HOLMES is a new experiment to directly measure the neutrino mass with a sensitivity as low as 0.4 eV. HOLMES will perform a calorimetric measurement of the energy released in the electron capture decay of $^{163}$Ho (A. De Rujula and M. Lusignoli, Phys. Lett. B 118 (1982) 429). The calorimetric measurement eliminates systematic uncertainties arising from the use of external beta sources, as in experiments with beta spectrometers. HOLMES will deploy a large array of low temperature microcalorimeters with implanted $^{163}$Ho nuclei.

$^{163}$Ho + e$^{-}$ → $^{163}$Dy* + $\nu_{e}$

**mid-term prototype 2016**

- $A_{EC} = 300$ Bq
- $f_{pp} = 3 \times 10^{-4}$
- $\Delta E = 1$ eV
- $\tau = 1$ $\mu$s

**full scale HOLMES 2017**

- 16 channels $t_{M} = 1$ month
- 1000 channels $t_{M} = 3$ years

$E_{EC}$ = 300 Bq
$f_{pp} = 3 \times 10^{-4}$
$\Delta E = 1$ eV
$\tau = 1$ $\mu$s
• TES detectors R&D

163Ho

Au

TES

- Si
- SiO2
- SiNx
- Mo
- Cu
- Cu
- Bi
- Au
- Ho

• microwave readout and signal multiplexing

f_{ramp} \rightarrow f_{samp}

f_1

f_2

f_3

microwave synthesizer

GHz LC resonator f_i

MHz flux ramp modulation f_{ramp}

• pile-up discrimination algorithms for optimal time resolution

Δt = 3.8 μs

A. Nucciotti, Status of the HOLMES detector development