

Energy Linearity with X-rays on LIME (again, with new data)

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X-rays sources

Analyzed partially (about 1/2 of the total) data taken in July with sources of X-rays from multiple sources (200 events each)

- Available data at $Z=10, 25, 40\text{cm}$
- All 3 Z's merged together
- No Regression correction applied

Target	Energy (keV)		Photon Yield
	Selected K_alpha	K_beta (#/sec/steradian)	
Cu	8.04	8.91	2,500
Rb	13.37	14.97	8,800
Mo	17.44	19.63	24,000
Ag	22.10	24.99	38,000
Ba	32.06	36.55	46,000
Tb	44.23	50.65	76,000

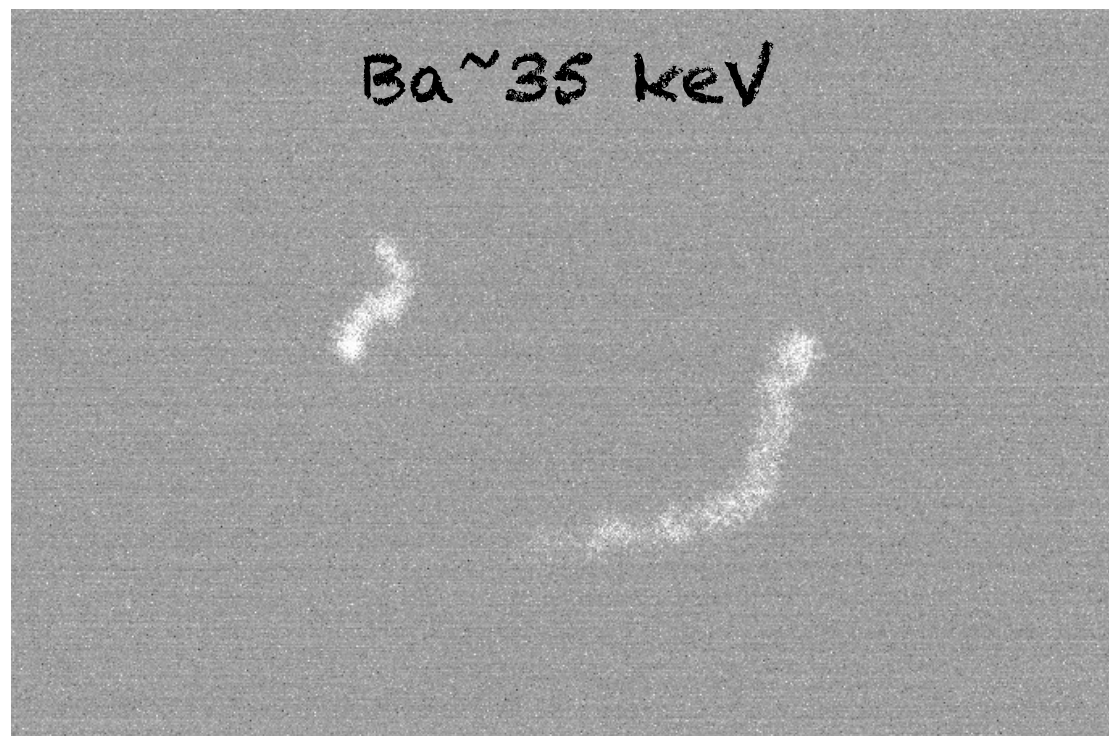
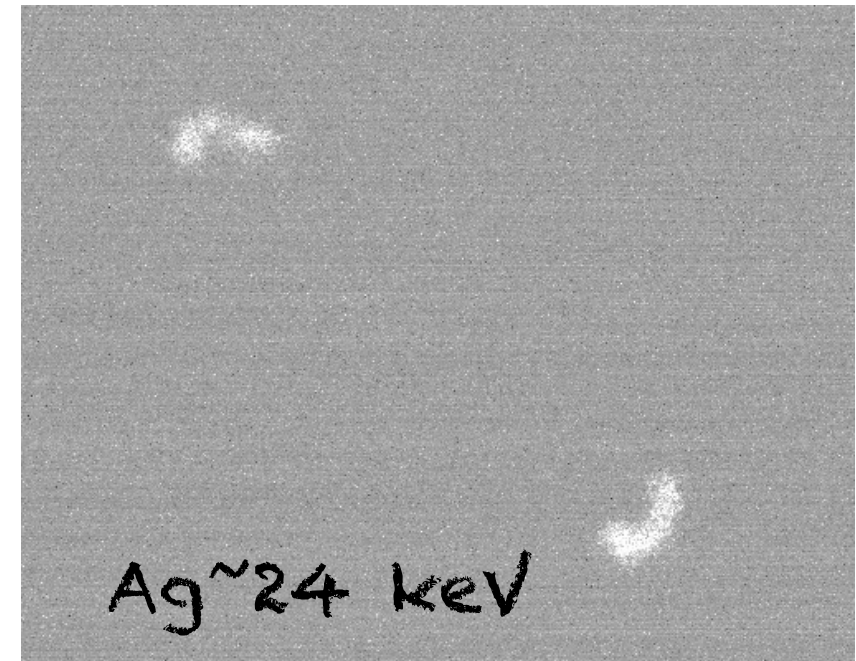
Possibility to study the linearity of energy response at the various sources.

Linearity was checked with similar data before the Summer. The new data are more complete (Z scan, but also the format contains full info: PMTs, GEM waveforms...)

For now repeat only the exercise of the linearity with RAW energy

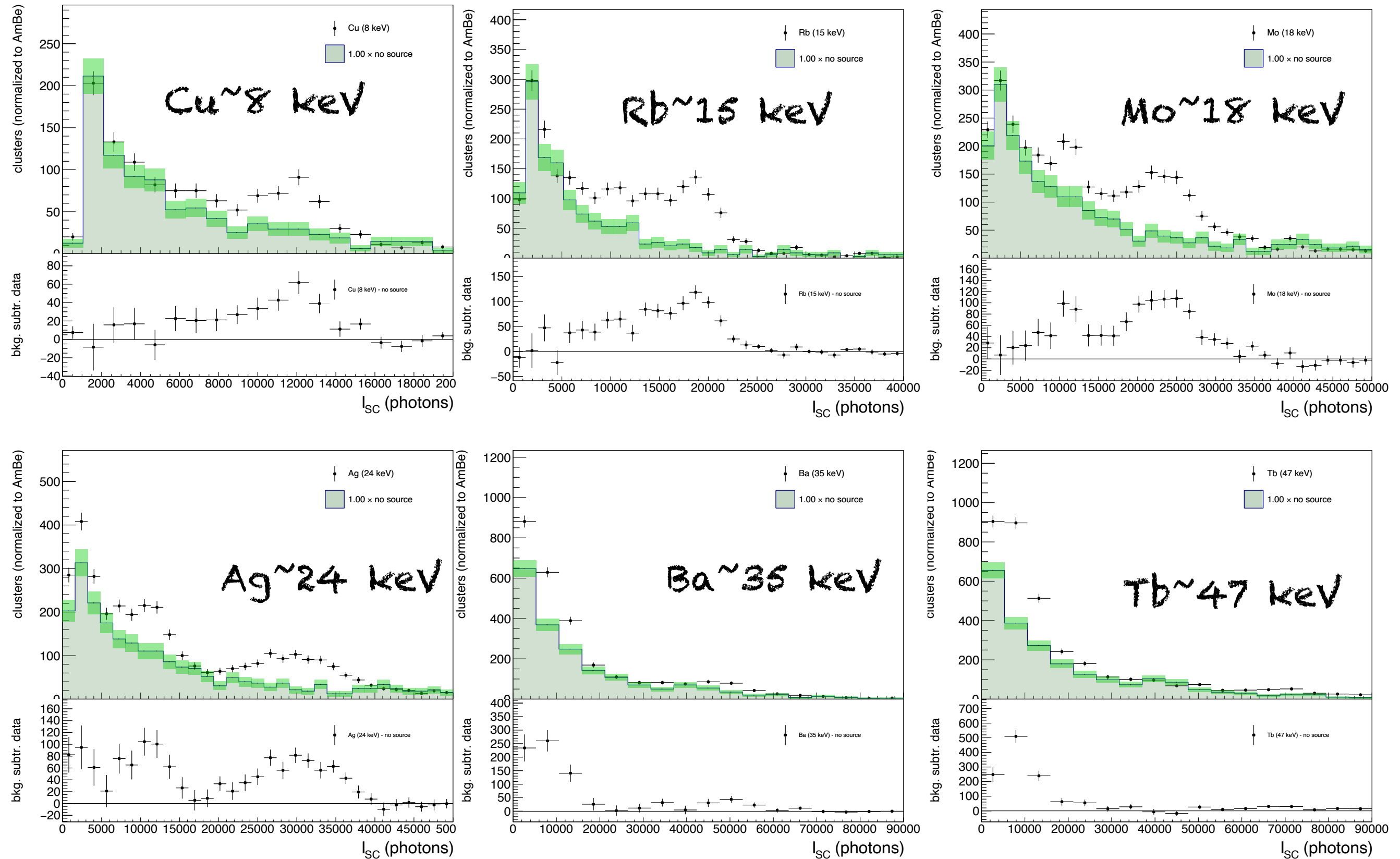
Raw event displays

selection detail: track length cut a bit relaxed for higher energies



Examples from
old data taking

energy spectra



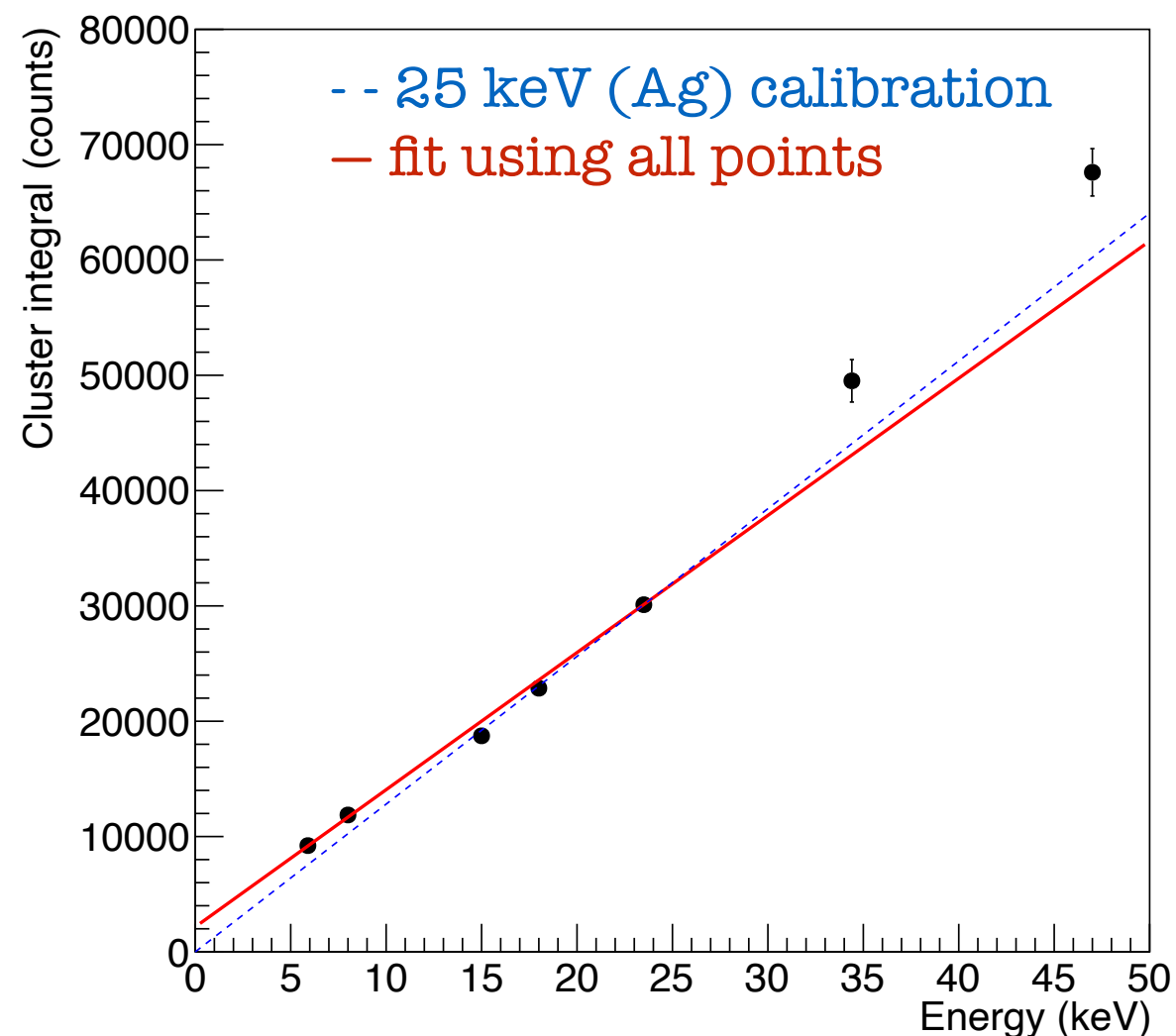
Energy Linearity

Bkg is subtracted from no-source data, resulting spectrum fitted with a Gaussian.

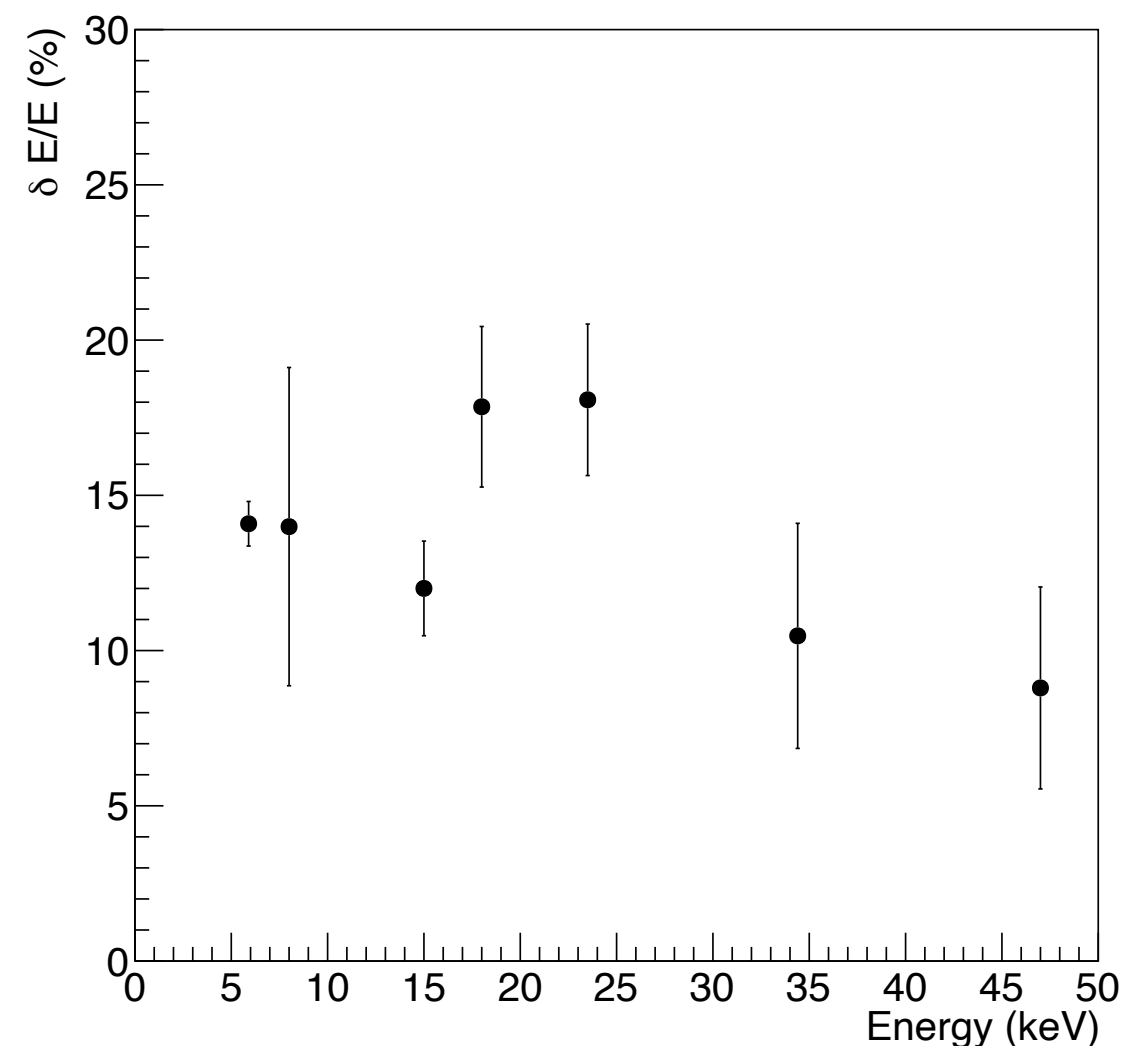
Other bumps are seen, but used only the expected one.

Last two points affected by large SYSTEMATIC error from bkg subtraction

Fe is slightly inconsistent (different Z-values in those runs wrt multi-source)



energy response



energy resolution

Analyzed with a simple selection the data taken by Davide with different sources of X-rays

The photo-electric peaks of the sources can be seen from all elements, and the response of LIME seems proportional to the true E in the range [6-47] keV.

Energy resolution around 15% (no corrections apart optical vignetting is applied)

Understanding of the origin of the other peaks apart the principal ongoing

- Can use this effect to explore other (lower) energies?

Test the effect of the MVA energy regression on the resolution vs Energy