometer. The detectors will be kept at the working temperature of ~50 mK using a dilution refrigerator. In order to gather the required $3 \times 10^{11}$ events in a three year long data taking with a pile up fraction as low as $10^{-3}$, detectors must fulfill rather high speed and resolution requirements, i.e. 20 $\mu$s rise time (10-90) and ~1 eV resolution.

The TES average response to a 2.6 keV energy deposition. The target 20 $\mu$s 10-90 rise time has been reached (10 $\mu$s $\tau$). Changing the working point allows the TES to operate with even faster rise time, as long as the slew rate is below 0.5 $\Phi$/sample.

Next detector steps:
- Production and test of the final HOLMES array
- Test on first implanted detectors
- 16 x 4 detector array with implanted $^{163}$Ho for short calorimetric measurement of EC spectrum

High performance detectors for HOLMES: Transition Edge Sensors

Mo/Cu Transition Edge Sensors coupled to Gold absorbers where $^{163}$Ho will be implanted

Production and R&D for detectors optimization: NIST, Boulder-Colorado USA

Implantation: Genova

Test and measurement: Milano Bicocca

With our first ROACH 2 board we can now sample up to 32 channels at 500 kHz.

First pulses from multiplexed TES

With the 550 MHz ADC bandwidth of the ROACH2:
- 500 MHz effective pulse sampling
- 14 MHz resonance spacing
- 2 MHz resonance width
- 2 $\Phi$, SQUID oscillation/ramp

33 multiplexable channels per ROACH 2 board

X ray spectra acquired with TES not specifically designed for HOLMES to test the ROACH 2 multiplexed readout