# Commissioning of a mobile neutron detector for LNGS

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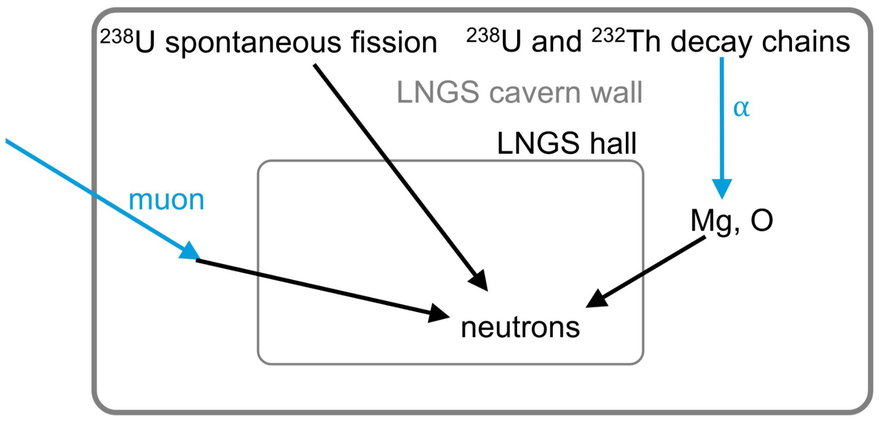
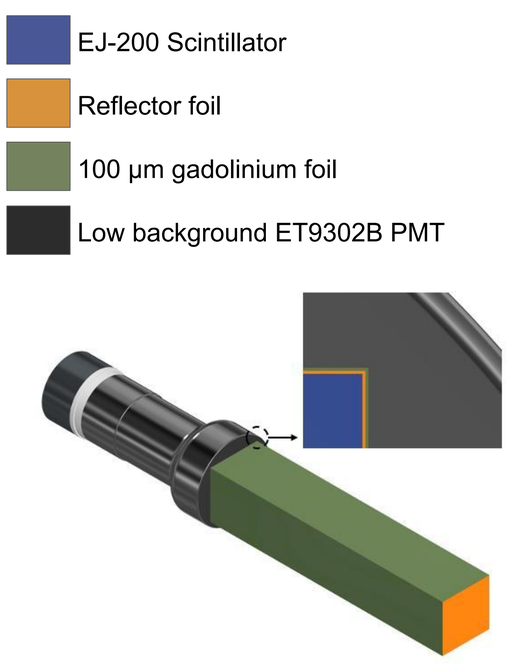
## LNGS neutron background

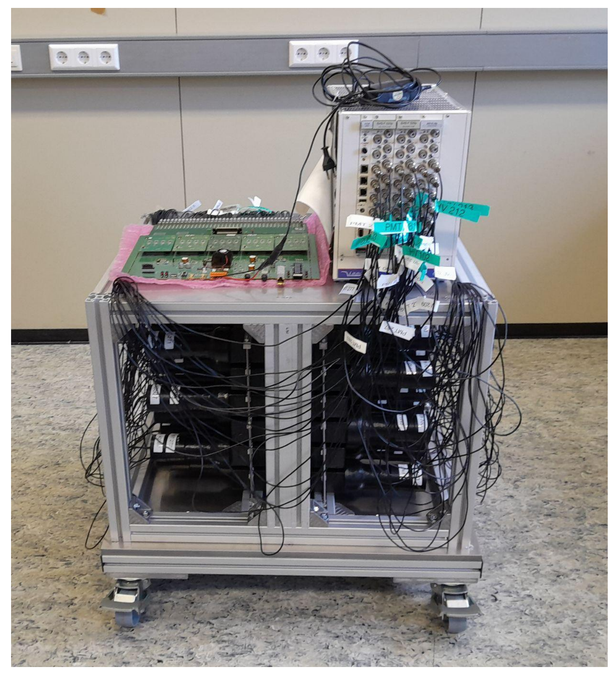
- Time and location dependent
- Complex direct comparison of previous measurements
- ALMOND (**A**n **L**NGS **Mo**bile **N**eutron **D**etector) is designed to overcome these challenges




## A capture-gated mobile spectrometer

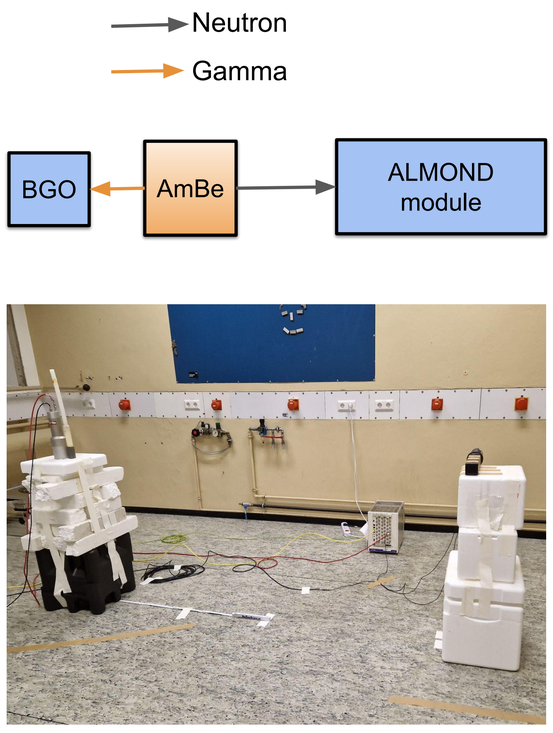



Scheme of a single 5 × 5 × 25 cm module.

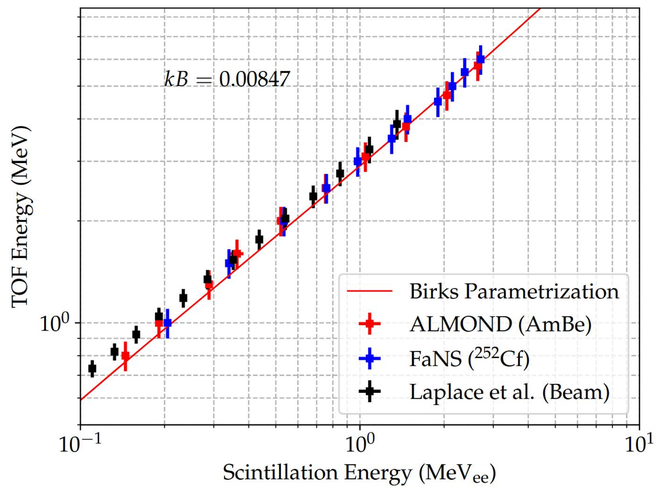


ALMOND in its calibration setup: a Bosch profile structure houses an array of 6 × 6 modules, DAQ board and HV supply on top, Pb sheets on side walls dismounted.

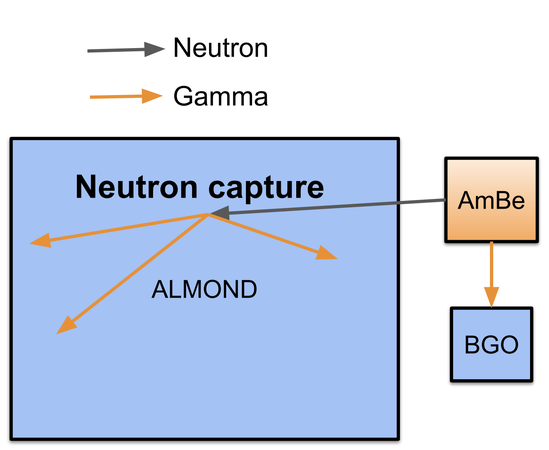
## Americium-Beryllium calibrations

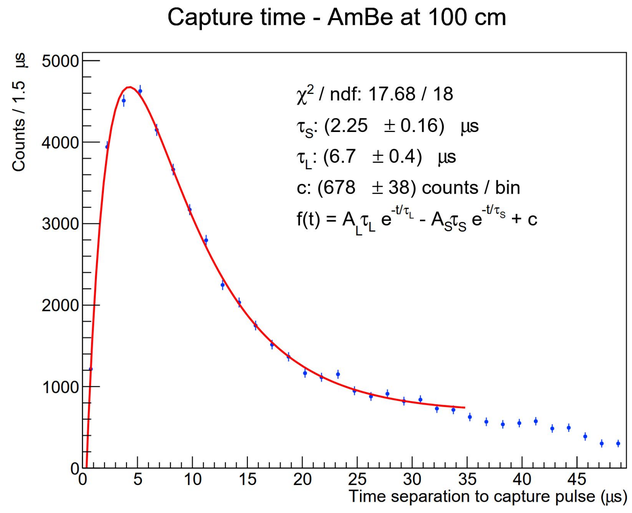





Neutron **time-of-flight** calibration with a single module

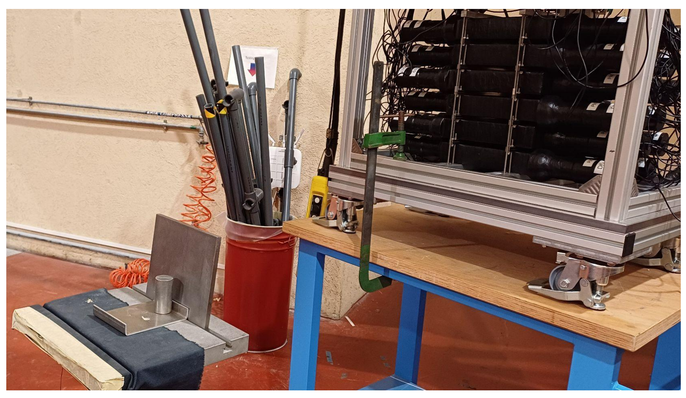


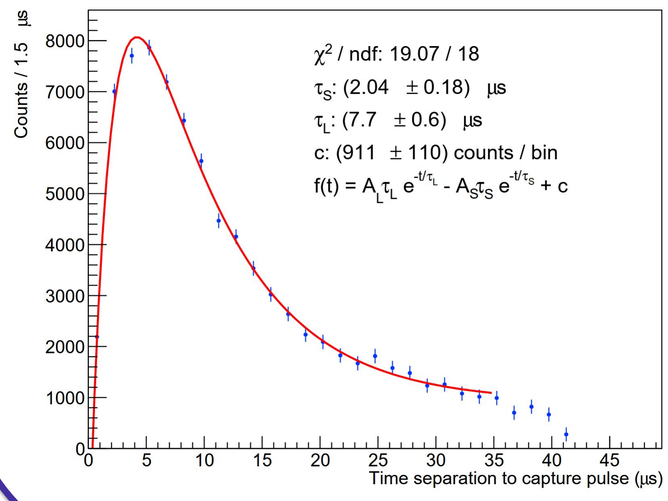

- Energy calibration and capture time measurement with a tagged AmBe source at KIT
- Detection based on **neutron capture** in gadolinium foils and BGO tagging

## Calibrations at ENEA Frascati

### **Americium-Boron** source

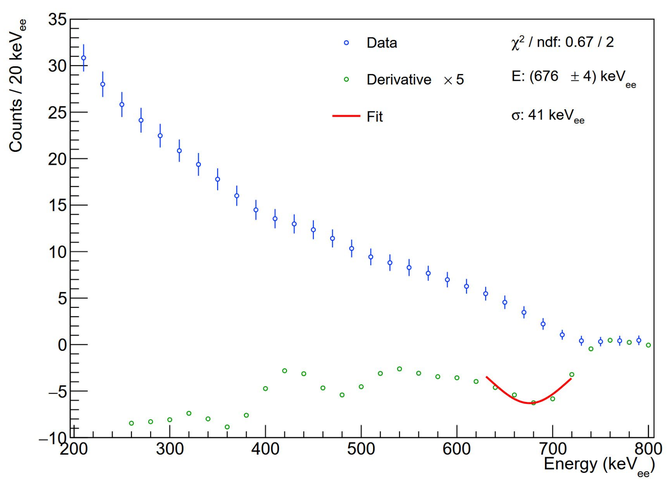


Capture time - AmB at 140 cm

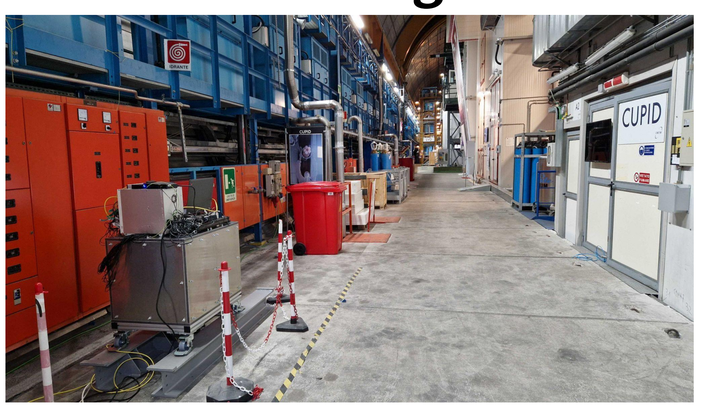



### DD generator

Single scatter events in the fiducial volume




## Commissioning at LNGS




- Currently taking data in Hall A
- Planned measurements in other areas of LNGS