



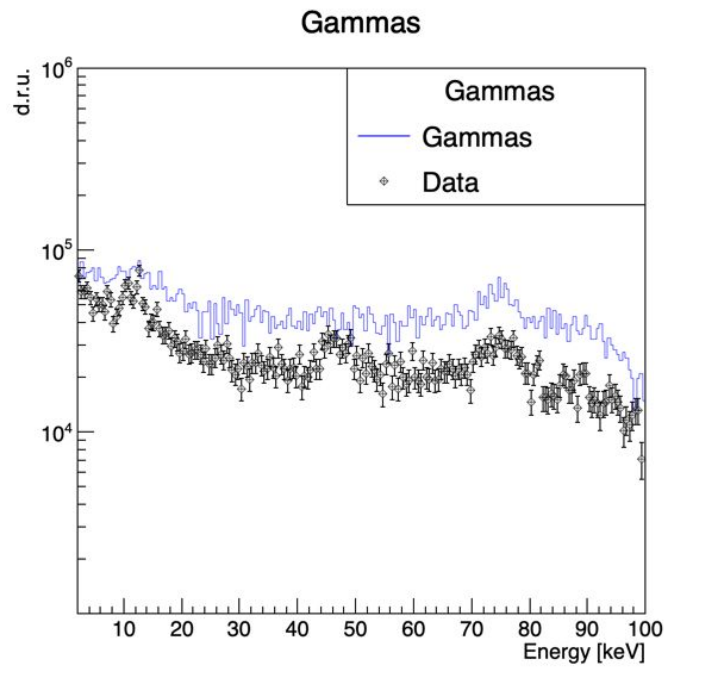
Mild shield at Sapienza data-simulation discrepancy

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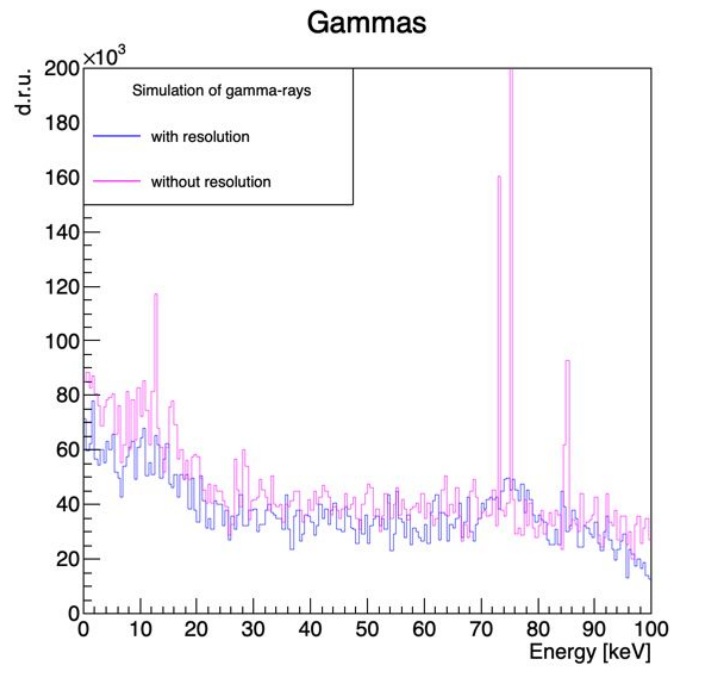
Digest, 12/11/2025

BULLKID at Sapienza

- A discrepancy between data and simulations was observed
- The analysis code includes the detector resolution



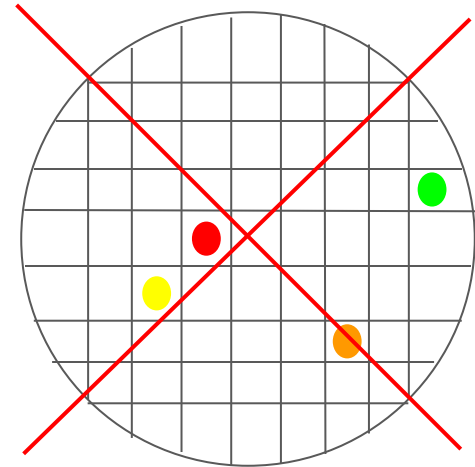
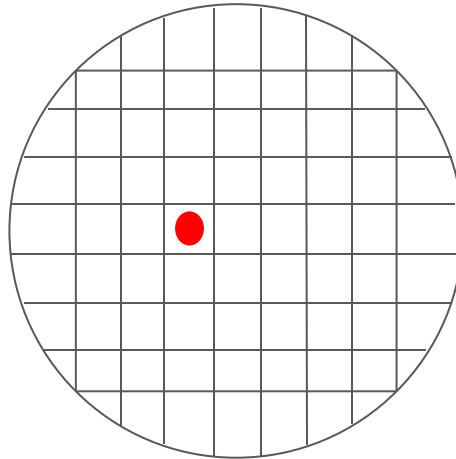
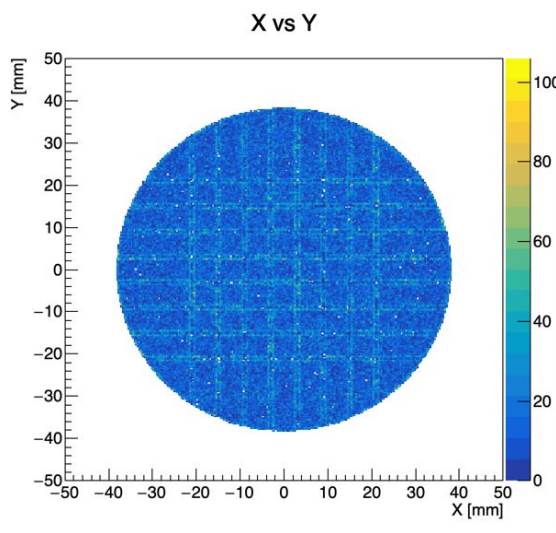
- MC/data comparison



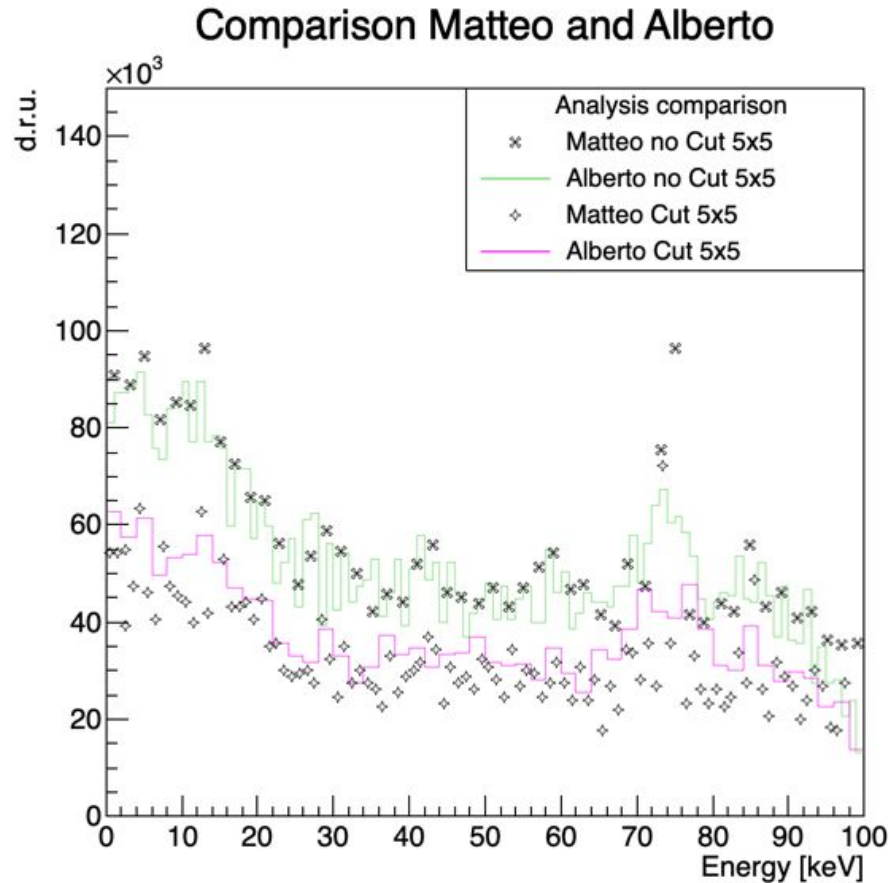
- Resolution implemented

BULLKID at Sapienza

- Two analysis (Matteo and Alberto) of the simulation have been performed
 - an agreement has been reached
- Cut implemented
 - interaction in only one die of the disk

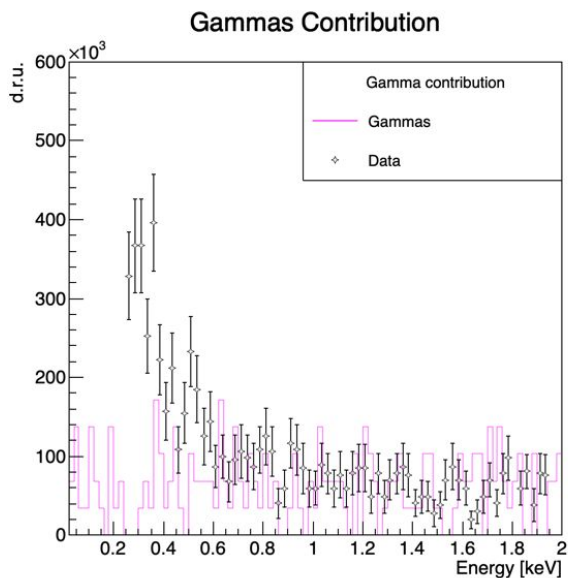


Analysis comparison

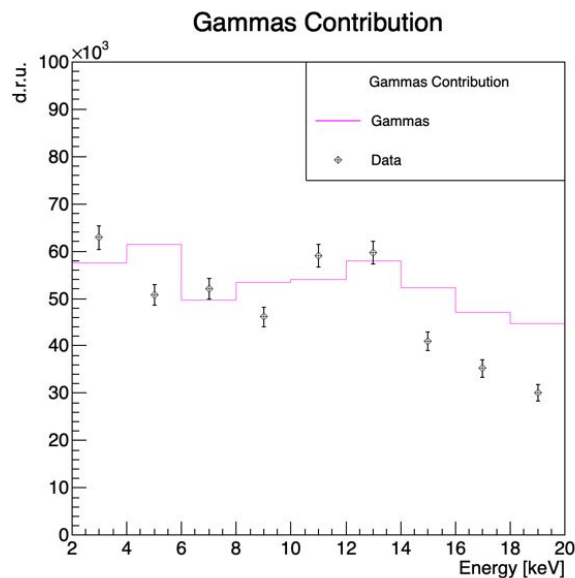


BULLKID at Sapienza: difference between data and simulations

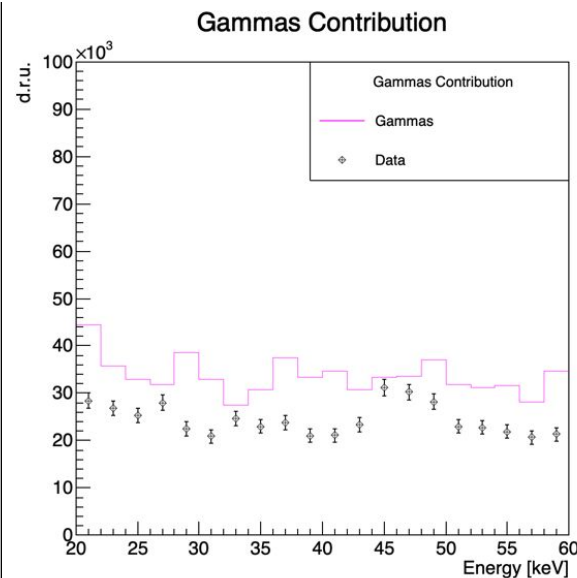
- Discrepancy between data and simulations persists above 14 keV



0-2 keV



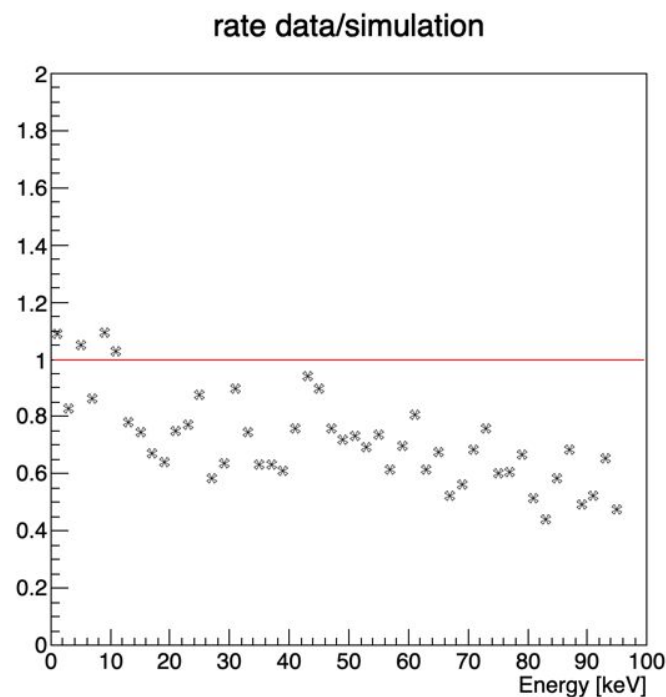
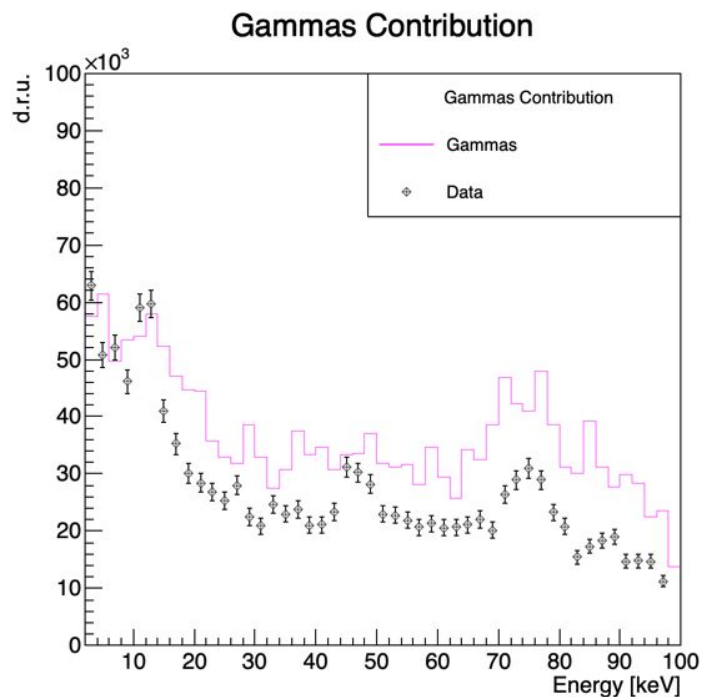
2-20 keV



20-60 keV

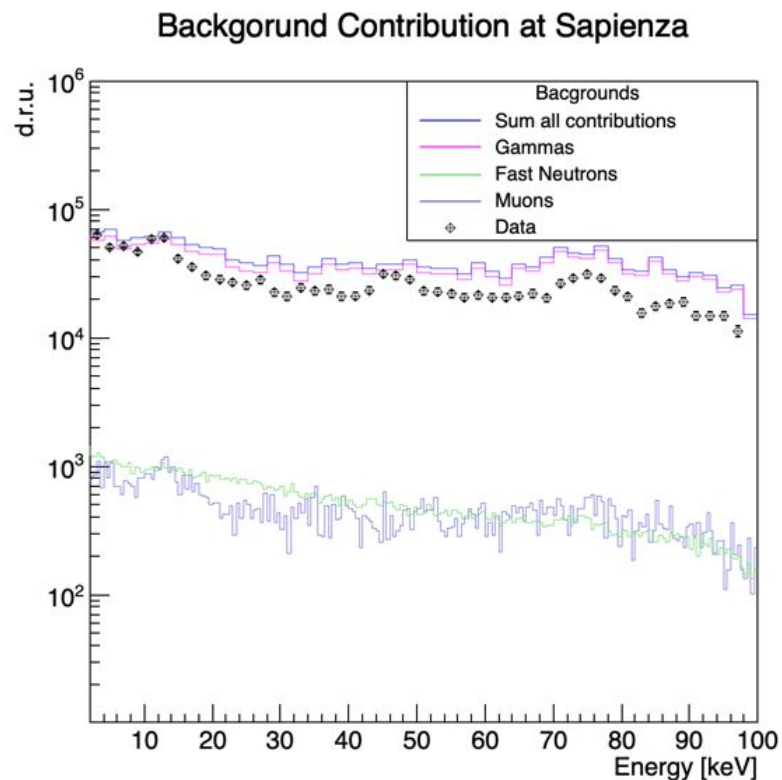
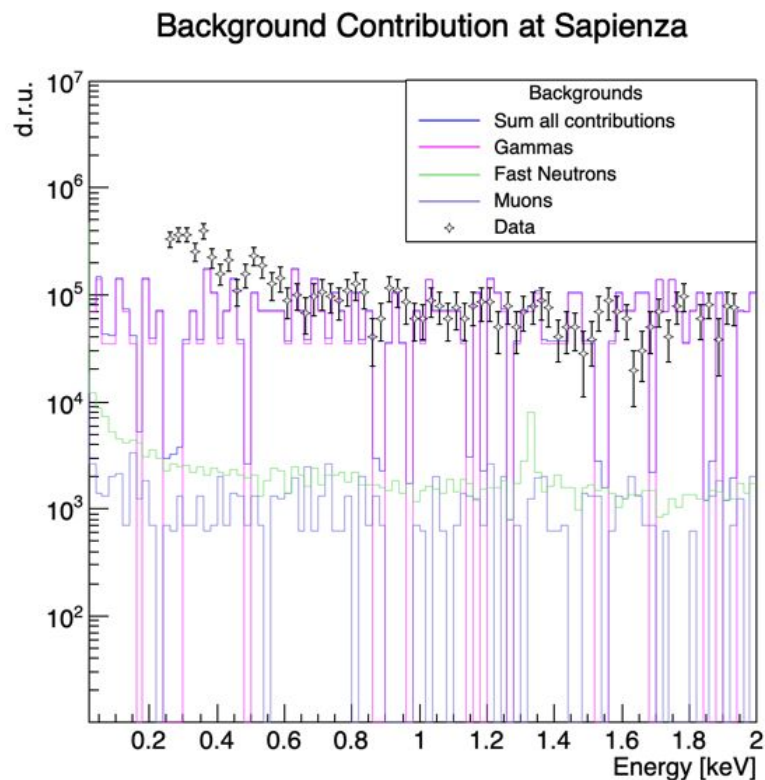
BULLKID at Sapienza: difference between data and simulations

- The discrepancy between data and simulation increases with the energy
 - errors to be included



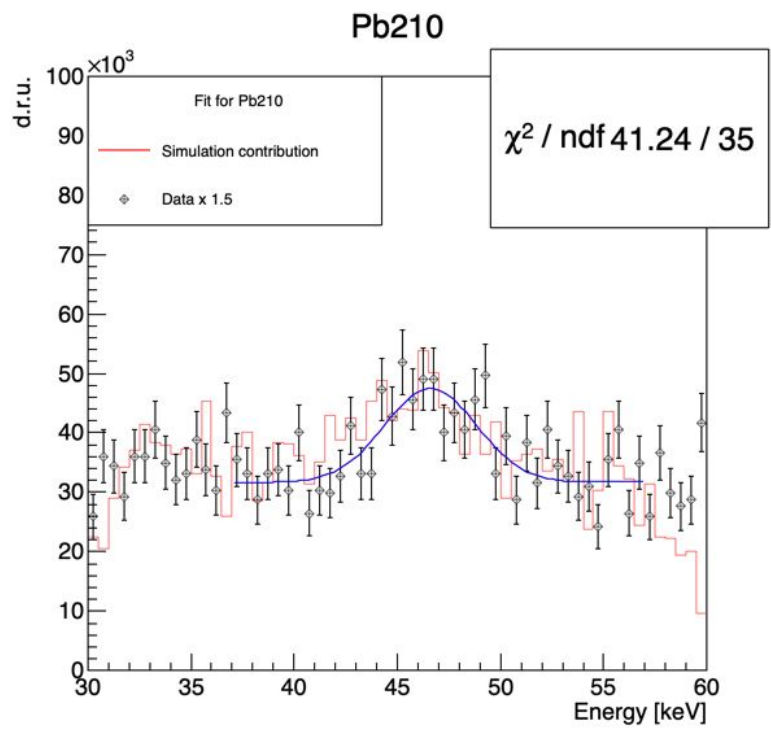
Background Contributions for BULLKID at Sapienza

- Gammas, fast neutrons and muons simulated



Activity of the lead

- Lead from the holder has a contribution to signal
- Estimation for the activity of ^{210}Pb
 - A gaussian + linear fit
 - parameters from TMinut
 - $\mu = 46.6 \pm 0.4$
 - $\sigma = 2.2 \pm 0.4$
 - Compute integral from the gaussian
 - Activity: 33.3 Bq/kg
- For comparison examples from SNOLAB Low Background Counting Facility
 - lead sample from Soudan 18-116 Bq/kg
 - lead sample from DAMIC 44.3 Bq/kg



Summary

- The two analysis (Matteo and Alberto) of the simulation are in agreement with each other
- Cut: only one interaction in the wafer per event in a single die
- The discrepancy between data and simulation increases with the energy
 - the geometry in the simulation is as close as possible to the experimental setup
 - we will check other physics list
- Activity of ^{210}Pb in the lead holder
 - 33.3 Bq/kg