Once upon a time in Americium

Gianluca Cavoto Emanuele di Marco Davide Pinci

Am source

- We used an incapsulated Am source with 40 kBq activity;
- Only gammas are expected to be produced; —
- According to <u>nuclear-data</u> the main X ray emissions are:

Gammas from ²⁴¹ Am (432.2 y 7)		
Eg (keV)	Ig (%)	Decay mode
59.5412 2	35.94	a
26.3448 2	2.40 2	а
33.1964 <i>3</i>	0.126 <i>3</i>	а

- Absorption length at 59 keV is hundreds of meters

- The maximum recoiling energy for the Compton electron is around 11 keV

- Absorption length at 26 keV is 14 m





Data set and daily scan

- We took data at 5 different distances of the source from the GEM: 5cm (Step1), 15 cm (Step2), 25 cm (Step3), 35 cm (Step4), 45 cm (Step5);
- In each position about 300 runs were collected for a total of 120k pictures each;
- Several runs seem corrupted and are skipped. Statistics not equalised so far;
- Daily scan performed with ⁵⁵Fe source (5.9 keV) provides the responses in the 5 steps: 6657, 8429, 10169, 10786, 11037 cnts;
- Calibration constants are therefore: 0.88, 0.70, 0.58, 0.54, 0.53 eV/cnts
- We can assume not saturated signals in steps 4 and 5 with about 5.4 keV every 10k cnts



Daily scan













With a simple cut to reject low density tracks we have fit a peak around 14 kcnts i.e. 7.5 keV (Copper?)









(55Fe Step5)







- Those are 200 pixels long (i.e. 3 cm) as expected for 60 keV ER



The z scan



What do we expect from the simulation?

Conclusion

- The Am-241 runs are promising to study our capability in reconstructing the energy scales;
- We should understand what we can expect in our data:
 - Energy spectrum: why a peak at 12 keV? Where are the 26 keV?
 - Dependence on z: why so low saturation?
 - Relative yields
- A complete MC (including GEANT) will provide a lot of those indications
- The issue of corrupted file in under investigation and should be fixed

