

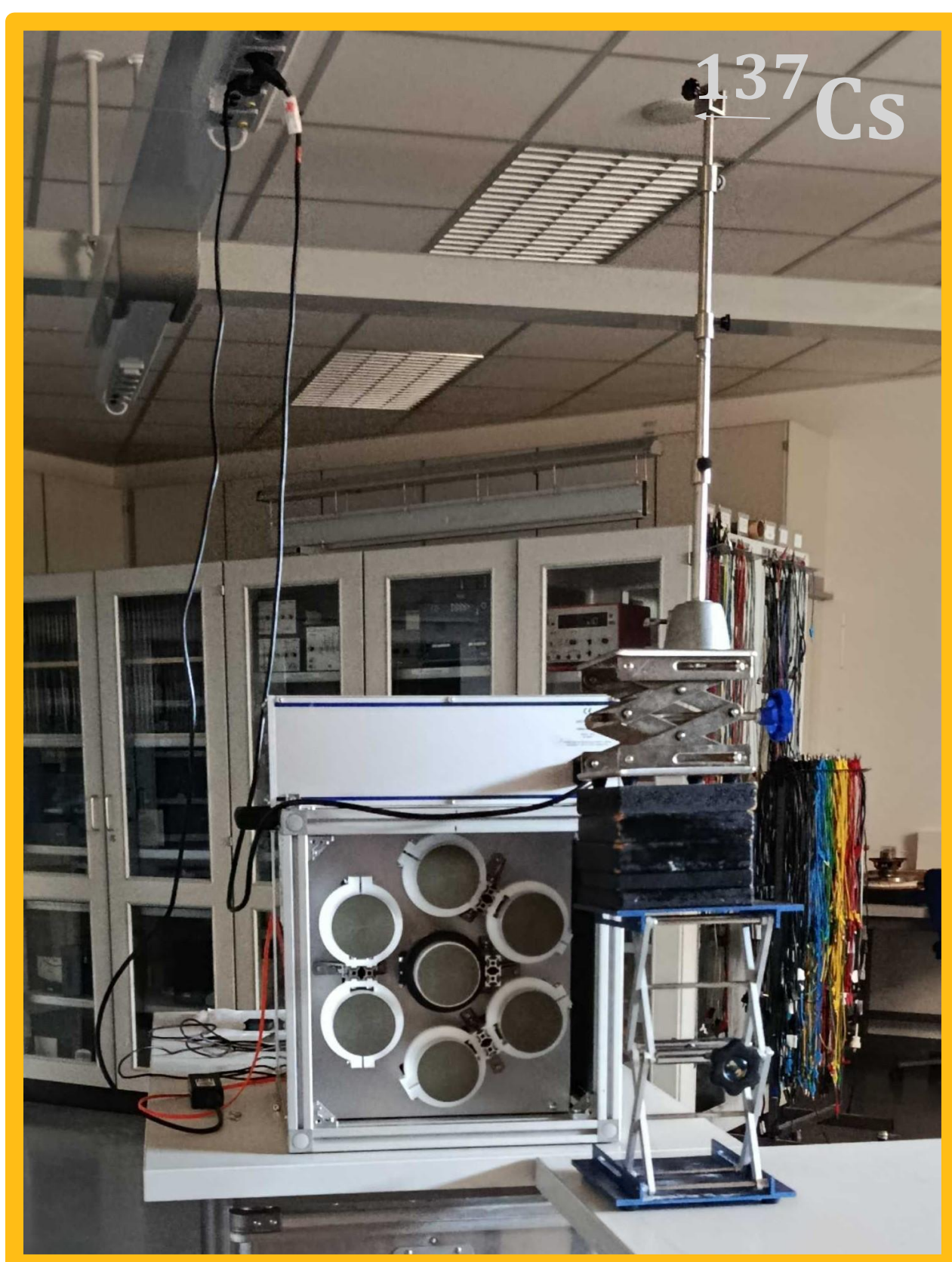
Calibrating a Compton Camera in the lab

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We use radioactive sources to calibrate the prototype of a Compton Camera. The Radiation Source Locator 7 (RSL7) serves as a test instrument in the decommissioning of nuclear power plants. In the current decommissioning process, wall sections are divided into several measurement areas of 1m^2 , and their gamma-ray spectra are measured individually to detect possible contaminations with different radioactive isotopes. Of particular interest here are ^{137}Cs (662 keV) and ^{60}Co (1173 and 1332 keV). To simplify this process by measuring whole rooms at once, we reduce the time to estimate upper limits. Together with our project partners, Hellma Materials GmbH (Jena), Brenk Systemplanung GmbH (Aachen), the Fraunhofer FKIE (Euskirchen), and the JGU Mainz, we investigate the capabilities of the RSL7 towards a new concept and improved prototype for terrestrial gamma-ray imaging.

LAB MEASUREMENTS



^{137}Cs (700 kBq, 190 kBq)
and ^{60}Co (24 kBq)

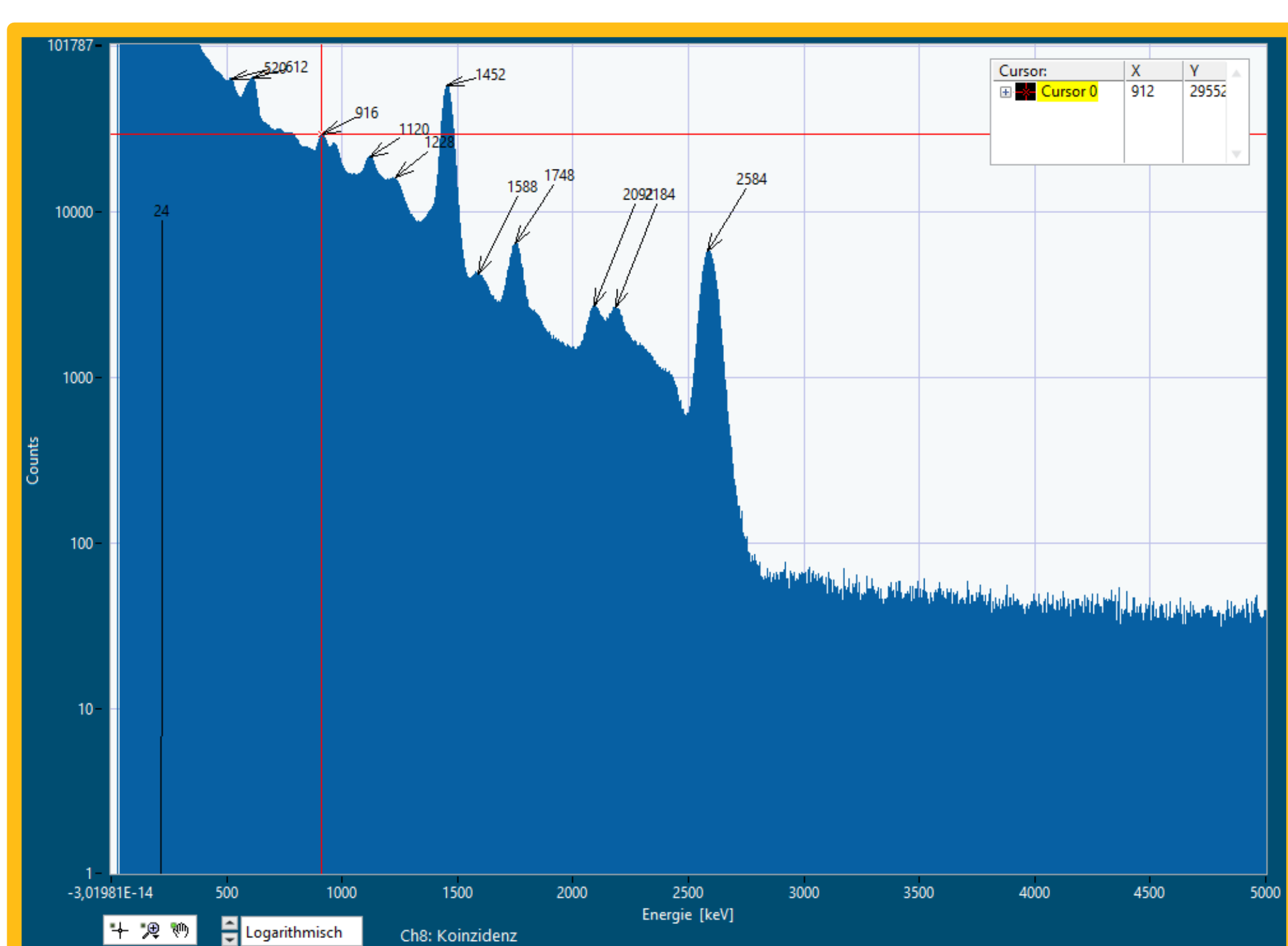
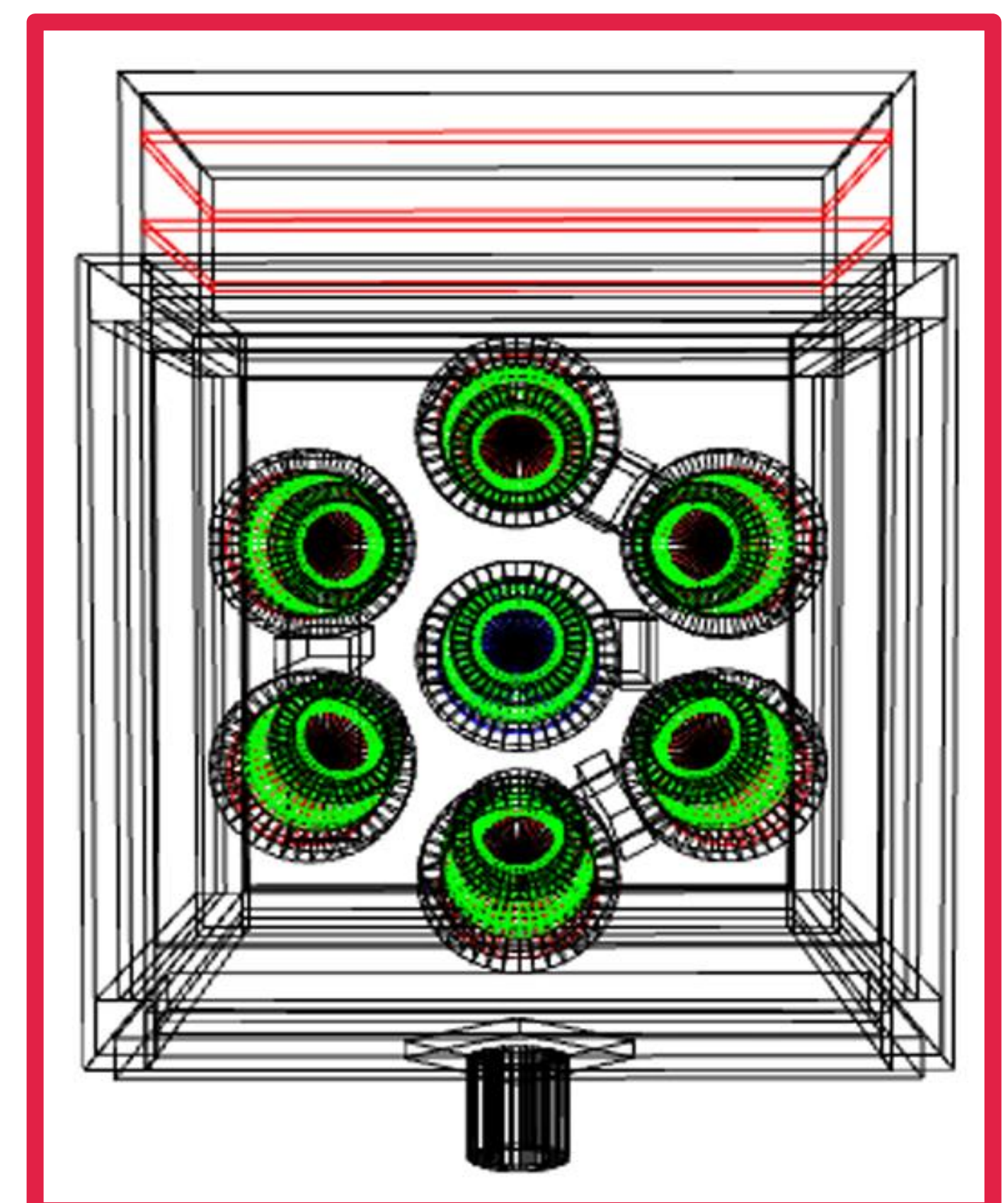
50 keV – 3 MeV

$4\pi\text{sr}$ sensitivity

Sources distances output

$$\phi = \arccos\left(1 - \frac{E_0}{E_{m,2}} + \frac{E_0}{E_{m,1} + E_{m,2}}\right)$$

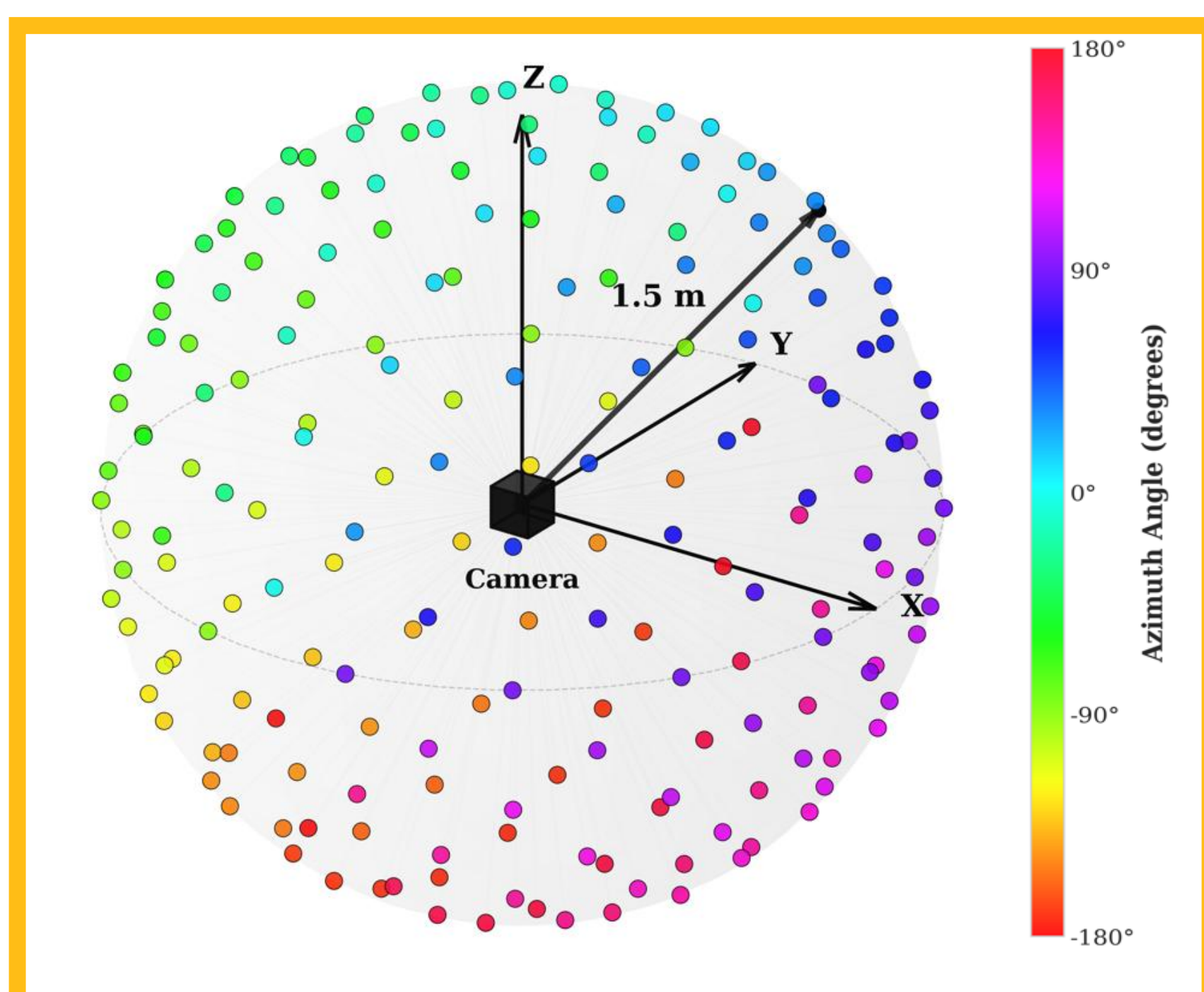
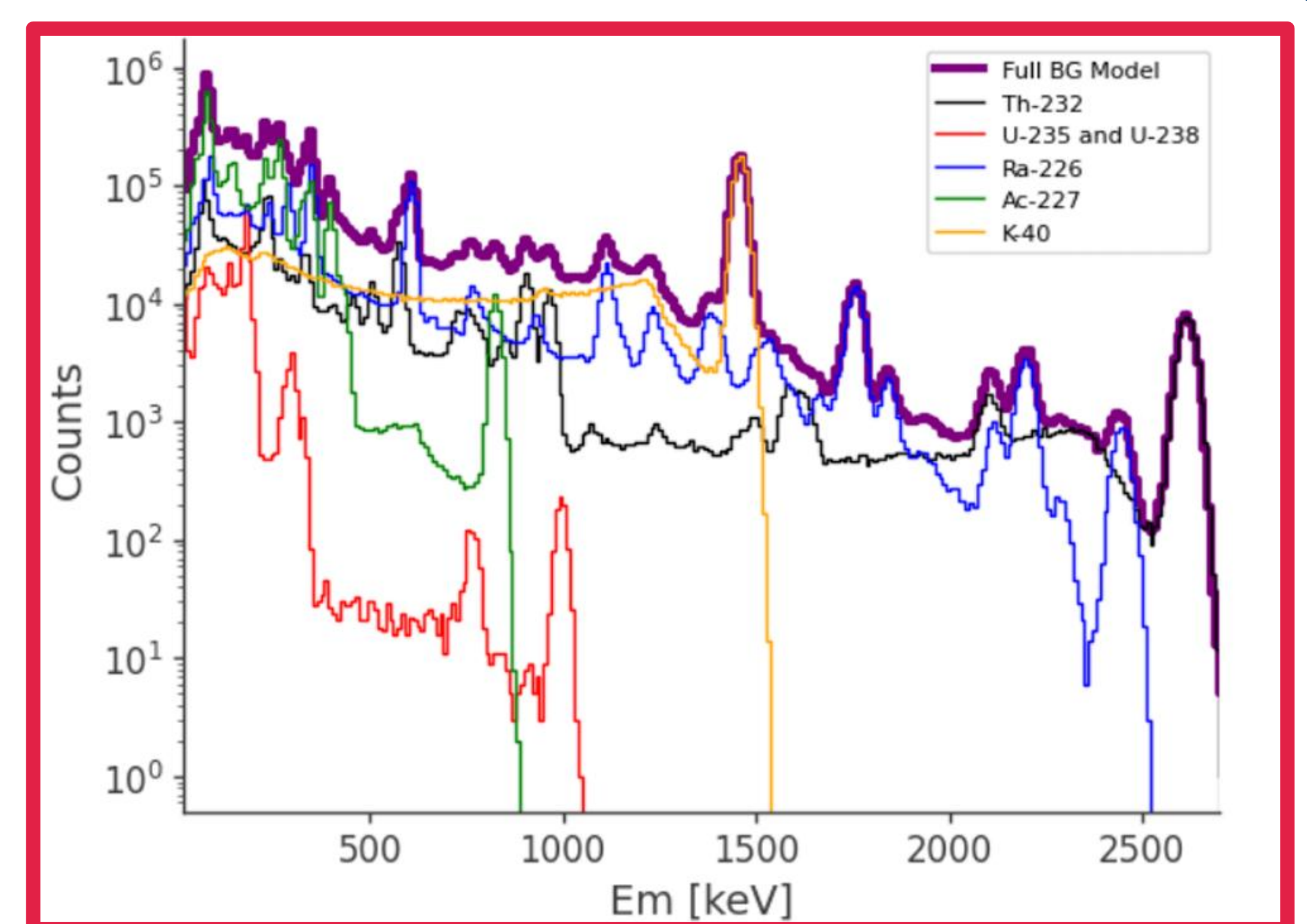
GEOMEGA SIMULATIONS



Background calibration

Spectral resolution of
CeBr3 detector: 4 % at
662 keV

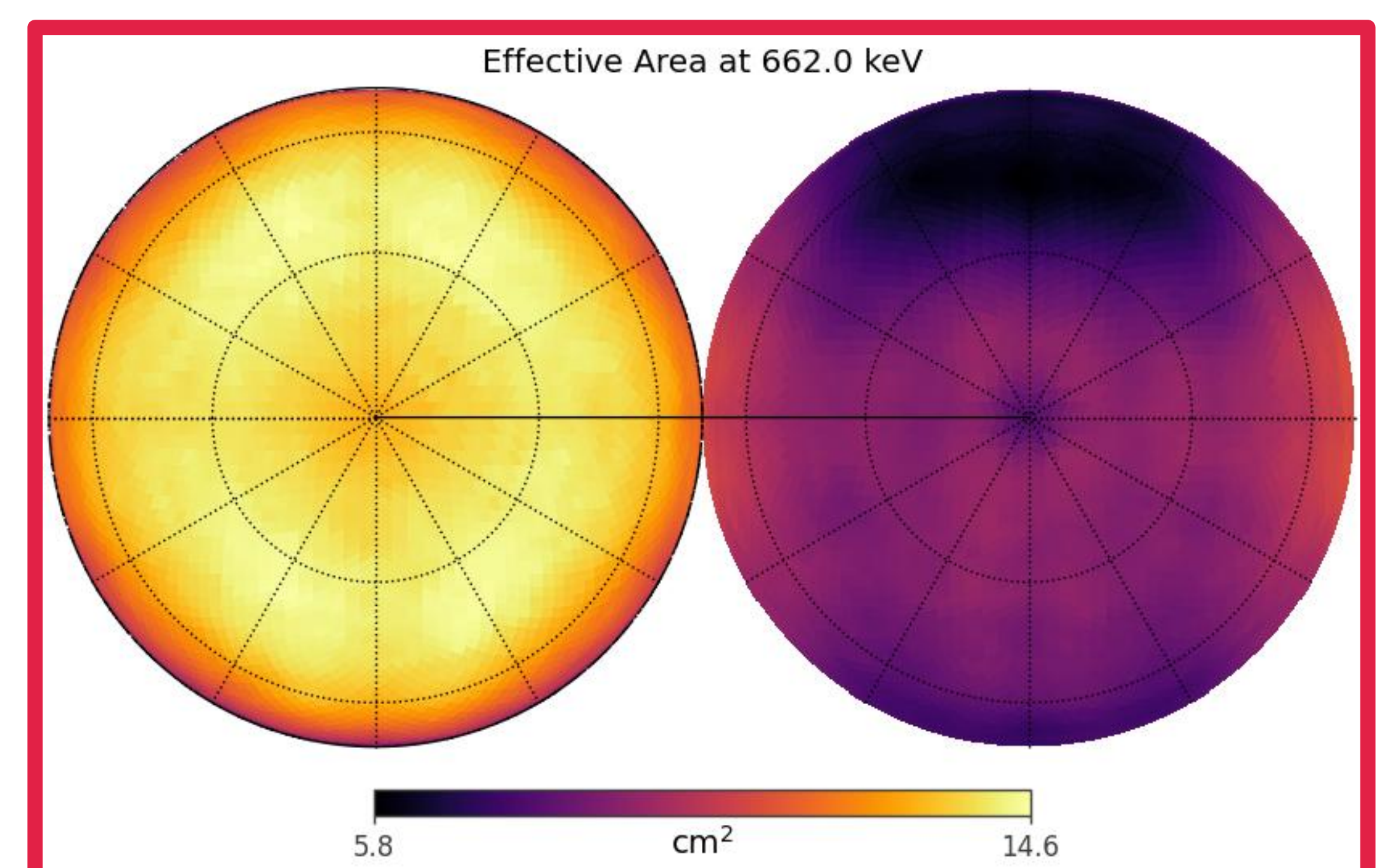
Measurements and
simulations are in good
agreement



Position calibration

192 positions

Angular resolution: 25 deg
at 662 keV



Acknowledgement



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