

Experimental Validation of the LabSOCS Detector

Efficiency Simulation

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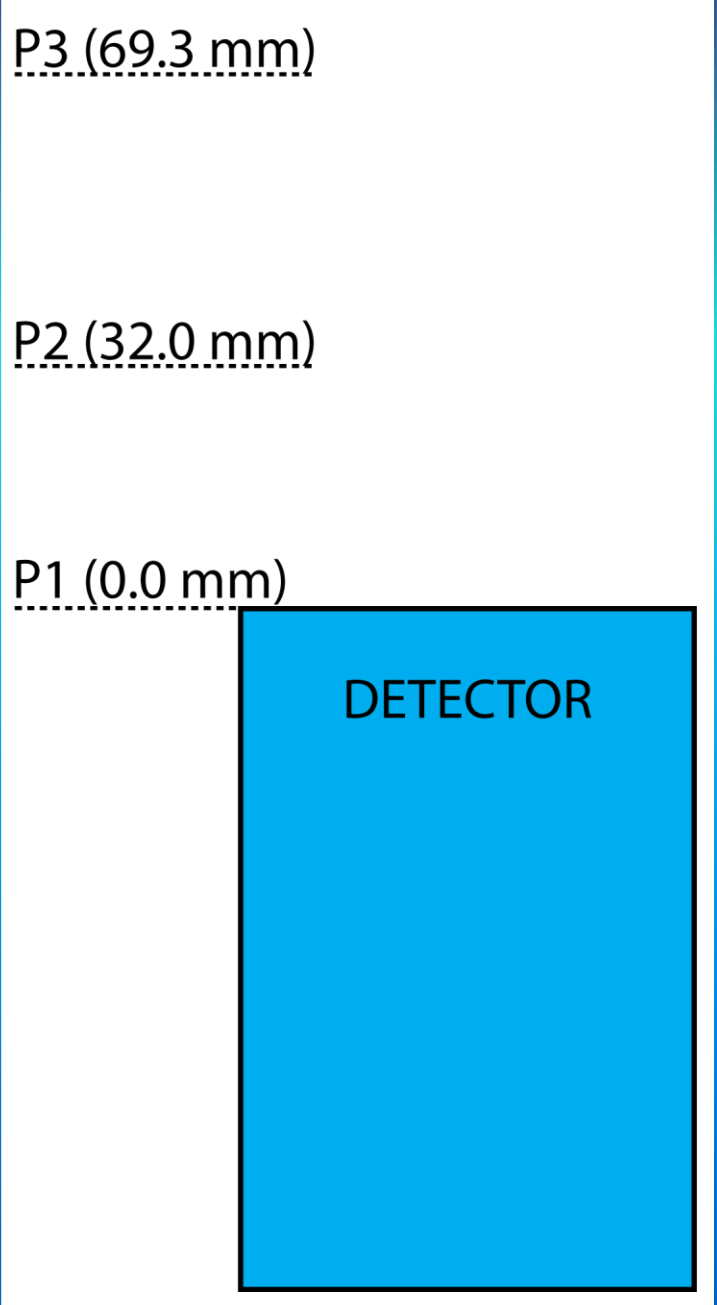
- Gamma spectroscopy measurements often require precise knowledge of the detection efficiency;
 - Experimental calibration
 - Time consuming;
 - Source geometry can be an issue;
 - **RELIABLE!**
 - Monte Carlo simulation
 - Fast & (rather) easy with commercial software;
 - Can accommodate different sample geometries;
 - **RELIABLE?**



AIM OF THIS PAPER:
To assess the reliability of the LabSOCS Monte Carlo efficiency calculation for point-like sources at different geometries!

Method

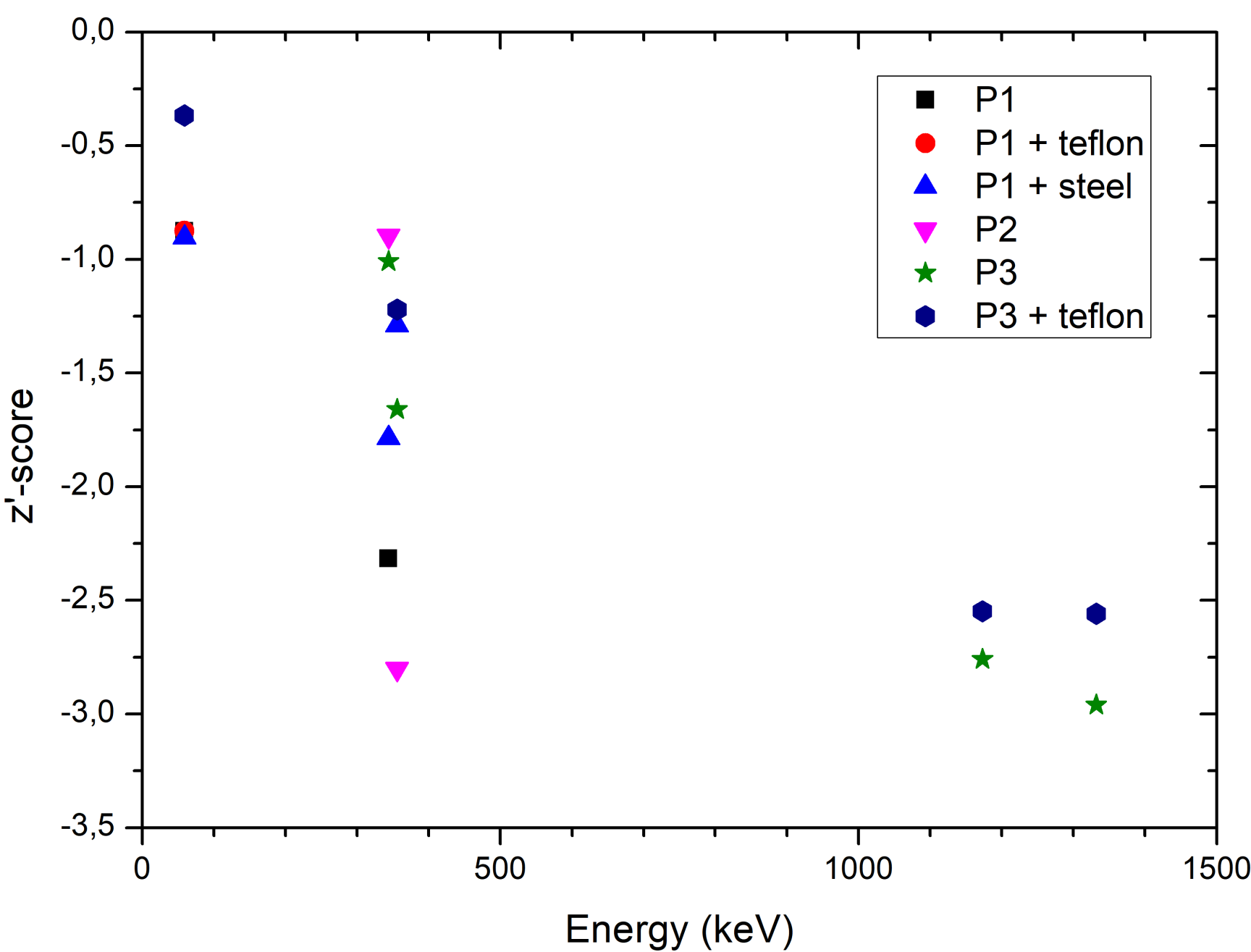
- Calibrated sources:
 - ²⁴¹Am (60 keV)
 - ⁶⁰Co (1173 and 1333 keV)
 - ¹³³Ba (main E_γ = 356 keV)
 - ¹⁵²Eu (main E_γ = 344 keV)
- 3 positions (P1, P2, P3);
- 3 absorbers (+ combinations)
- Use LabSOCS efficiencies
- Calculate source activities and compare to certified values.



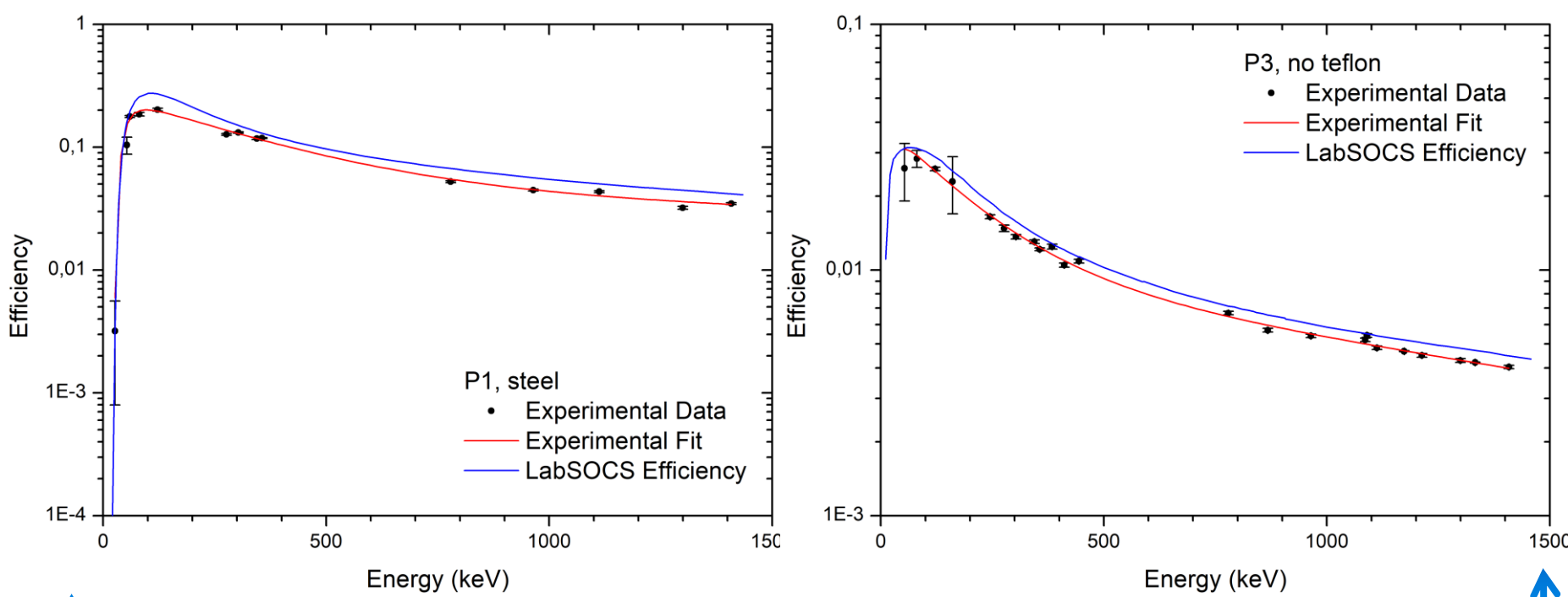
- "teflon" (3.68mm, teflon)
- "holder" (1.30mm, acrylic)
- "steel" (0.38mm, stainless steel)

Results

- How good is the simulated value?



- Z'-scores < 3, but...
- ALL calculated activities were lower than expected!!
 - **POSSIBLE SYSTEMATIC OVERESTIMATION OF ϵ_γ**



- Simulations with source **in the face of the detector** or with **no absorber** gave equally unsatisfactory results;
- TEST: changing d_{sd} from 32 to 33mm reduced ϵ_γ by 2-3%

- Calculations are **VERY sensitive to minimal differences in distances!**

Conclusion

Use LabSOCS with care, at least for point sources.