



Contribution ID: 408

Type: Poster

## Microfabrication of TES microcalorimeters for the HOLMES experiment

*Tuesday, 23 July 2019 18:45 (15 minutes)*

HOLMES is an experiment aiming at pushing down the sensitivity on the smallest neutrino mass at the order of  $\sim$  eV performing a calorimetric measurement of the Electron Capture decay spectrum of  $^{163}\text{Ho}$ . For reaching its goal, HOLMES will deploy an array of 1000 microcalorimeters based on Transition Edge Sensors with gold absorbers in which the  $^{163}\text{Ho}$  will be ion implanted. A major challenge is represented by the fabrication of the microcalorimeters with the required amount of  $^{163}\text{Ho}$  (300 Hz/det). Therefore, the fabrication process needs to be compatible with ion implantation without impairing the detector performances. The gold absorber will be fabricated in more steps: before, during and after the ion implantation. In particular, the gold deposition during the embedding process is intended to compensate for the absorber atom sputtering caused by ion implantation and to control the  $^{163}\text{Ho}$  concentration in the detectors. The implanted area will finally be encapsulated in-situ to ensure the fully containment of the decay energy and to avoid oxidation of the holmium.

We describe here the multi-step microfabrication process, mainly focusing on the last steps.

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

N

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

N

**Primary author:** Mrs FERRI, Elena

**Co-authors:** GIACHERO, Andrea; PUIU, Andrei (MIB); NUCCIOTTI, Angelo Enrico Lodovico; REINTSEMA, Carl (NIST); BECKER, Daniel (National Institute of Standards and Technology); Dr SCHMIDT, Daniel (NIST); SWETZ, Daniel (NIST); BENNETT, Doug (NIST); GATTI, Flavio (GE); HILTON, Gene (NIST-Boulder); PESSINA, Gianluigi Ezio (MIB); GALLUCCI, Giovanni (GE); ULLOM, Joel (NIST/University of Colorado); MATES, John (National Institute of Standards and Technology); GARD, Johnathon (NIST); FOWLER, Joseph (NIST); VALE, L.; BIASOTTI, MICHELE (GE); Mr FAVERZANI, Marco; BORGHESI, Matteo (Istituto Nazionale di Fisica Nucleare); DE GERONE, Matteo (GE)

**Presenters:** Mrs FERRI, Elena; GATTI, Flavio (GE)

**Session Classification:** Poster session

**Track Classification:** Low Temperature Detector fabrication techniques and materials