

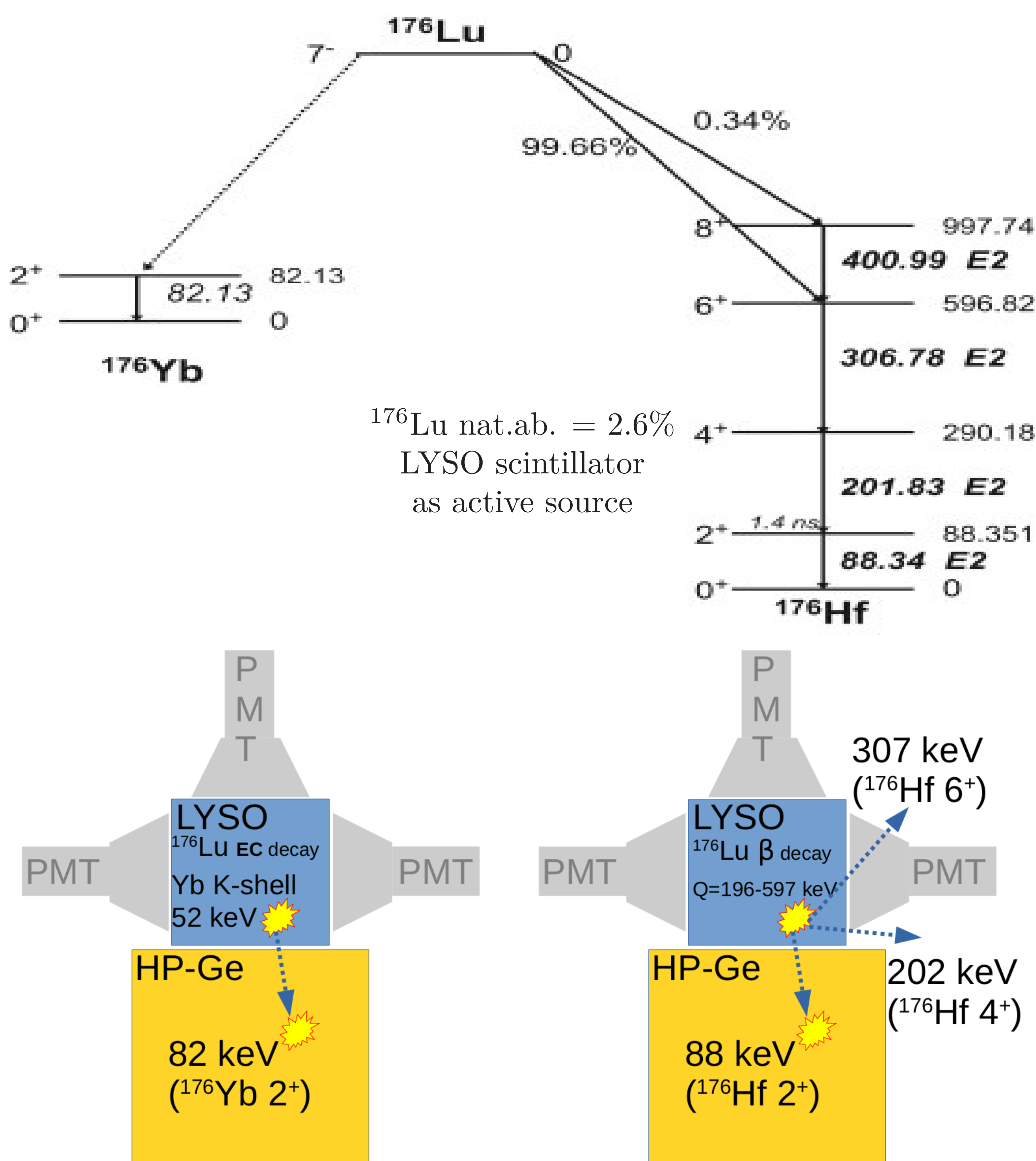
Search for Electron Capture of ^{176}Lu with LuCE experiment

E. Ghezzer¹, G. Bertuolo², F. Nozzoli^{1,3}

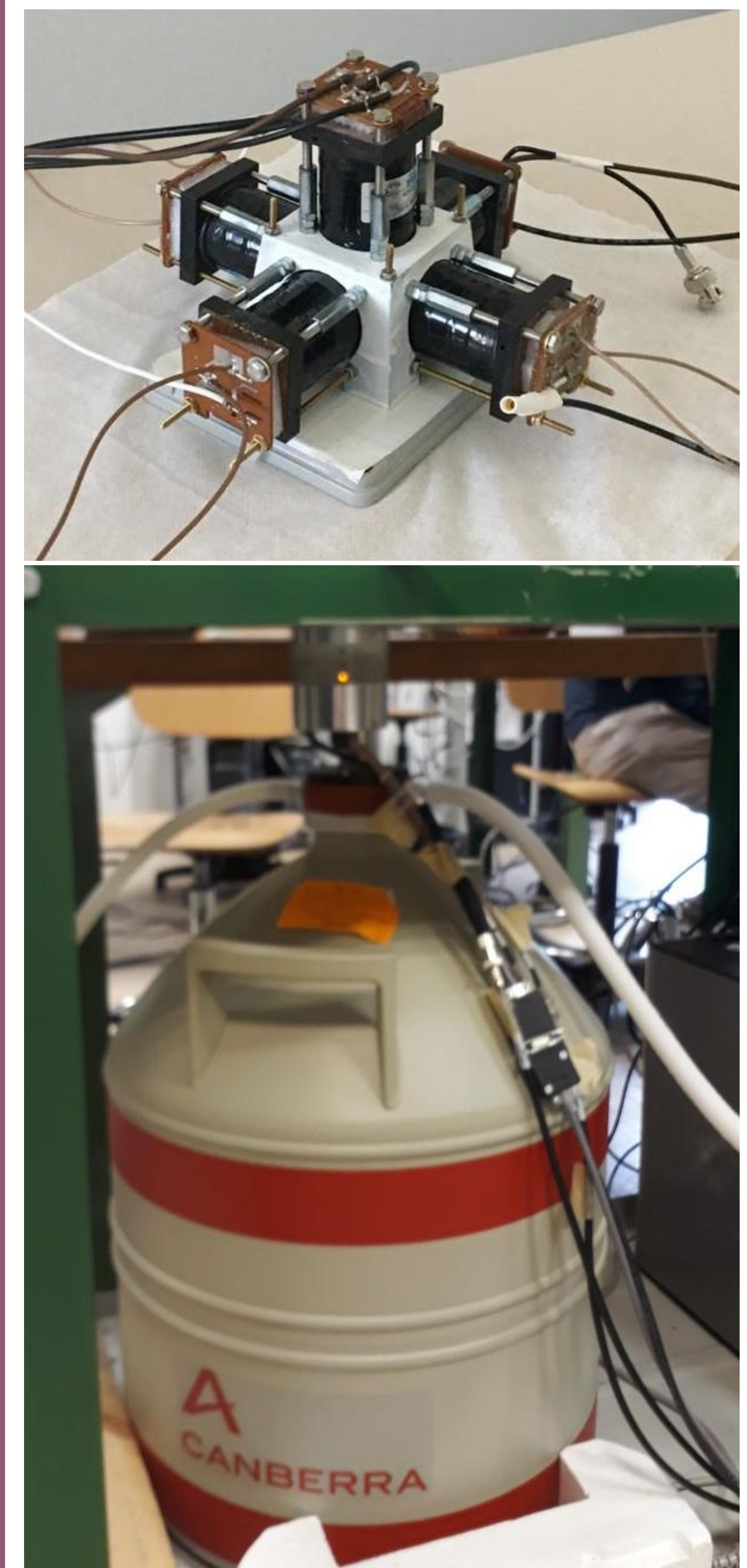
¹ Università degli Studi di Trento, ² L.S. Leonardo da Vinci Trento, ³ INFN-TIFPA, Trento, Italy.

^{176}Lu normally decays by β^- decay to ^{176}Hf with a half-life of 3.6×10^{10} years. Therefore Lu/Hf is useful for radiometric dating concerning age of minerals and cosmic objects. However different experiments have published not compatible values for ^{176}Lu half-life. ^{176}Lu should also decays by Electron Capture (ϵ) to ^{176}Yb but this decay was never observed. The goal of LuCE experiment is to search for ^{176}Lu Electron Capture in a LYSO scintillator with HP-Germanium in coincidence.

^{176}Lu decay scheme and identification of EC branch

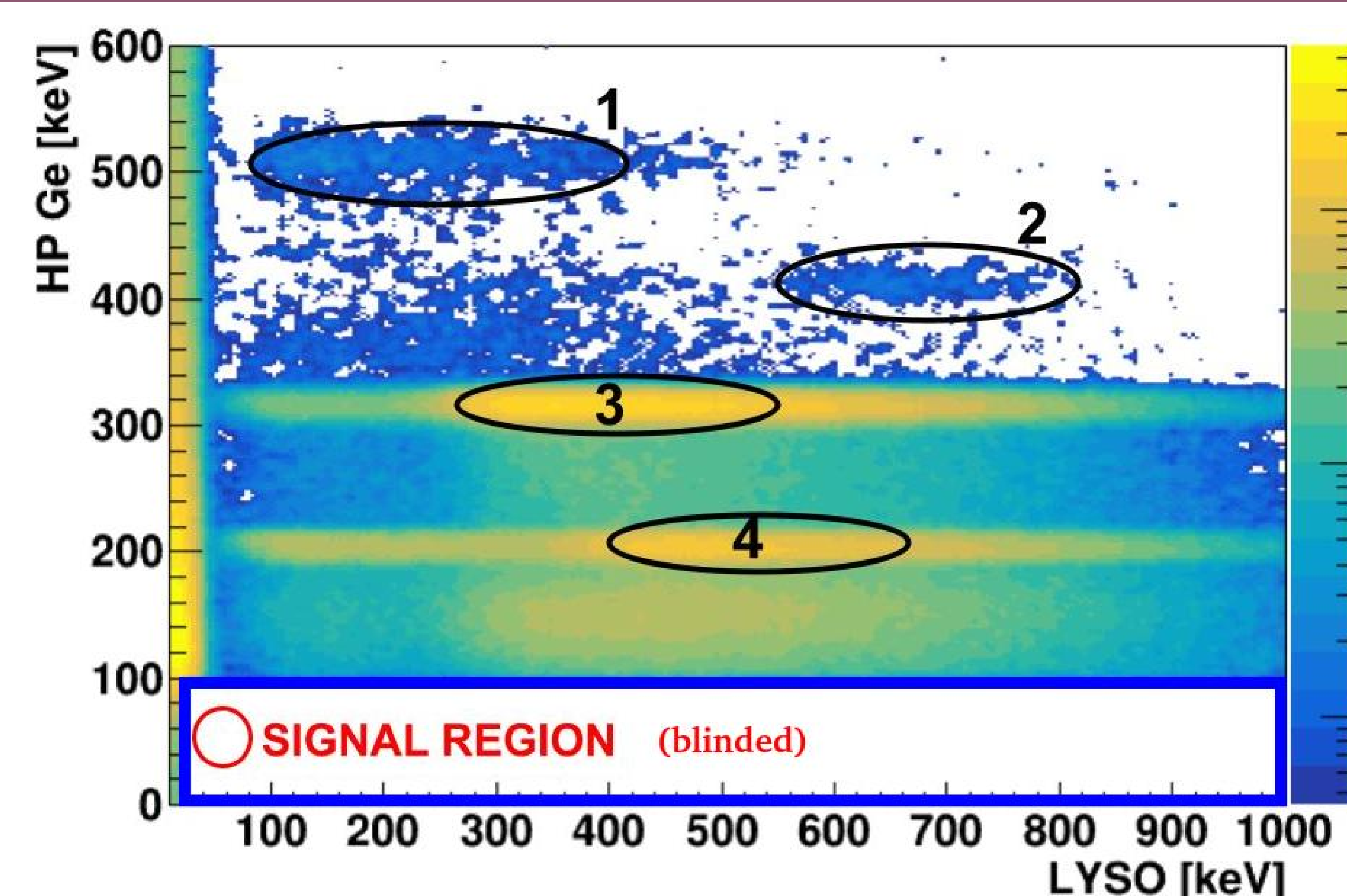


LuCE detector @ TIFPA



5x4x4 cm³ LYSO scintillator and PMTs over the HP-Ge detector in coincidence.

Preliminary measurement: Background characterization & detector optimization



Preliminary measurement (high threshold)
Known structures in LYSO background spectrum:

- 1) 202+307keV in HPGe & 88keV + β^- in LYSO
- 2) 401keV HPGe & 88+202+307keV + $\beta^-_{0.3\%}$ LYSO
- 3) 307 keV in HPGe & 88+202 keV + β^- in LYSO
- 4) 202 keV in HPGe & 88+307 keV + β^- in LYSO

Improved data acquisition will allow:

- Enlarge the measurement gate for HPGe (improve HPGe energy resolution a factor 10)
- Amplify PMT signal a factor 10 (improve LYSO resolution a factor 3)
- Reduce the Ge and LYSO thresholds below 20 keV.

WORK IN PROGRESS