Istituto Nazionale di Fisica Nucleare

GRAN SASSO SCIENCE INSTITUTE

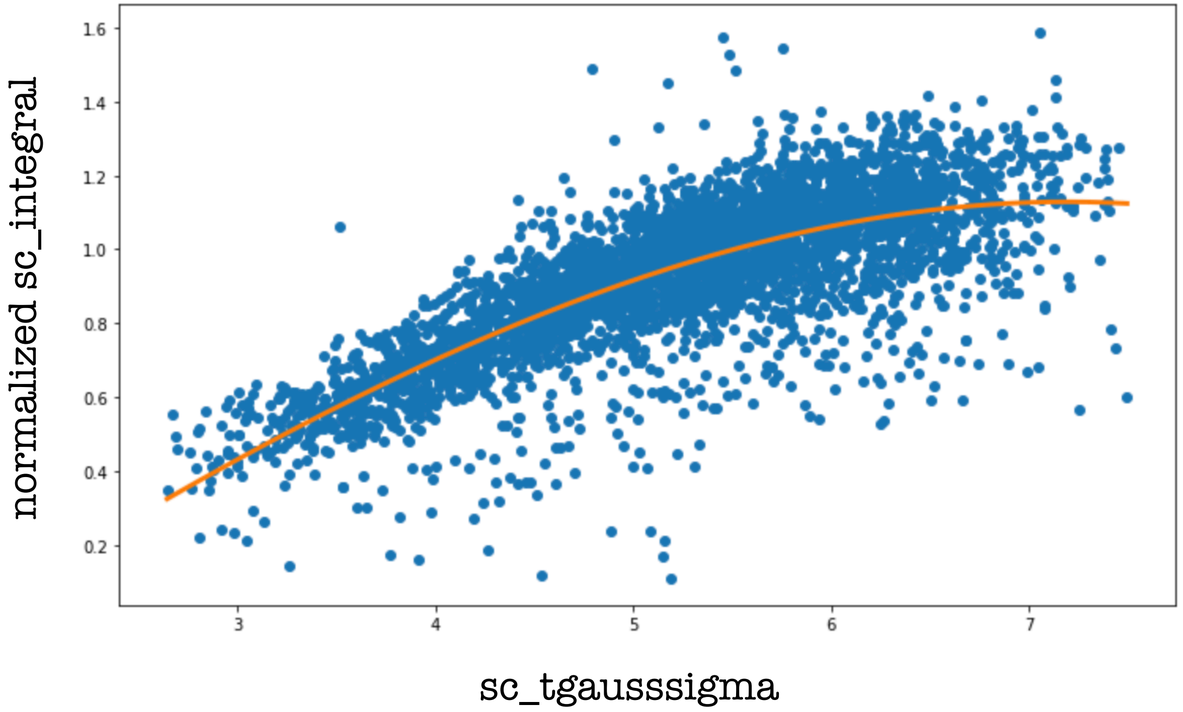
RUN4: about daily calibrations

S. Piacentini

DAQ Meeting - 04/10/2024

Corrections from tgausssigma

1. Take a full daily scan: Fe spots in all z
2. Selection of Fe spots
3. Plot (normalized) integral vs tgausssigma [integral is normalized to step3]
4. Fit with n-degree polynomial (example is n=3)



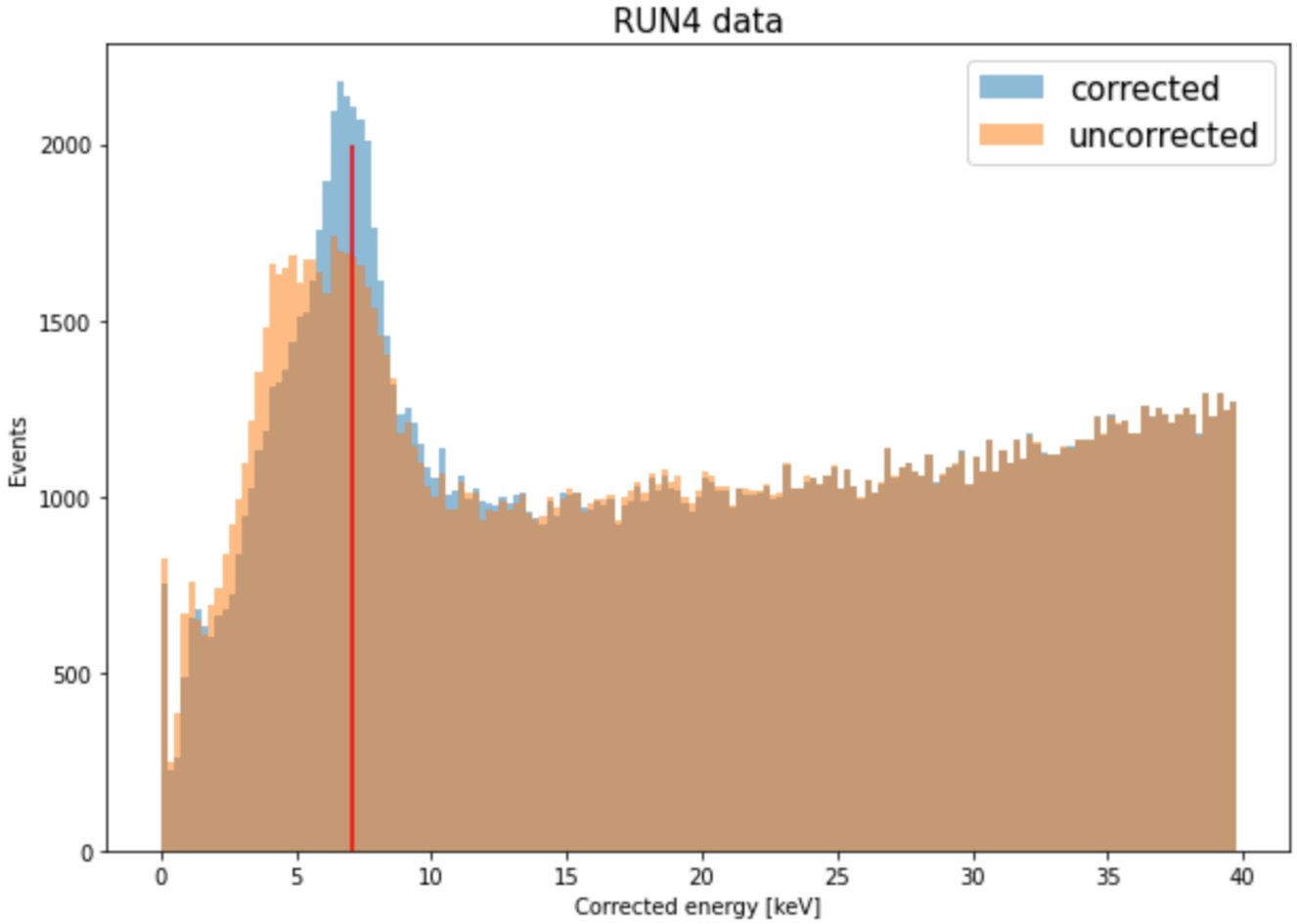
Output:

For each daily scan, a set of **n+1 parameters**

Goal: use these parameters to correct the energy of **spotlike** tracks

Results on the low energy spectrum - RUN4

- Correction **only if spotlike**, otherwise not corrected

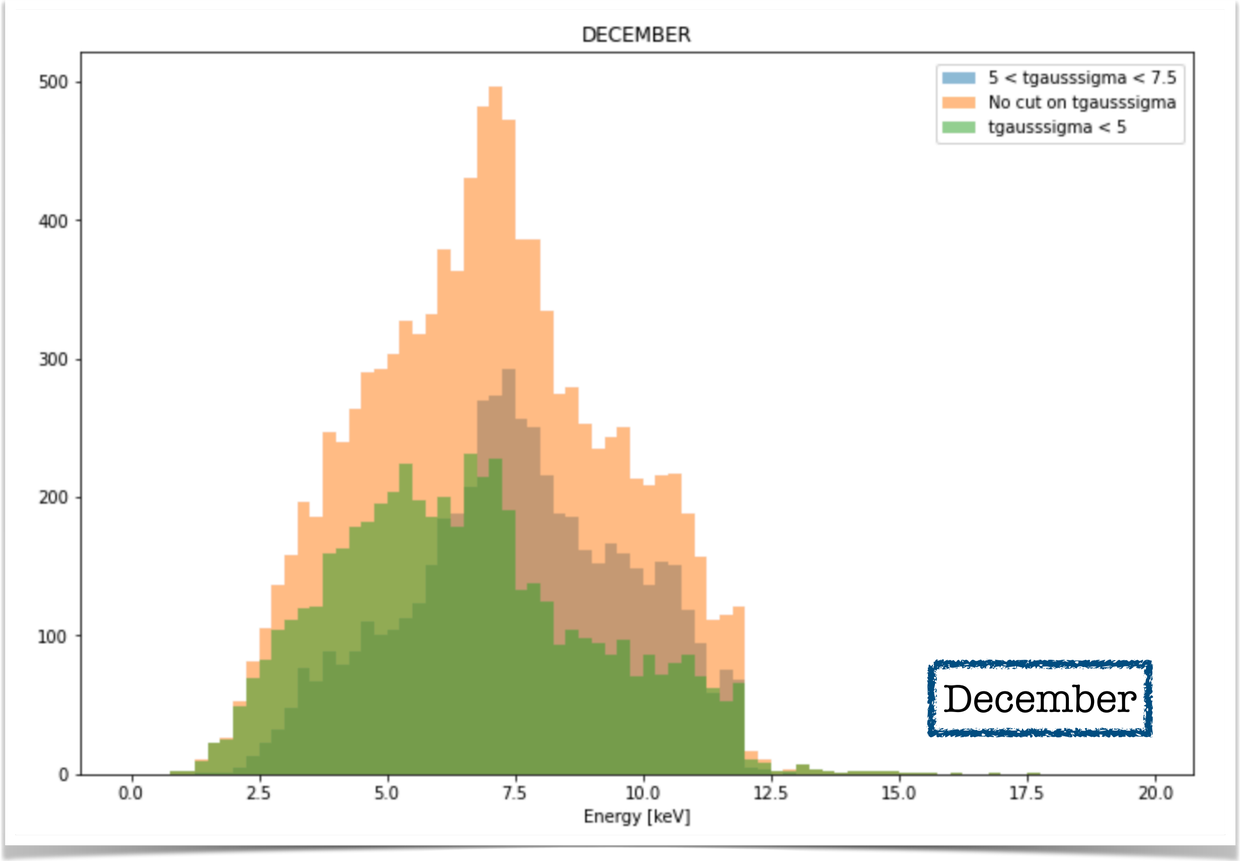


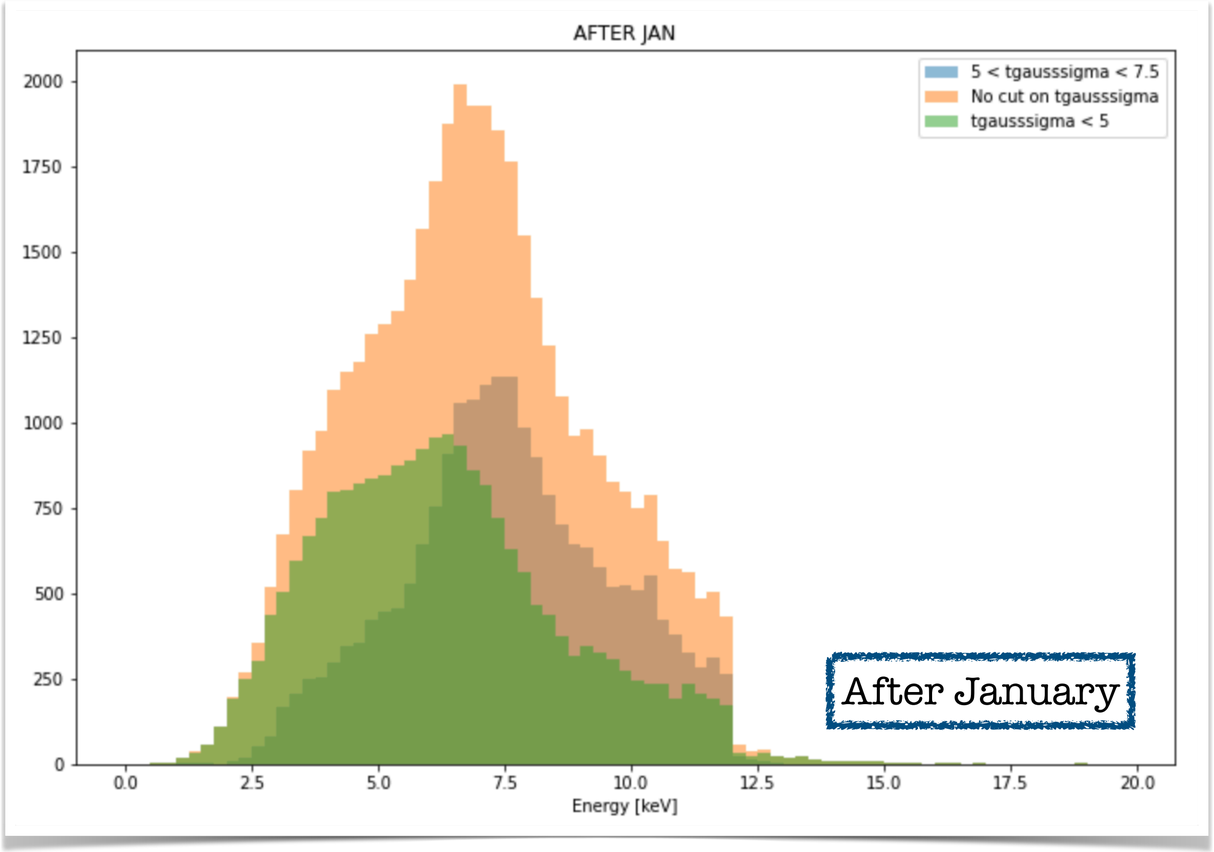
The peak at 7.1 keV shrinks a lot!

What happens if we focus on a low energy selection and we look at the intensity of the peak in the two half of the detector (in z)?

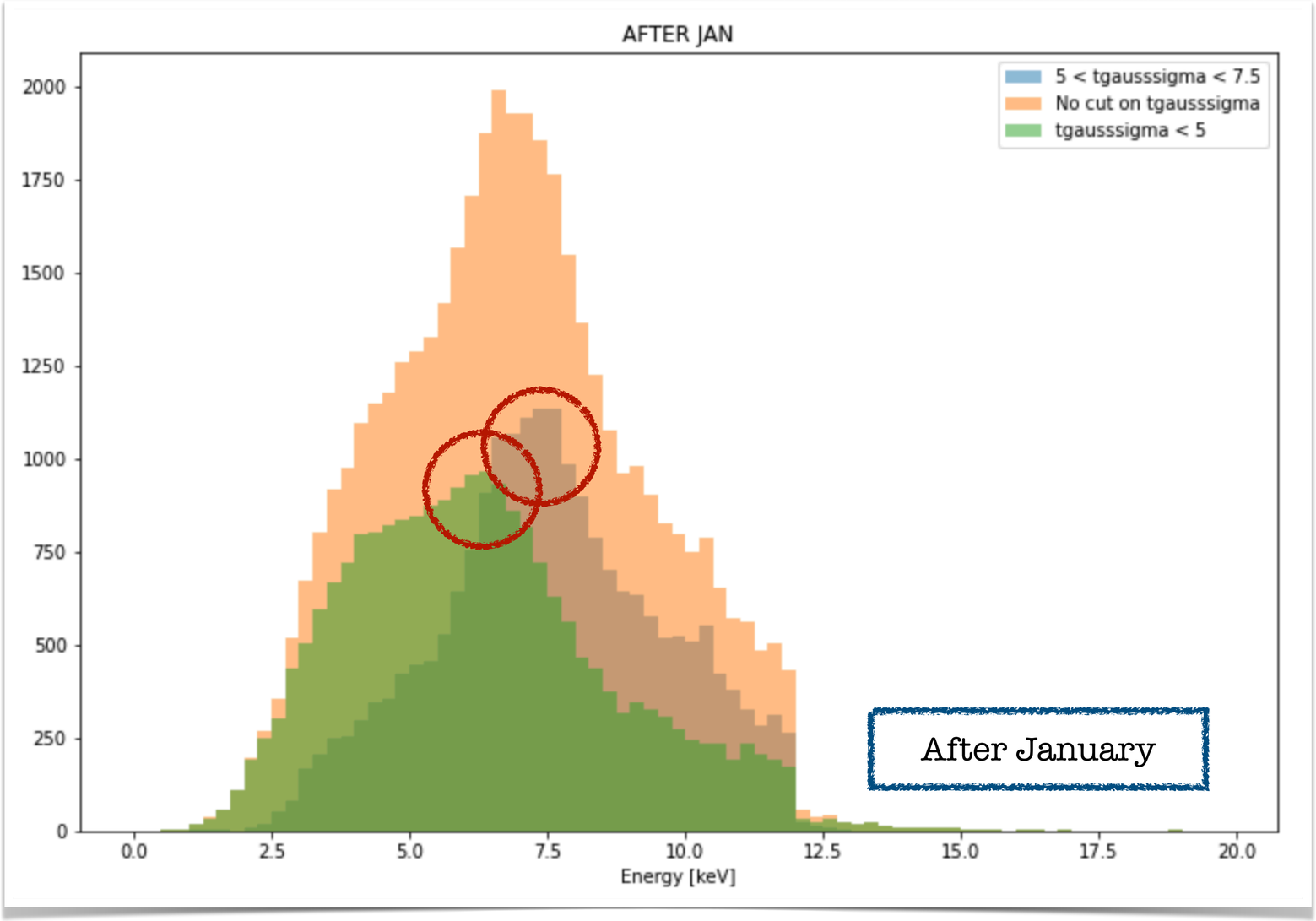
Results on the low energy spectrum - RUN4

- I would say no observable difference between the two (probably only the relative height of the ~5keV shoulder?)
- Then, let's focus on the January plot from now on.





Results on the low energy spectrum - RUN4

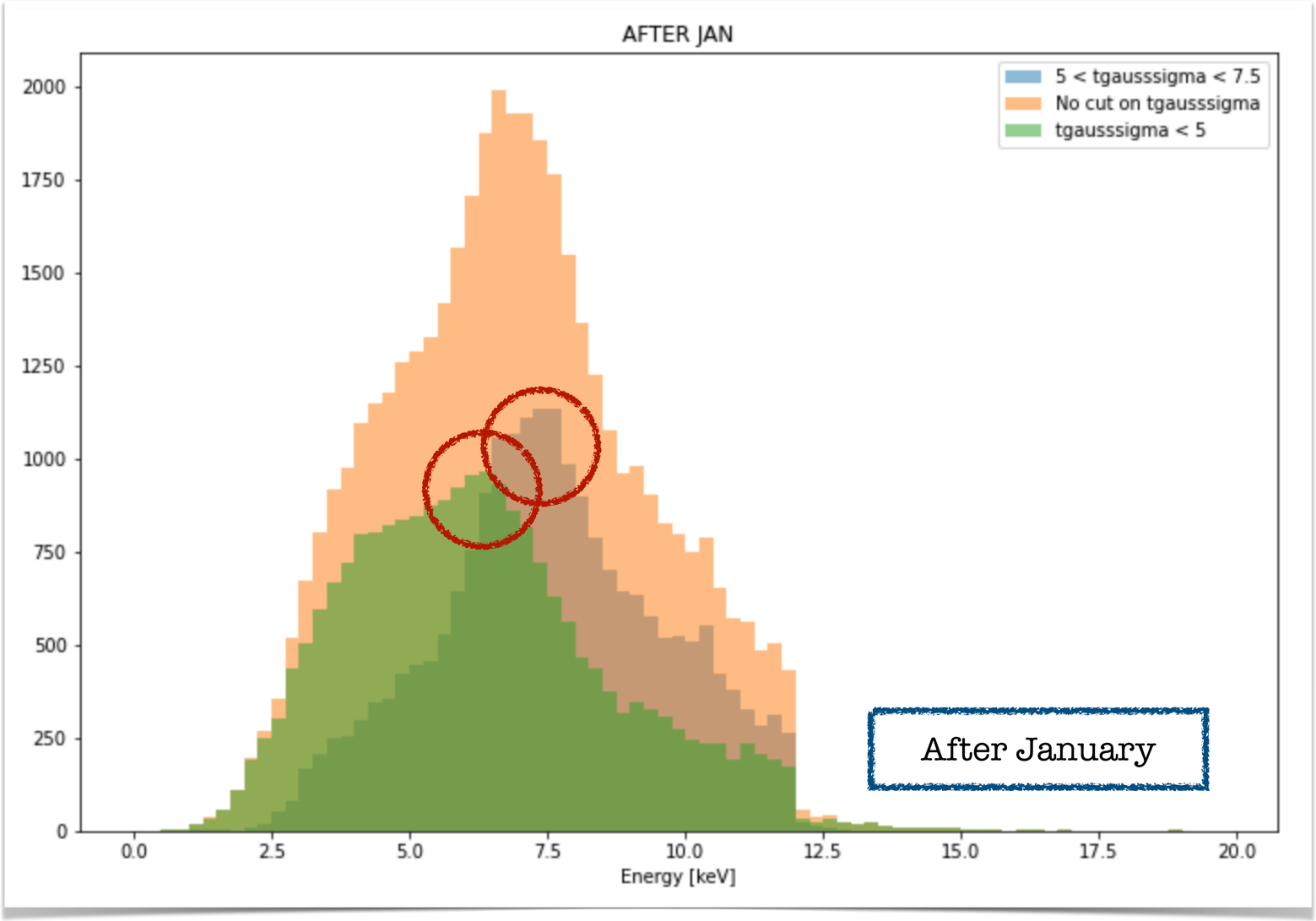


Notes:

- Peak is around 7.2-7.3 keV: considering **saturation, they probably are the 8.1 keV from copper.**

- The peak is present also in the low z tracks but lower energy → **my correction could not work on 8 keV tracks because they saturate differently from 6 keV tracks!!!**

Results on the low energy spectrum - RUN4



Conclusions:

1. We need to correct the energy for the z → **daily calibrations** are **crucial BUT they are NOT enough**

2. **We**, in fact, **need to compute this correction as a function of the z AND energy via the MC!!!**

3. The peak is **more intense at high z → probably it's mostly 8.1 keV X-rays from the cathode!!!** [see next slide]

Results on the low energy spectrum - RUN4

Conclusions:

3. The peak is **more intense at high z → probably it's mostly 8.1 keV X-rays from the cathode!!!**

Simulation by Melba of Cu cathode radioactivity: