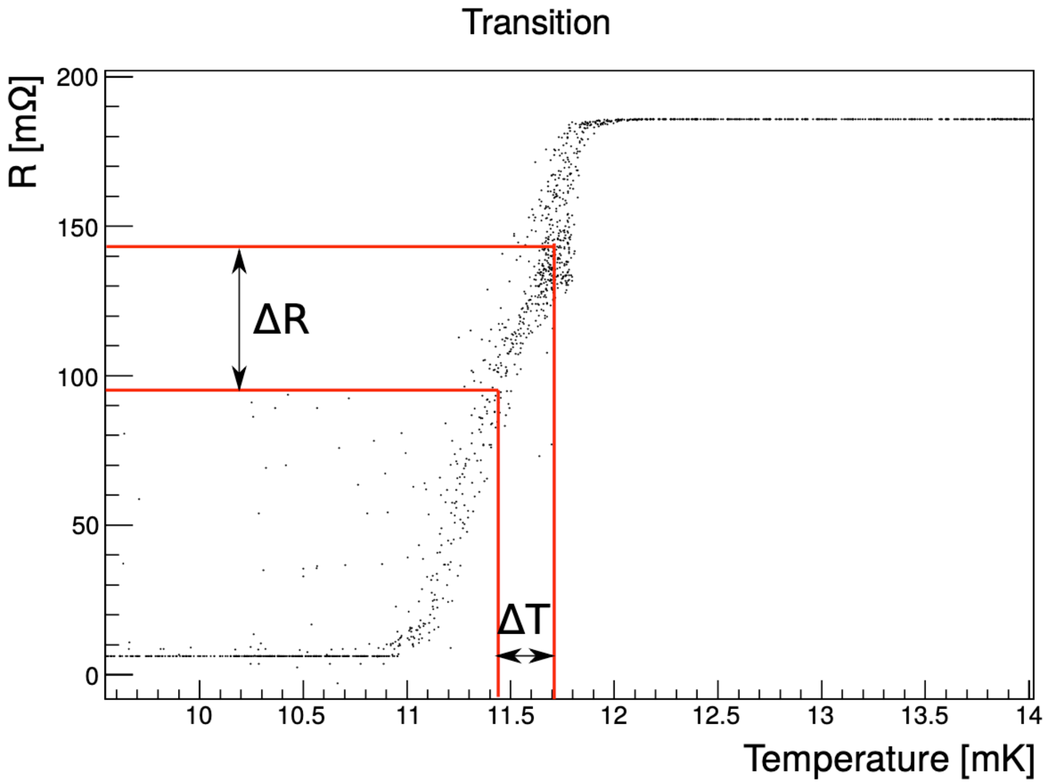
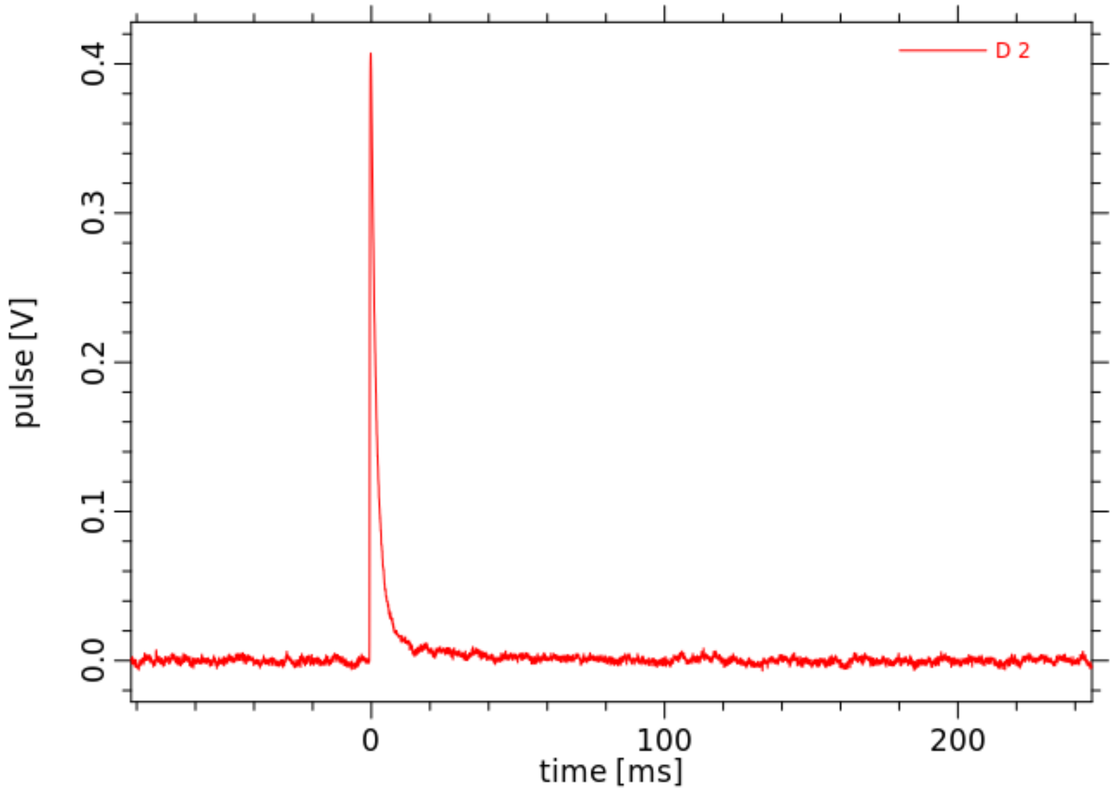
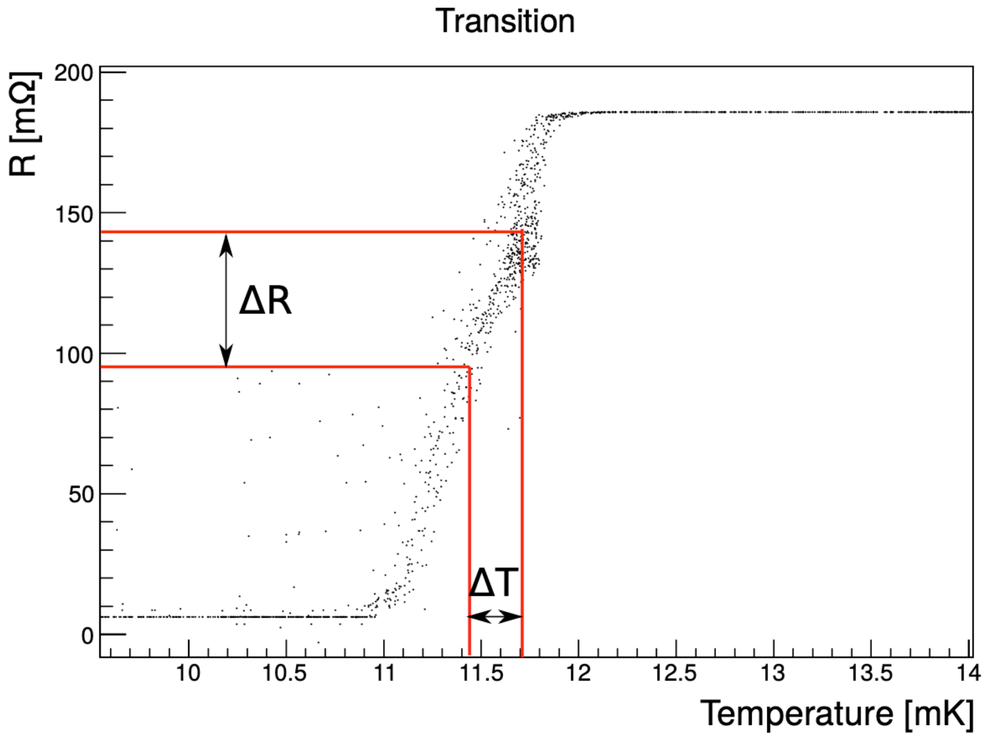
Study of impacts of an aluminium layer as a shield against magnetic fields

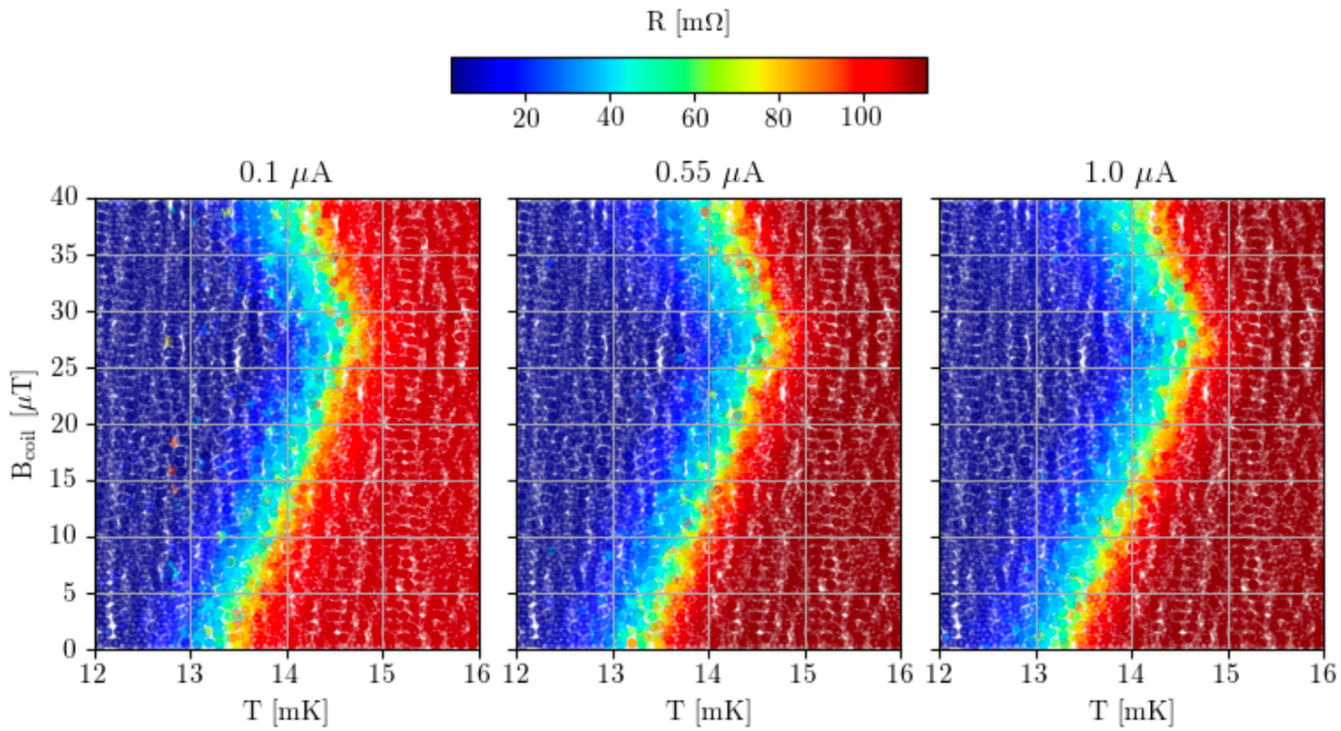
Effects of the B-fields on the TESs



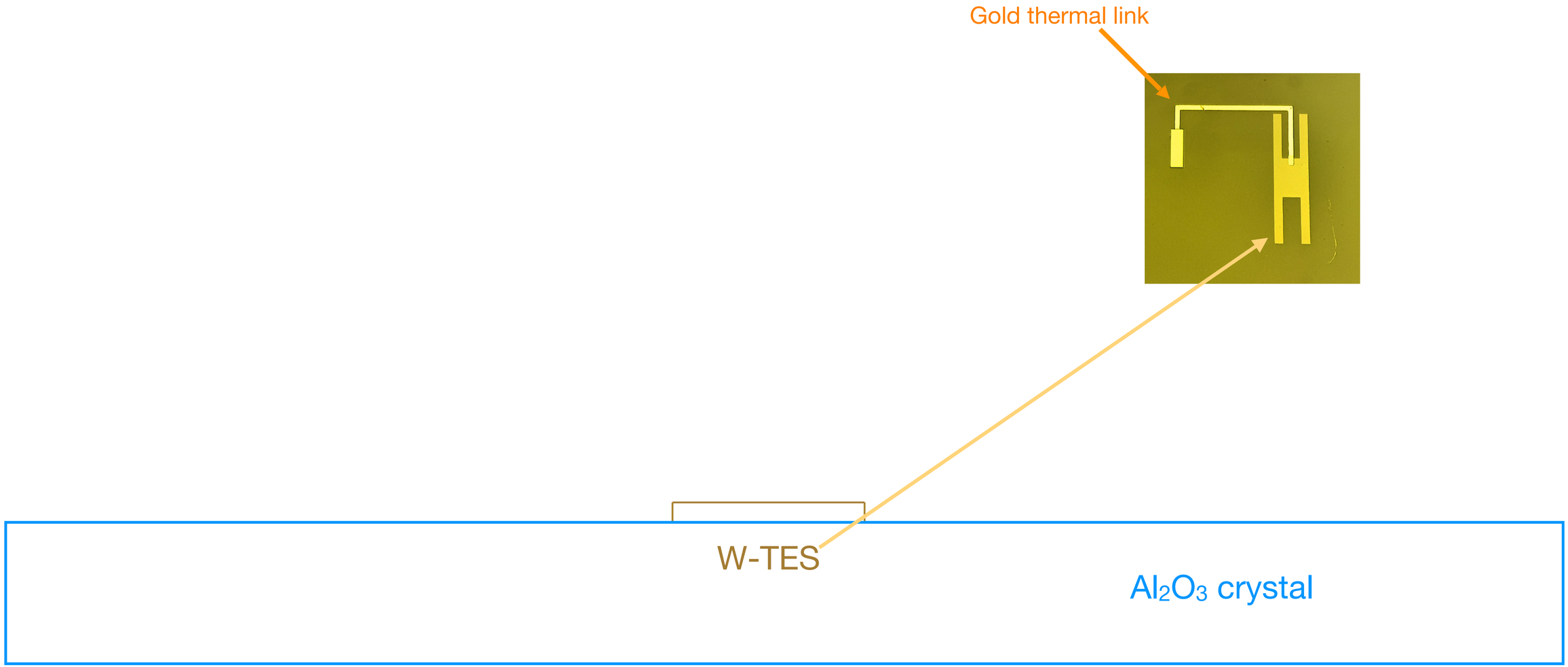


Effects of the B-fields on the TESs



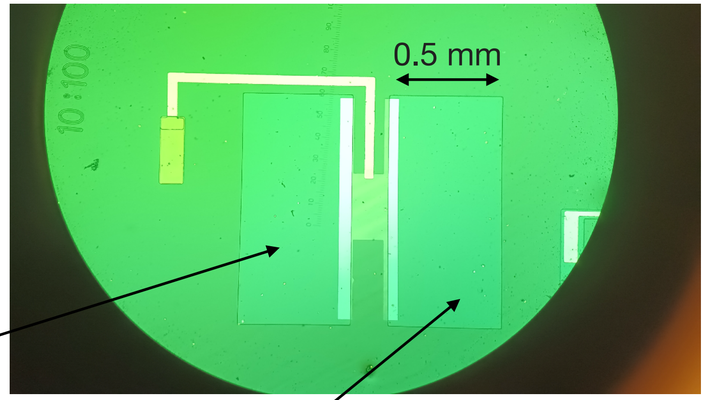


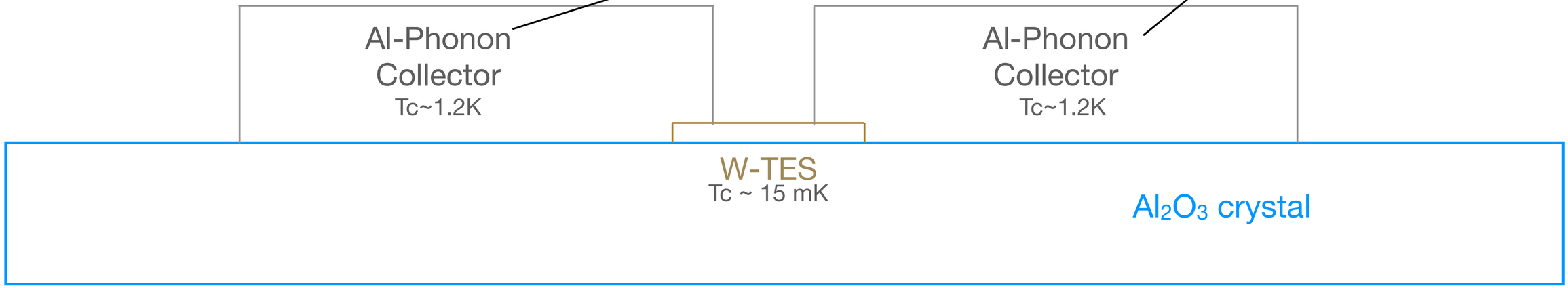
A new strategy: shielding the TESs themselves



A new strategy: shielding the TESs themselves

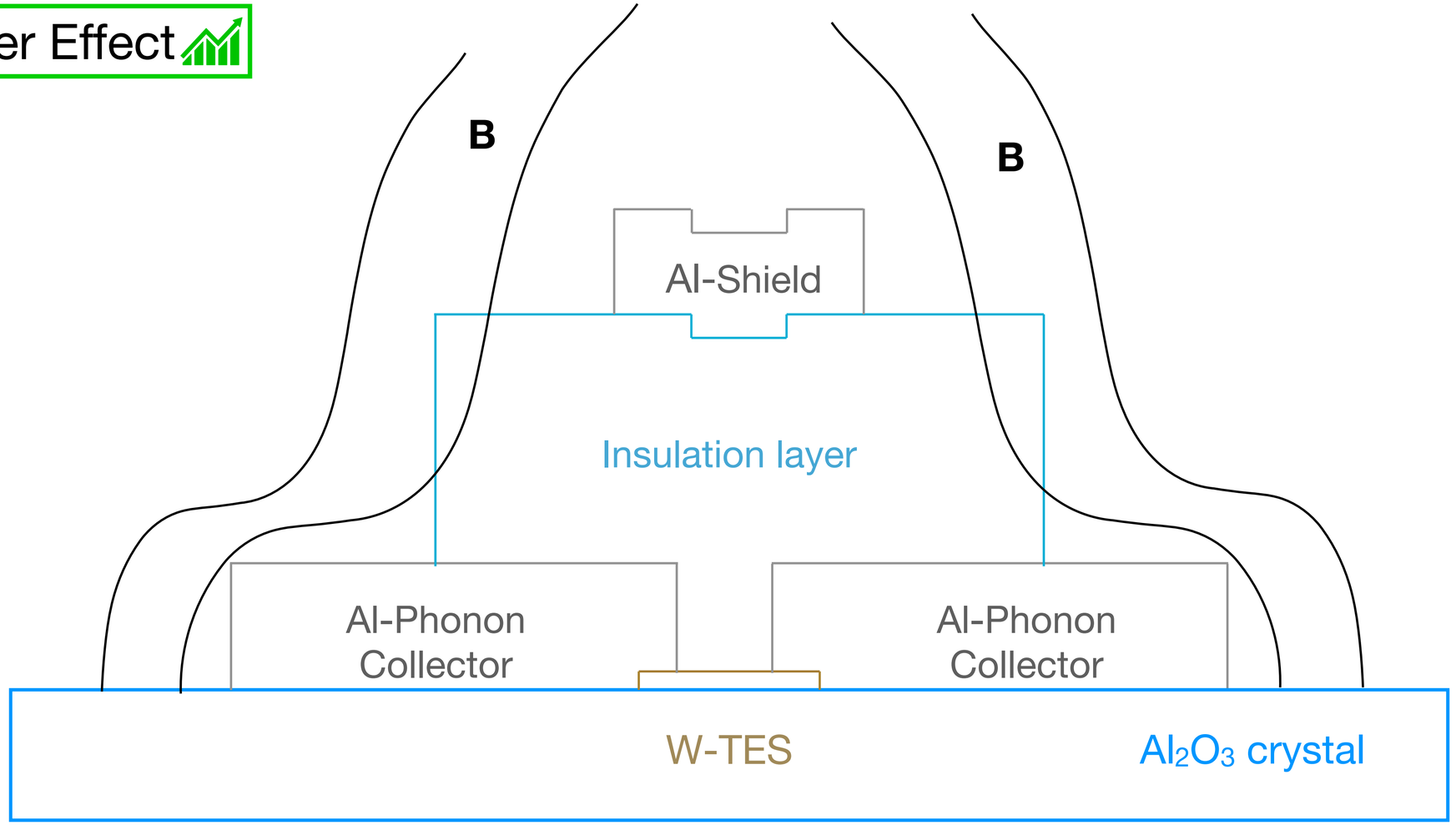
"Classical" TES design





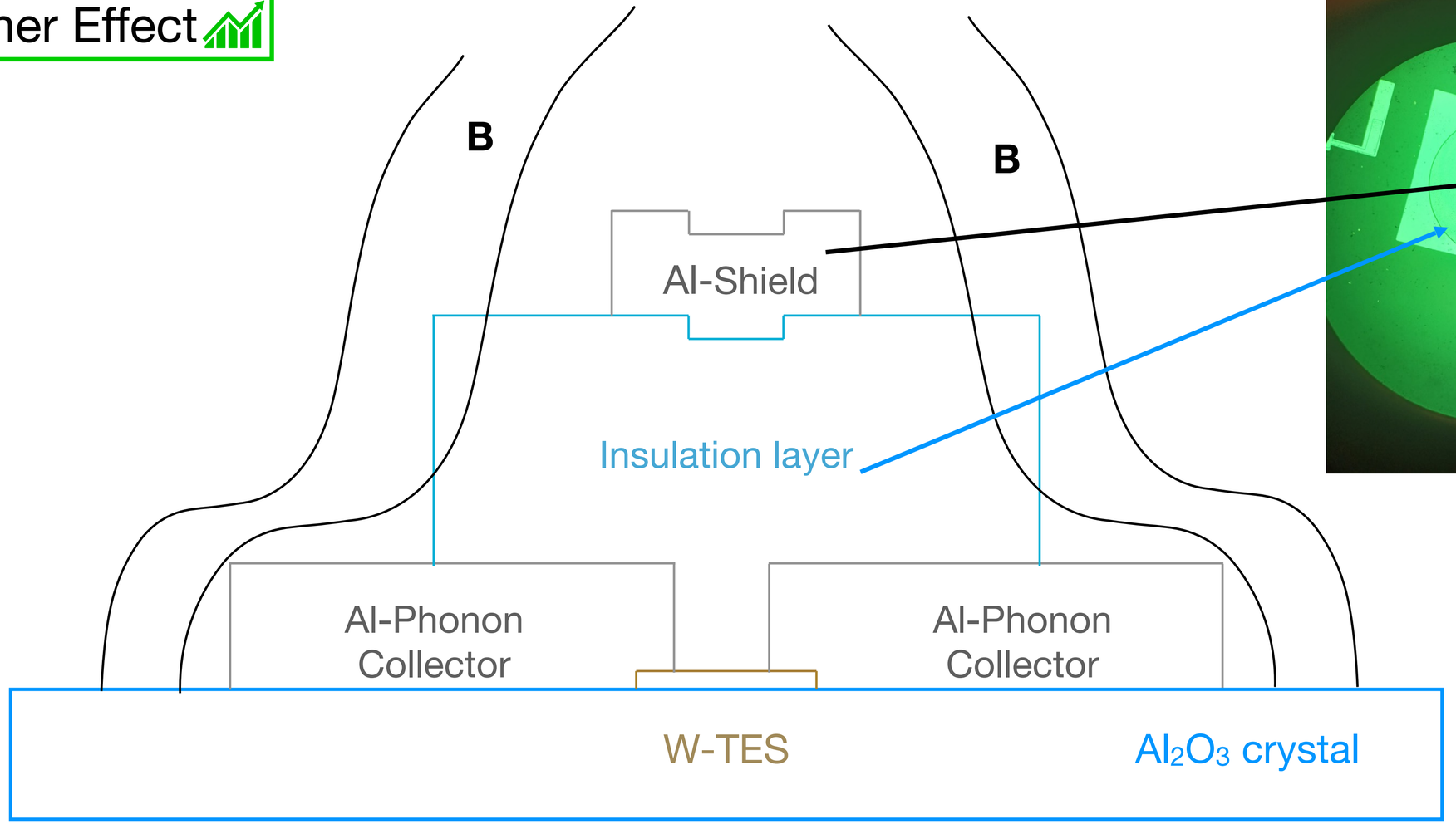
A new strategy: shielding the TESs themselves

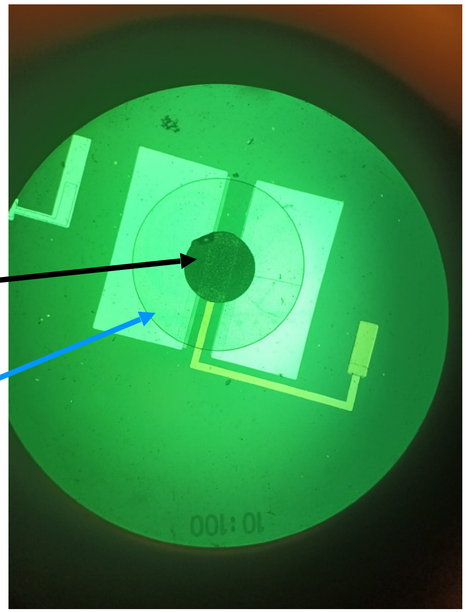
Meissner Effect



A new strategy: shielding the TESs themselves

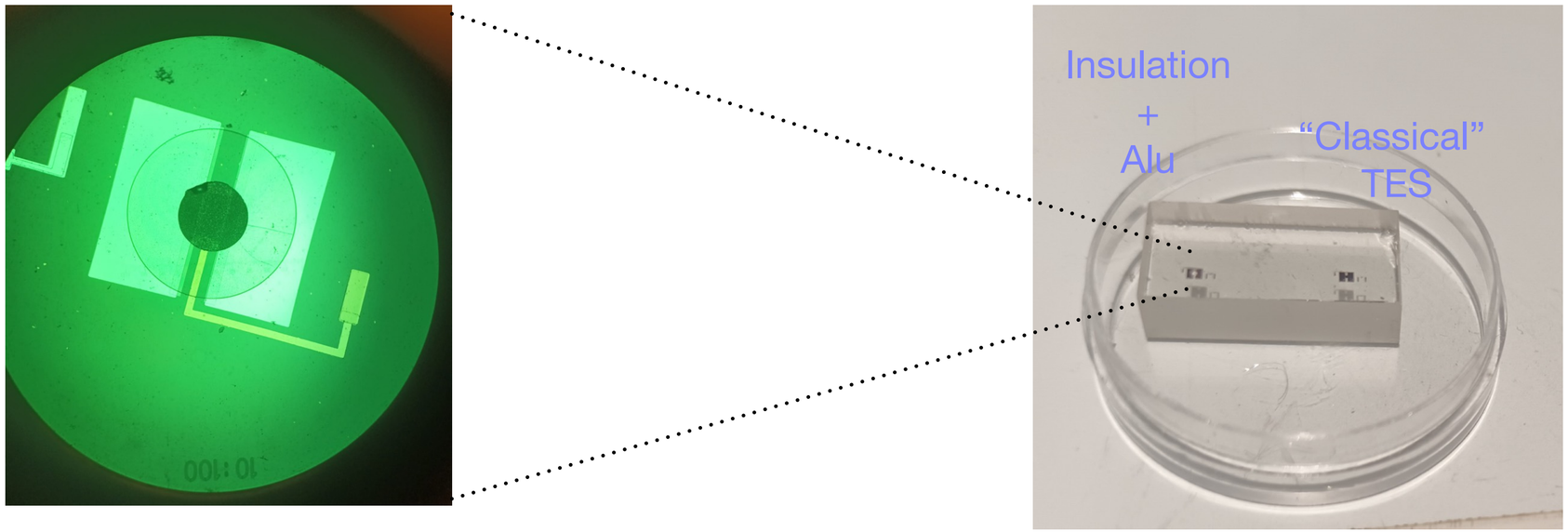
Meissner Effect





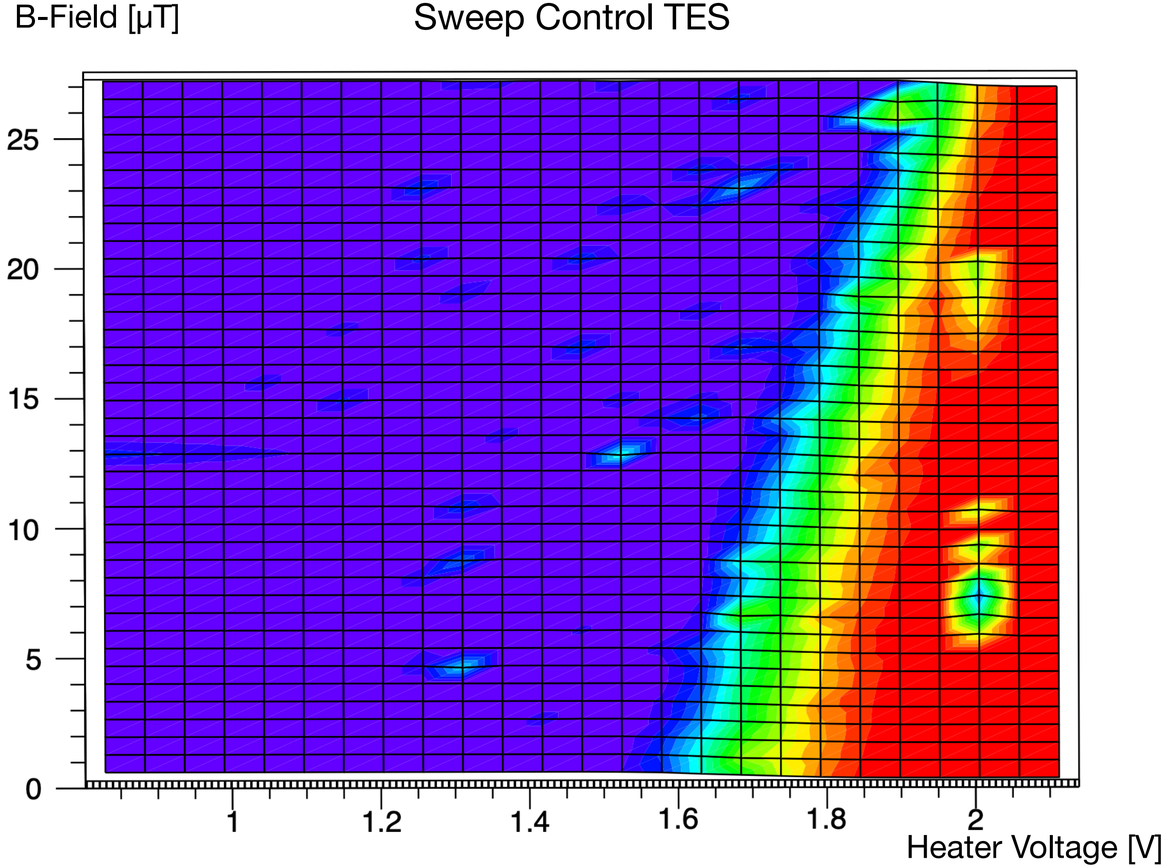
Detector set up

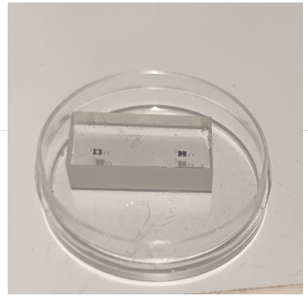
Two W-TESs on the same crystal: one without additional layers, the other with insulation layer and aluminium shield

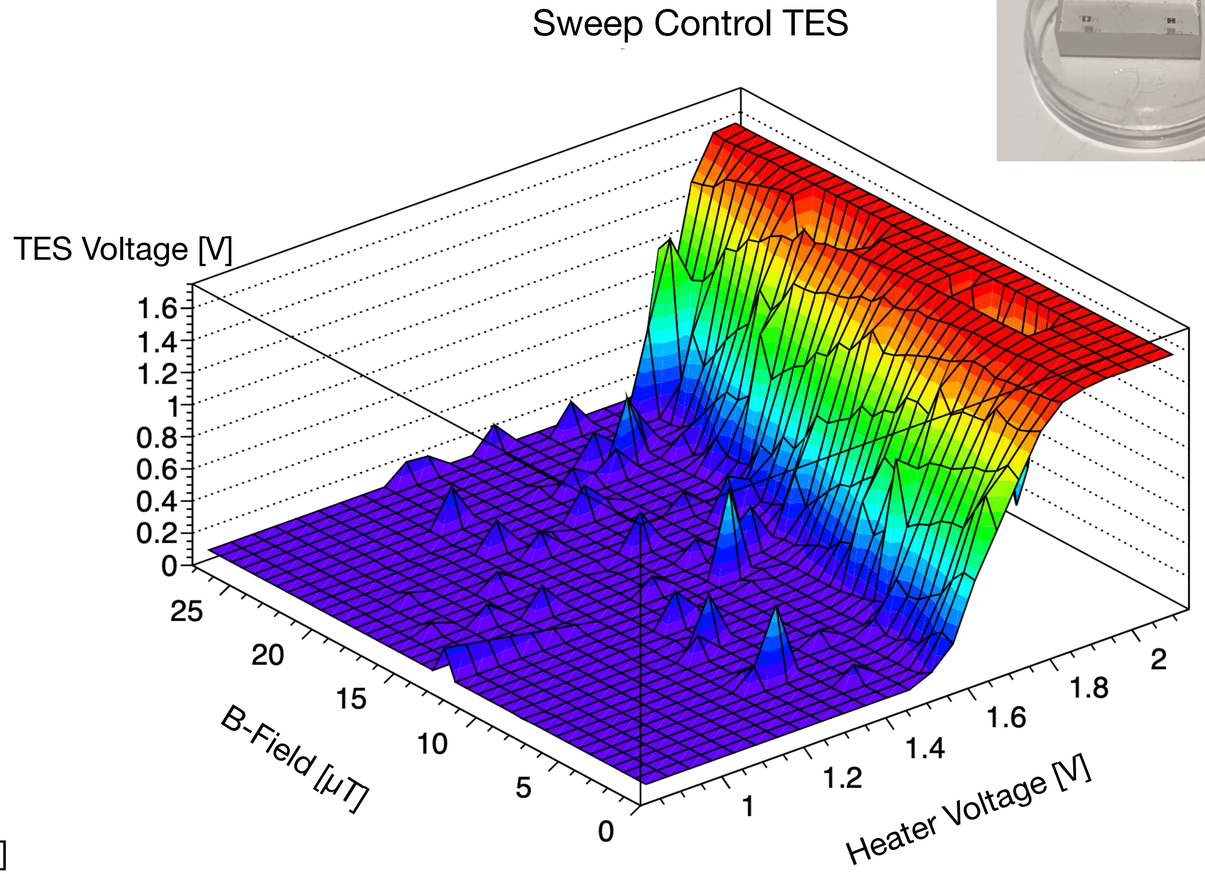


Transition measurement with variable B-field

This sample has neither the photoresist nor the Alu-Shield

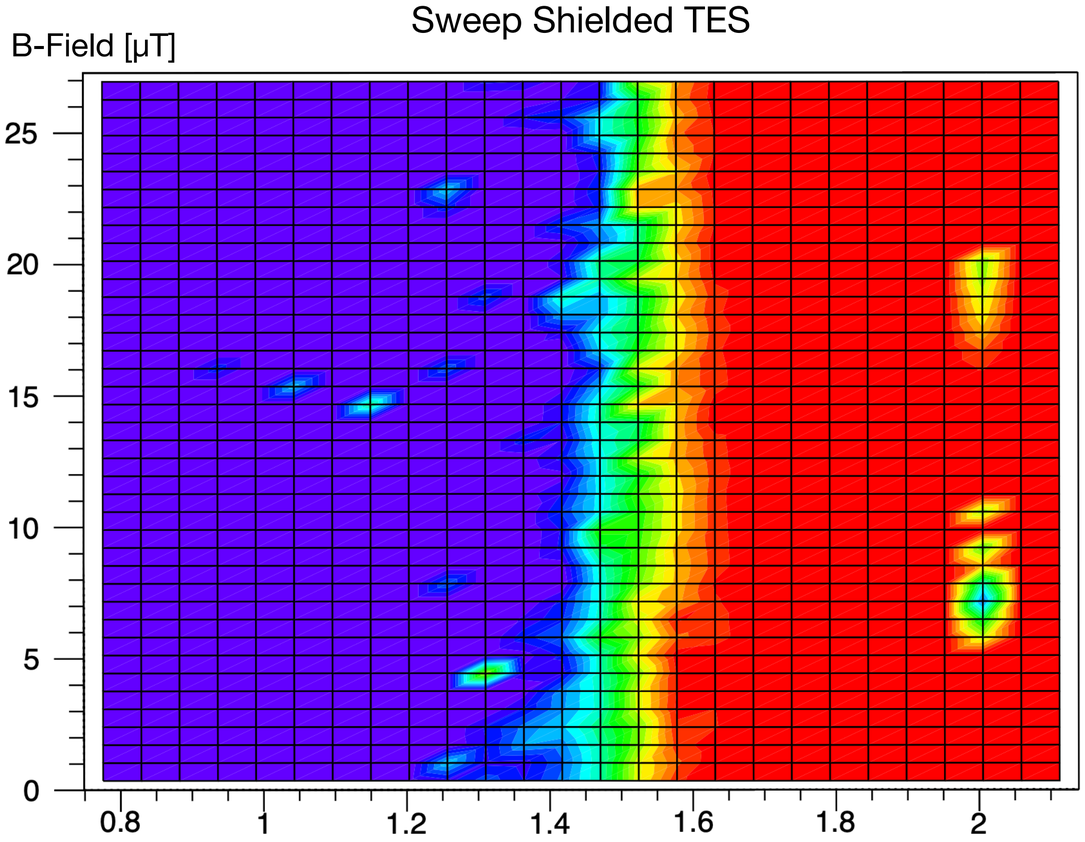


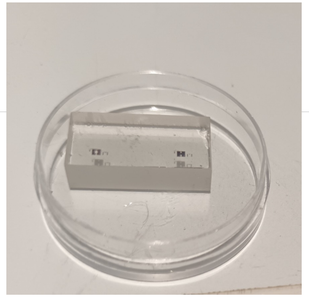


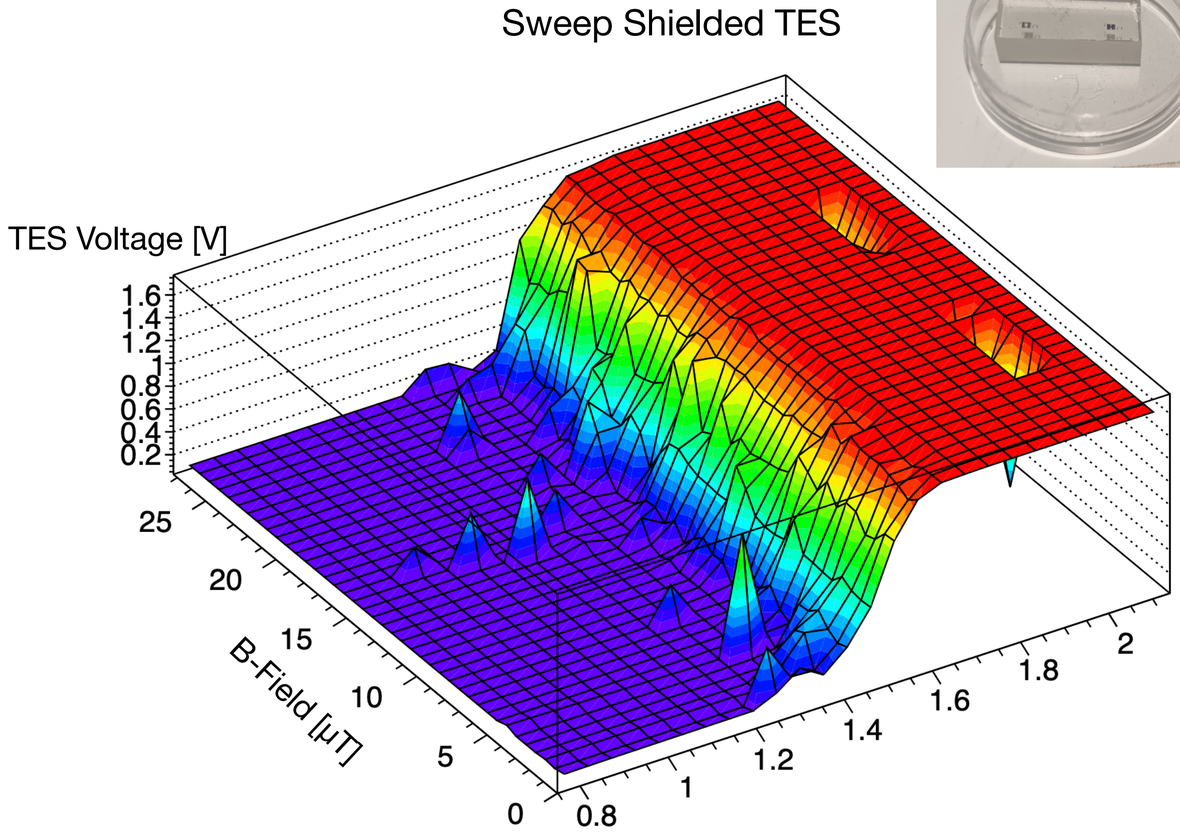


Transition with variable B-field

This sample has both the photoresist and the Alu-Shield

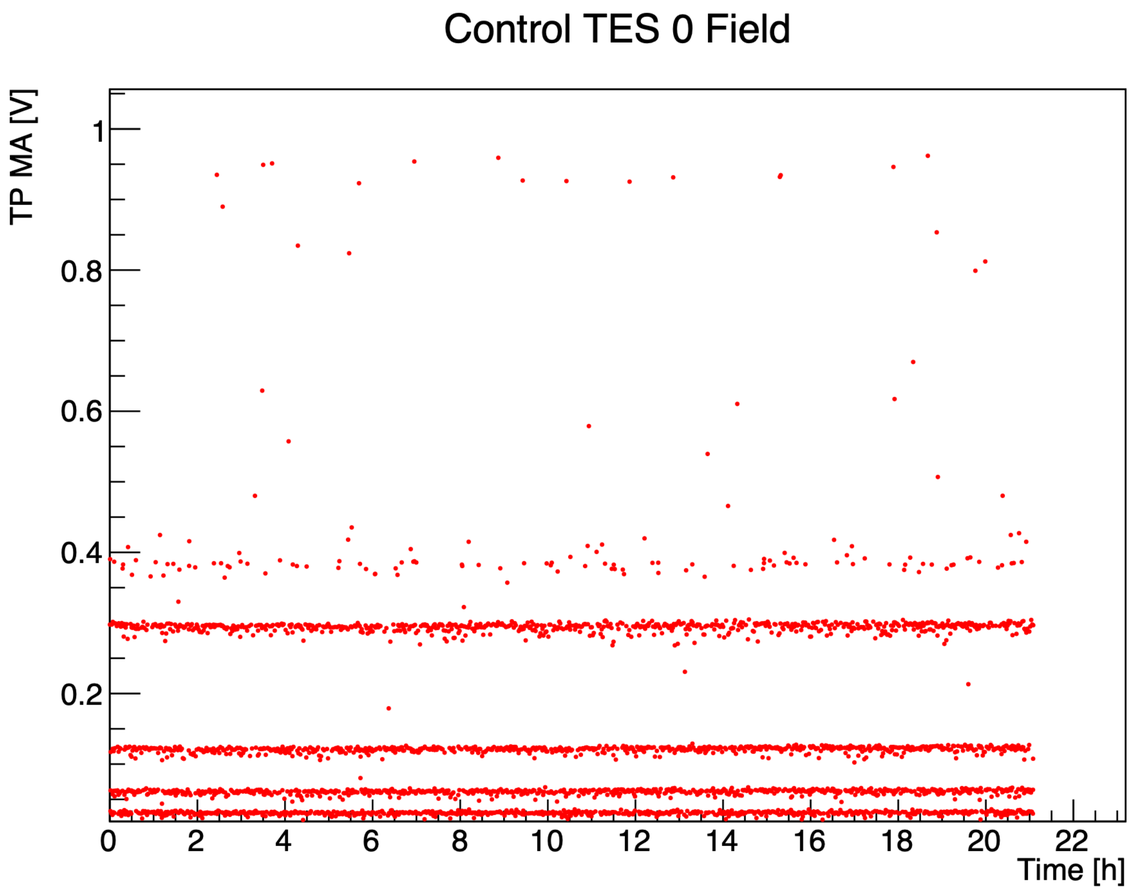


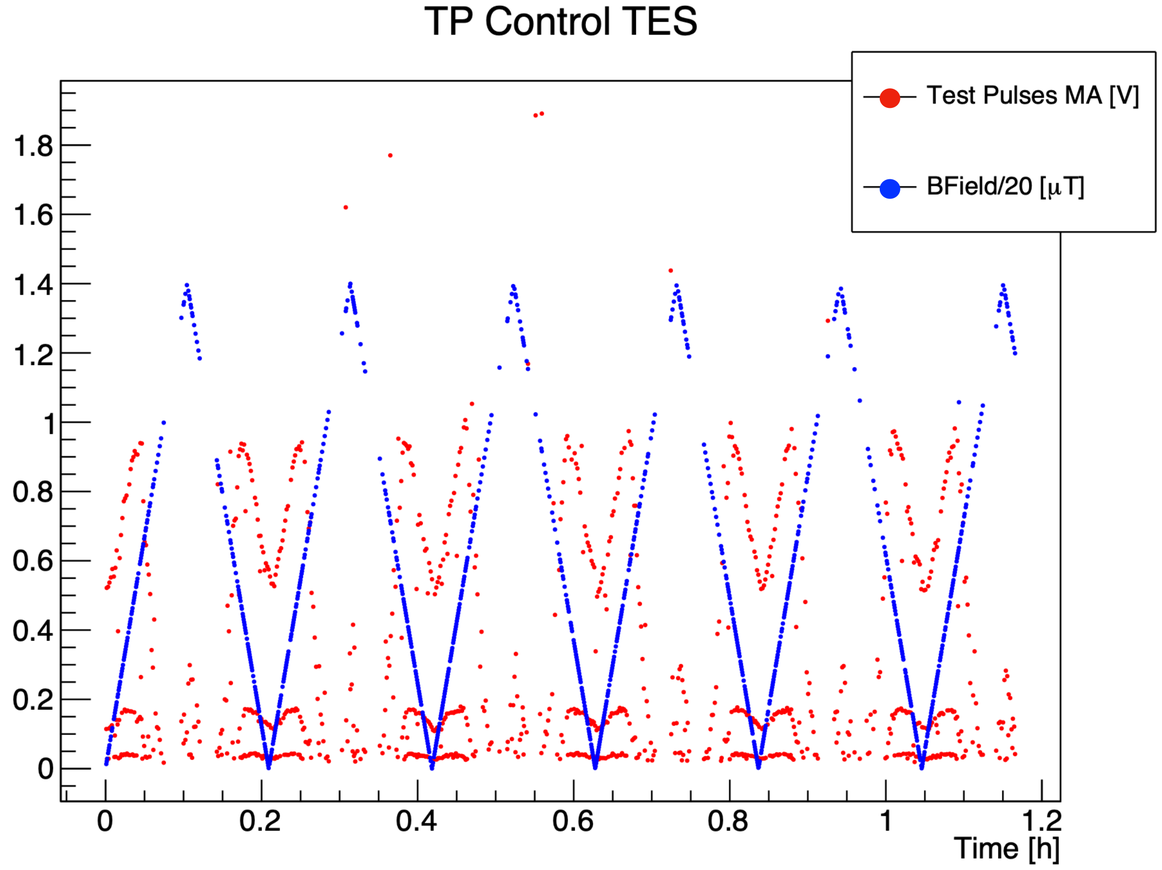




Comparison between the performance of the two TESs: Test Pulses

Variation of the magnetic field from 0 μT to **27.3 μT**





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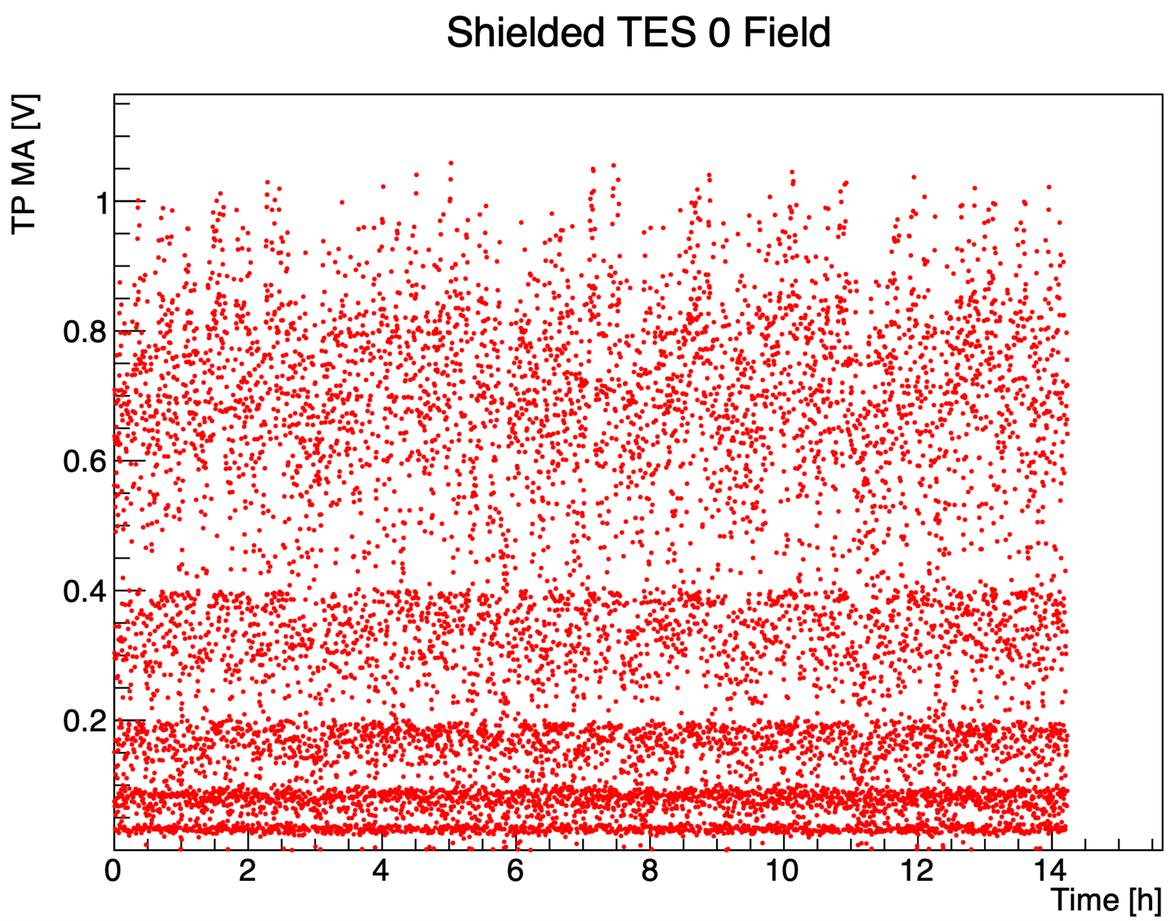
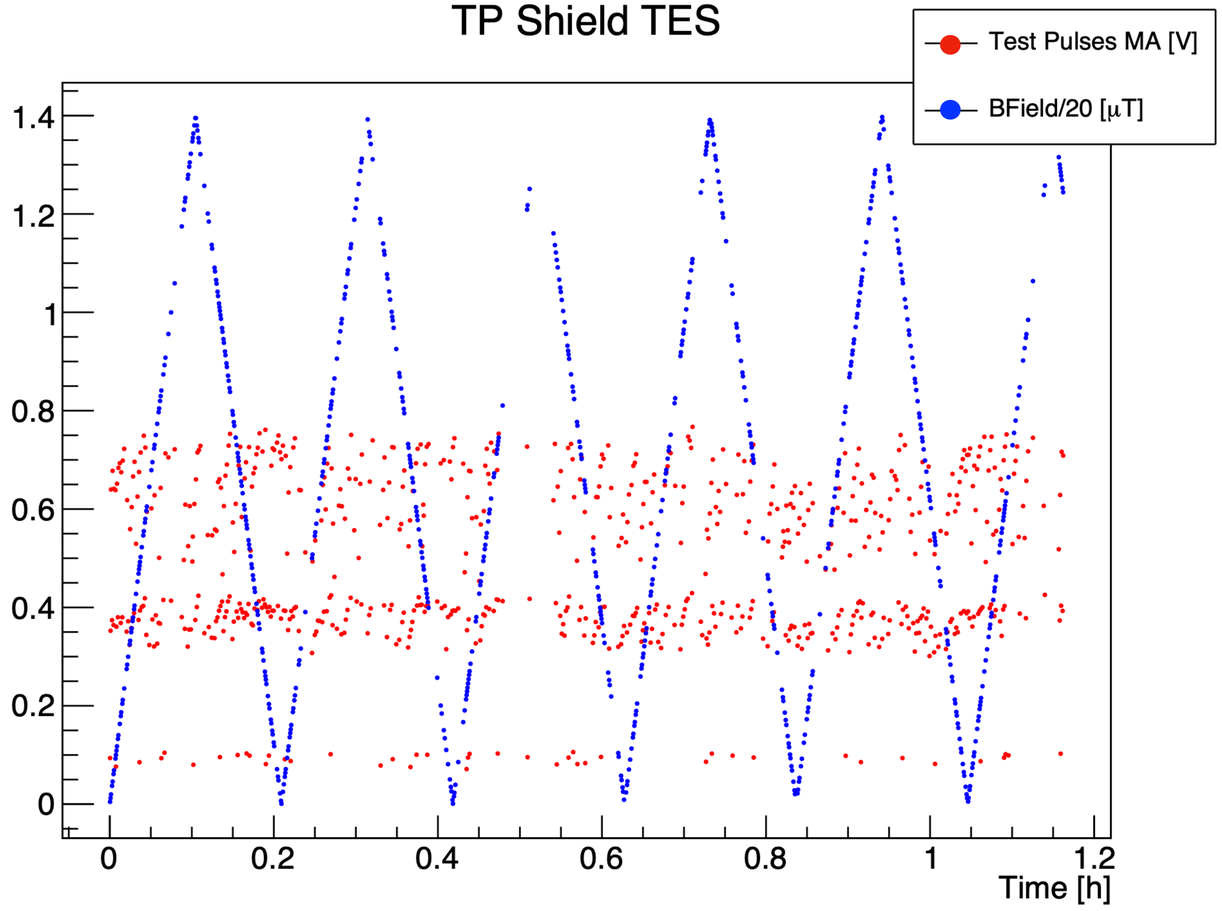




Summary and outlook

- New set up: magnetic shield→ classical set up + insulation & aluminium layer
- Stability of the shielded sensor in the presence of a B-Field improved

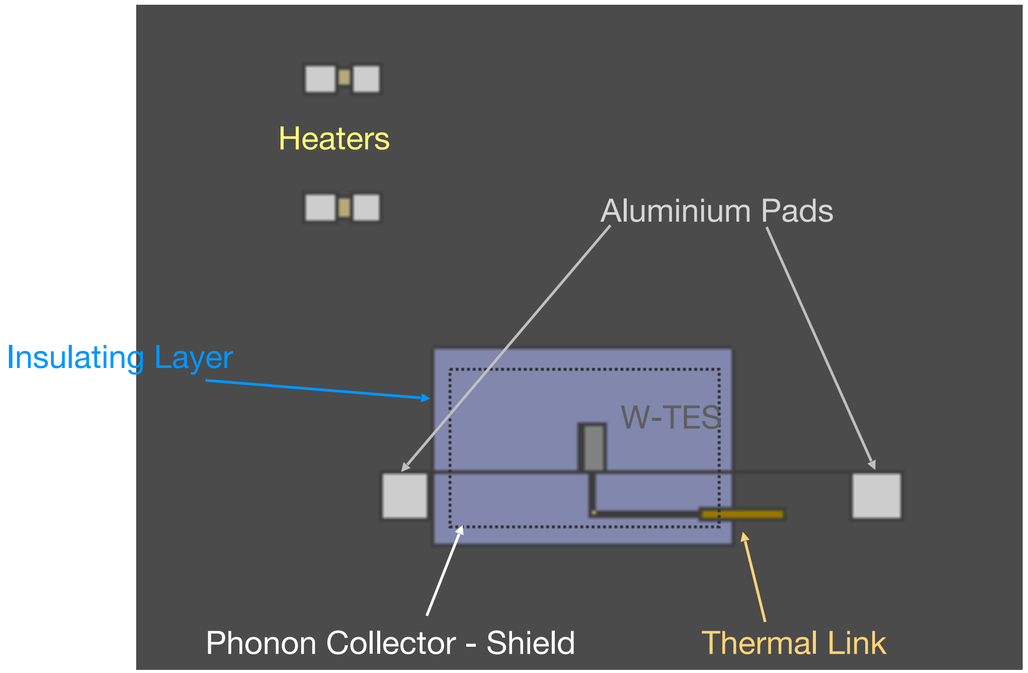
Future Steps: 

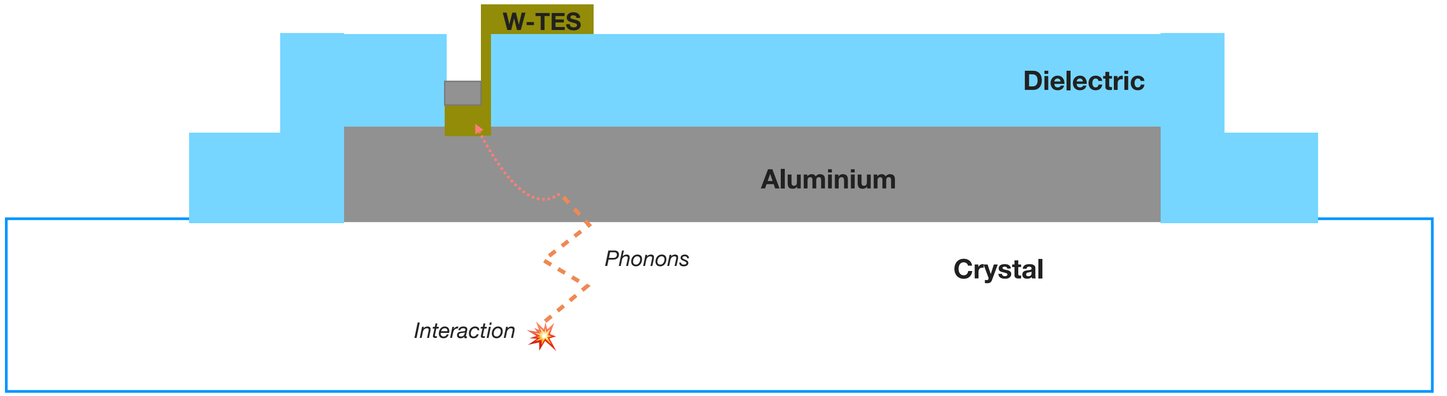
- New sensors: accumulate statistics + does the shield reduce their stability?
- Future design: Alu under the TES with the dual function of shield and phonon collector

BACK UP SLIDES

Possible solution

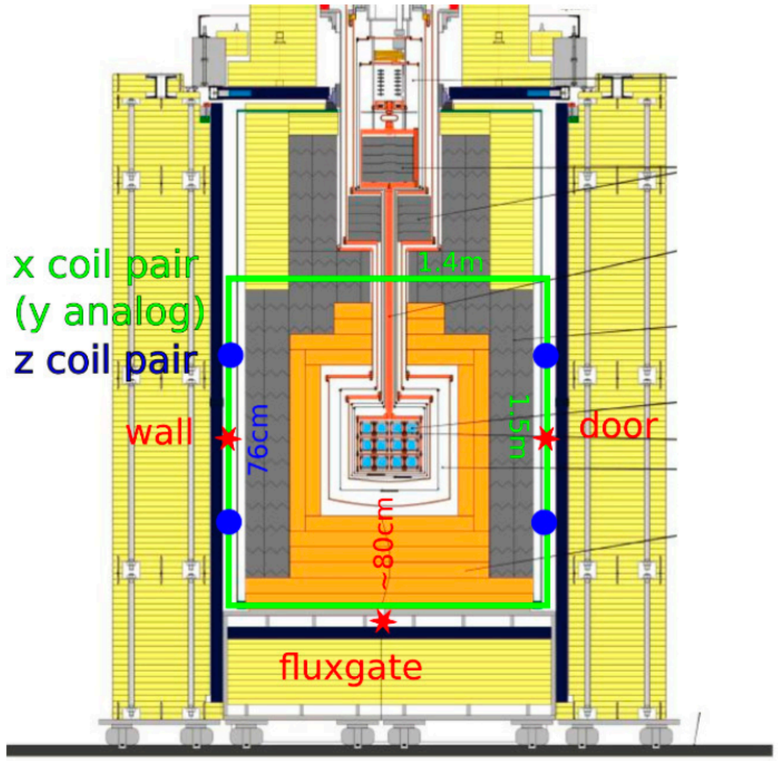
Use of the phonon collectors with the dual function of shield and phonon collectors

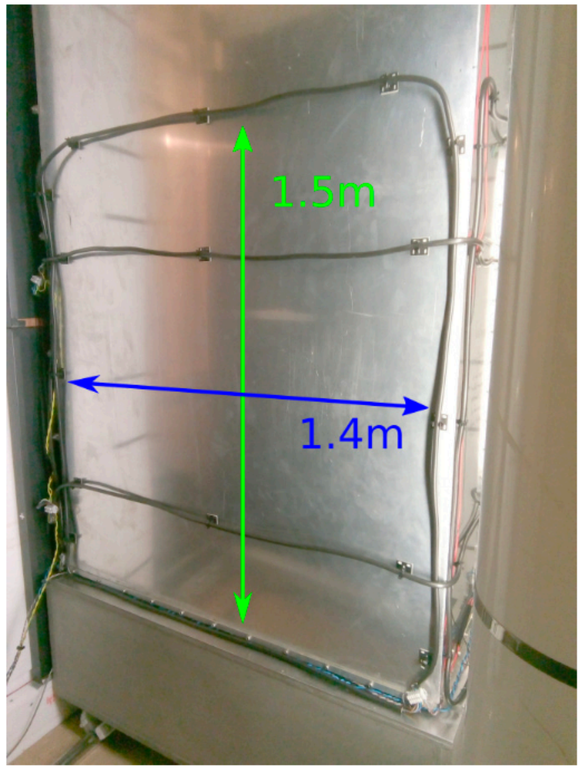




B-Fields compensation at the LNGS

Set of **magnetometers** and **coils**

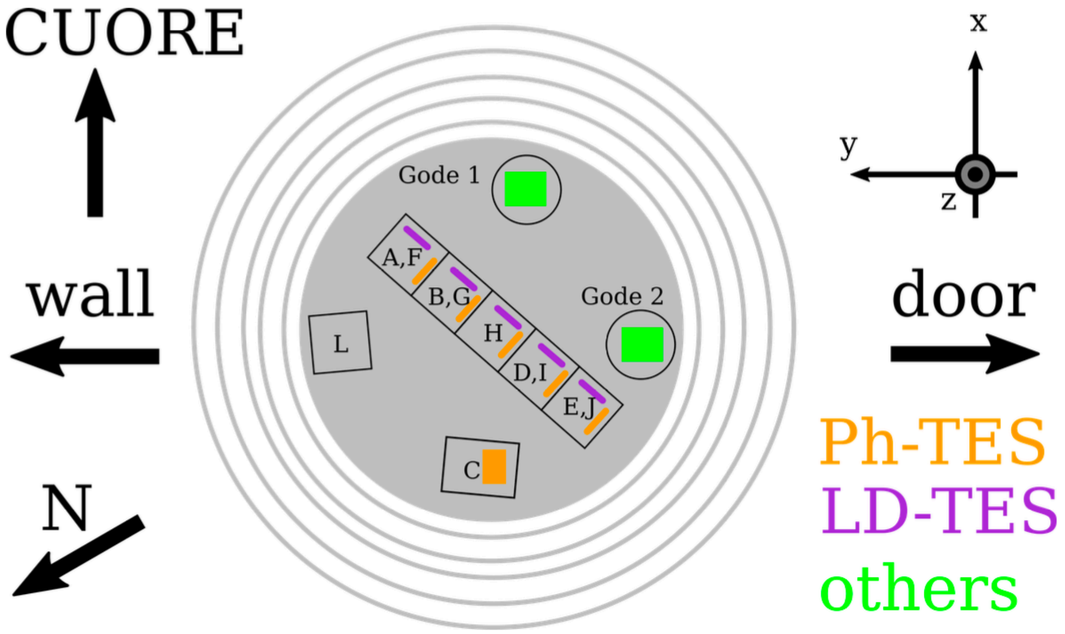


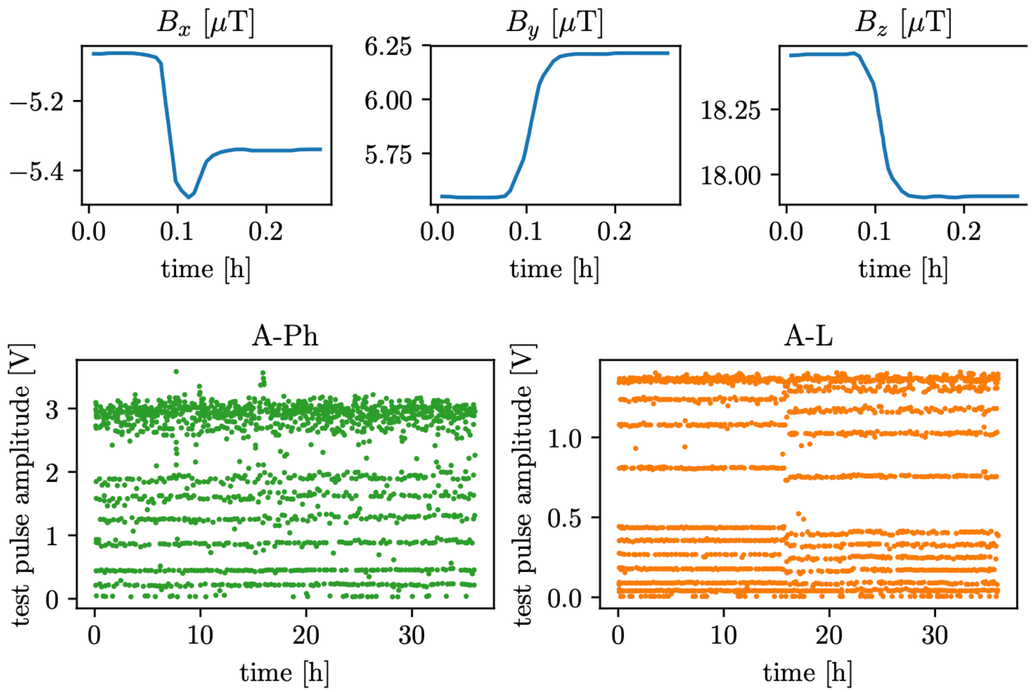


B-Field configuration con only be extrapolated ☹

B-Fields compensation at the LNGS

The TESs have different orientation ☹

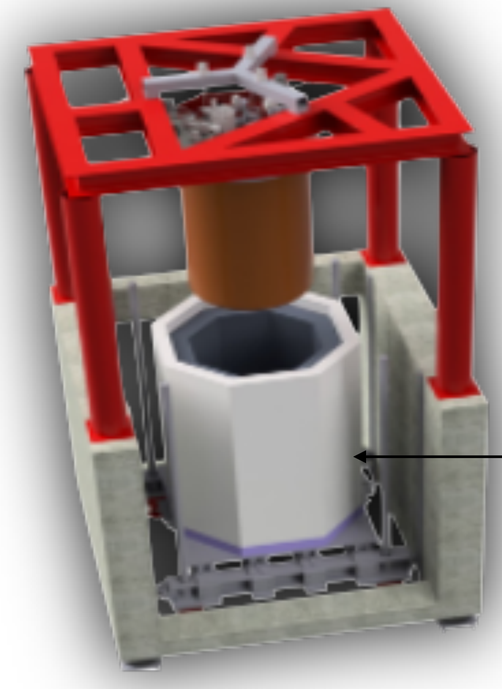




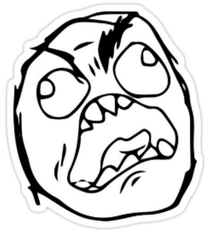
Maximum B-field variation @LNGS = **0.5 μT**

Why do B-Fields change at the LNGS?

Maximum B-field variation @LNGS = **0.5 μT**

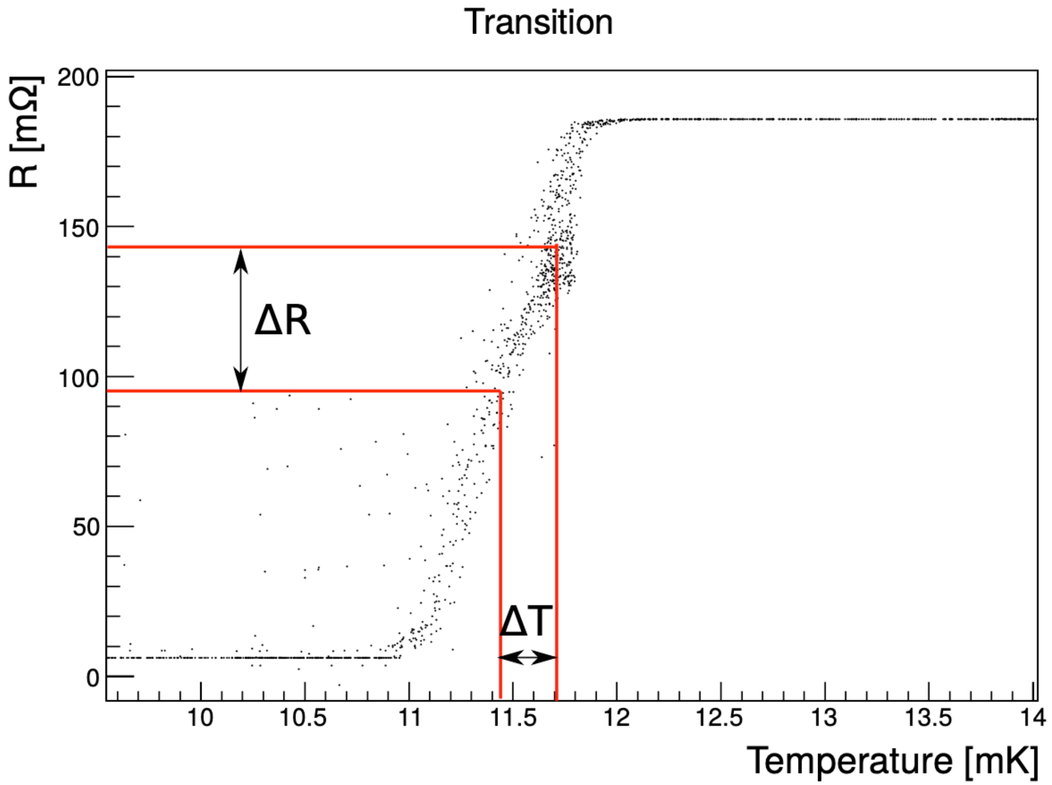


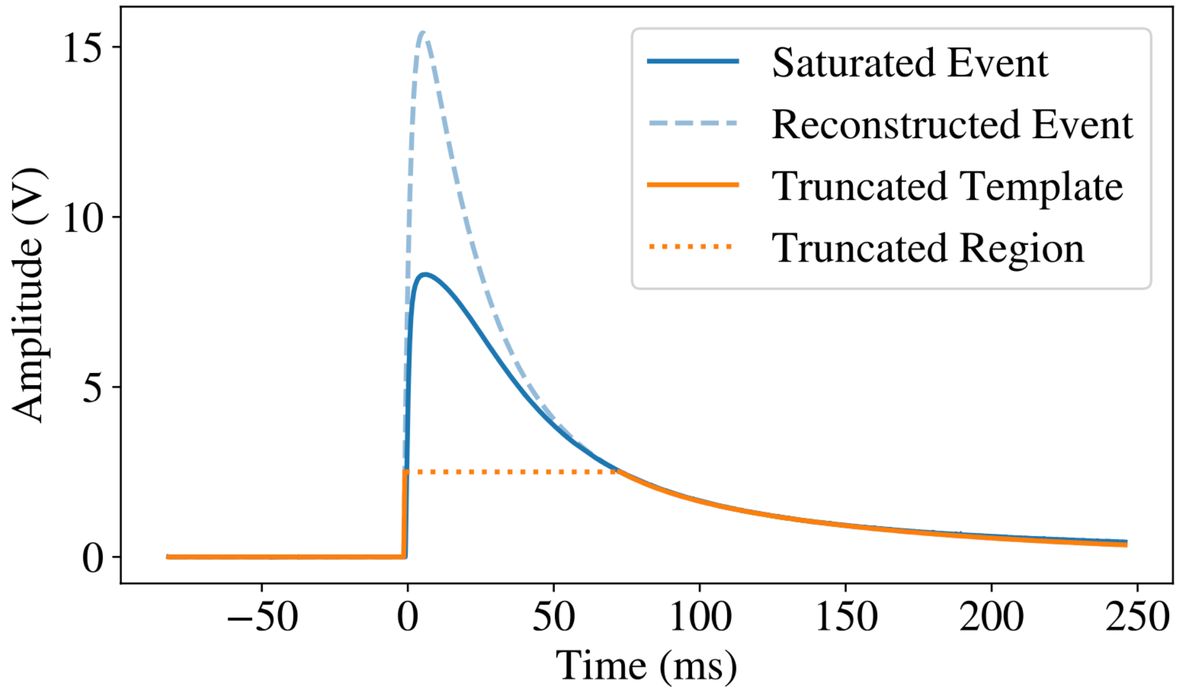
Lead Shield



CUORE
A search for neutrinoless double beta decay

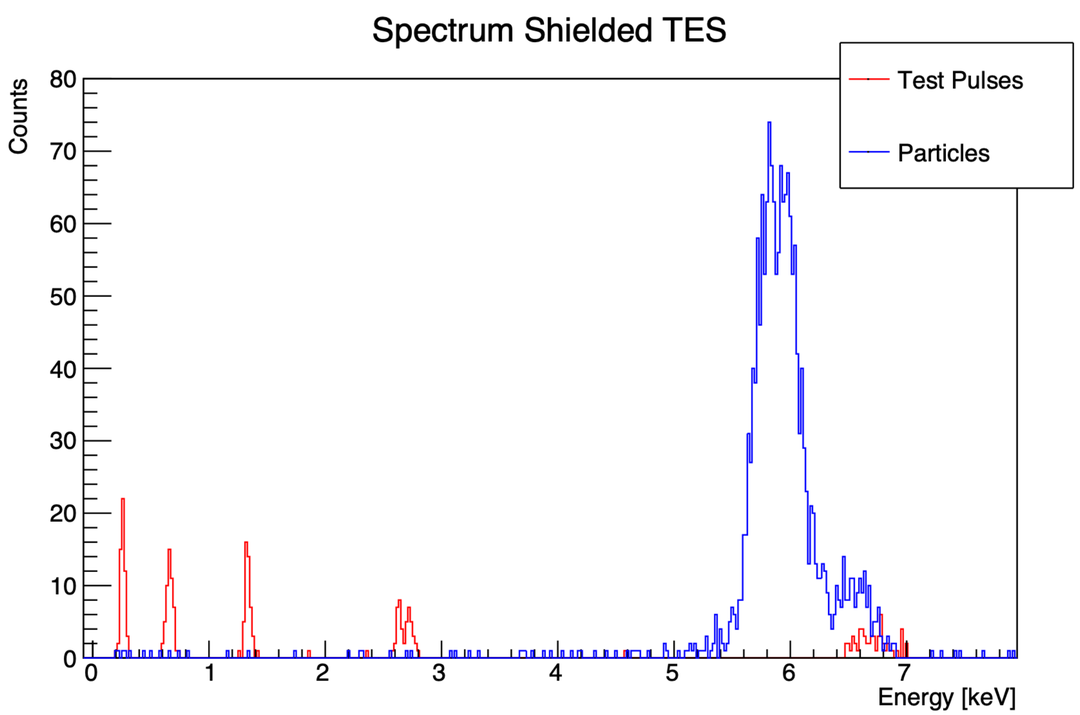
Truncated fit



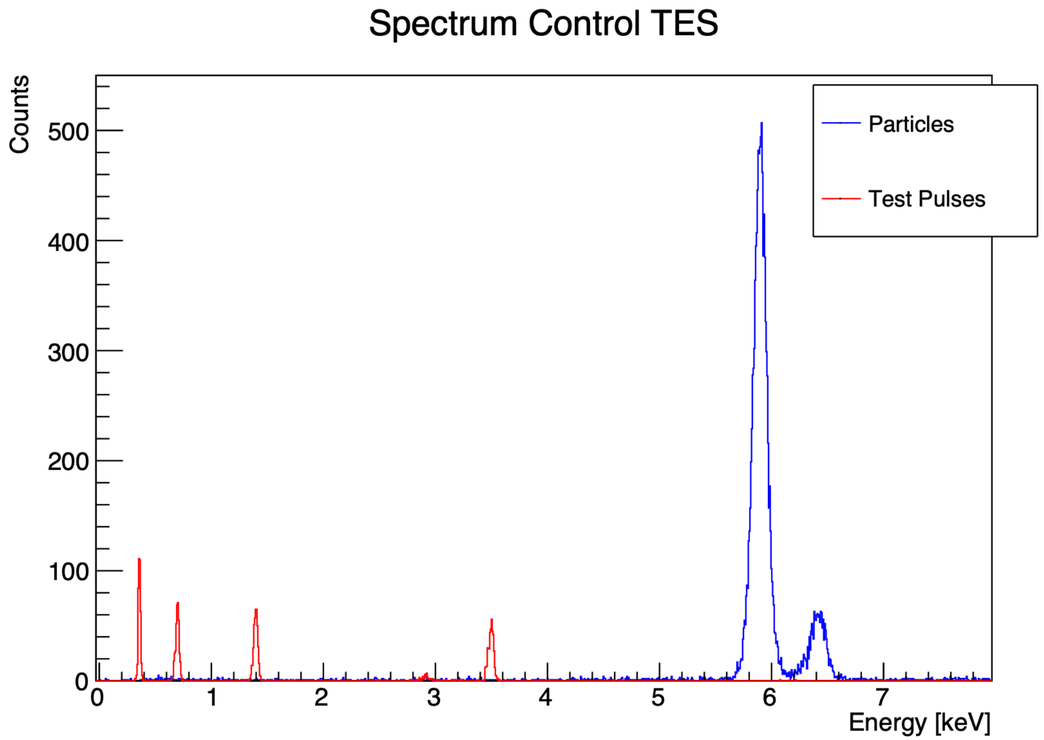


Spectra of the two detectors

- Goal: resolve the ^{55}Fe peaks to perform the calibration (two X-rays peaks at 5.89 keV and 6.49 keV)
- Due to its instability, the data cleaning greatly reduced the data set for the shielded sensor



BL Resolution Shield= (28 ± 2)eV



BL Resolution Control = (19 ± 5)eV