Status of the analysis on MC tracks

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Status of MC reconstruction

Started analysis of simulated ER and NR reconstructed tracks (iterating with Emanuele, Giulia & Davide)

1. Reconstruction run with exactly the same configuration used for latest data;

2. It worked (with some problems, see below) using pedestal files used for data;

3. Pedestal maps were then changed to better match the simulation of the digitization (a map with a mean value of 99 and and RMS of 2 is now used);

4. Results slightly improved (shown in the following).

Major open issues:

1) Reconstruction fails for 1keV samples (both NR and ER): 0 clusters are found;

   - Possibly, some of the reconstruction parameters prevent very small clusters to be identified?

2) @ 30keV (and above) both number of hits and integral for clusters (and SC) looks pretty wrong (see next slide).

   - Clusters at higher energies could actually be rather different, but we should be sure what the reconstruction is doing here as well…

# Examples of integral and nhits per cluster for ERs (the same applies to NRs)
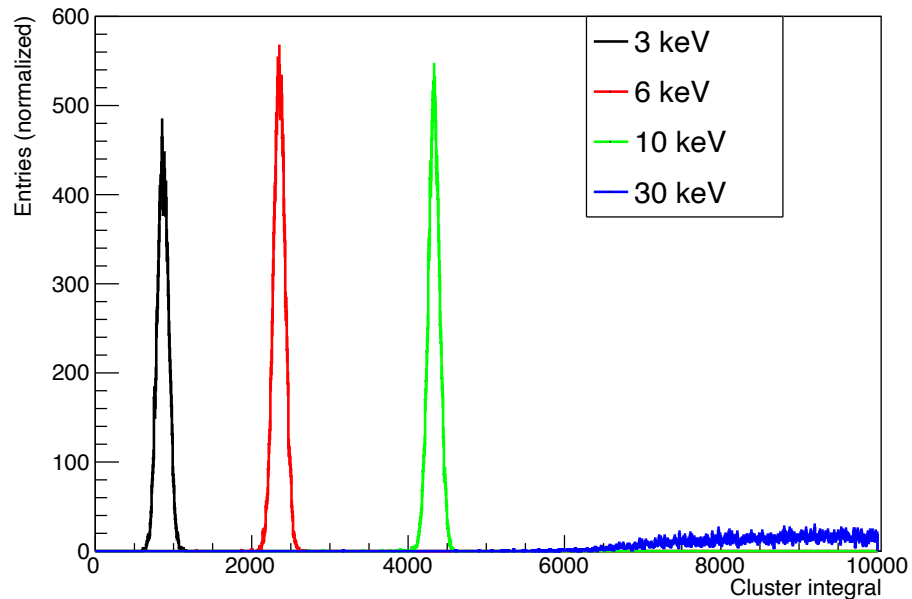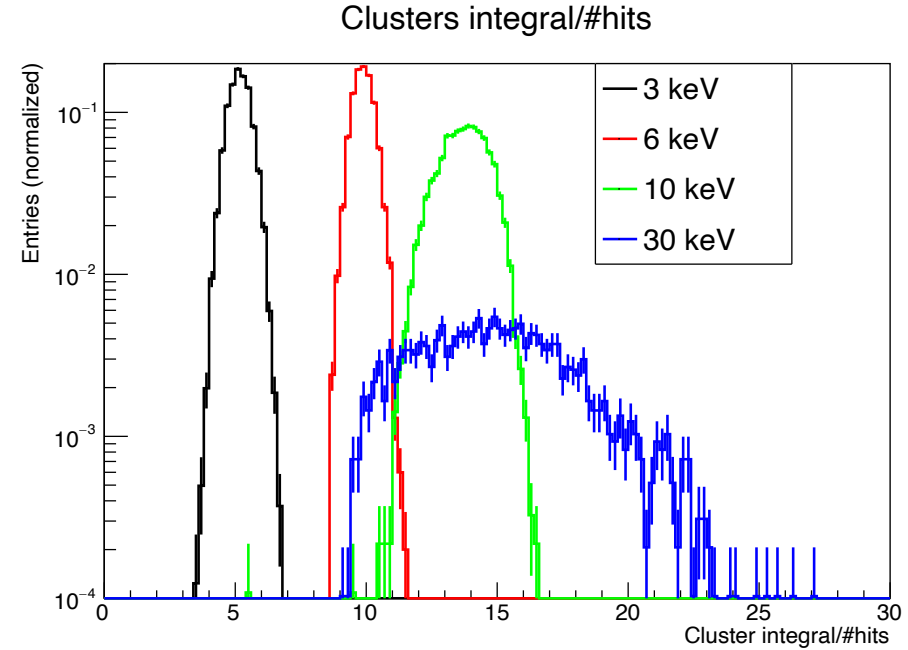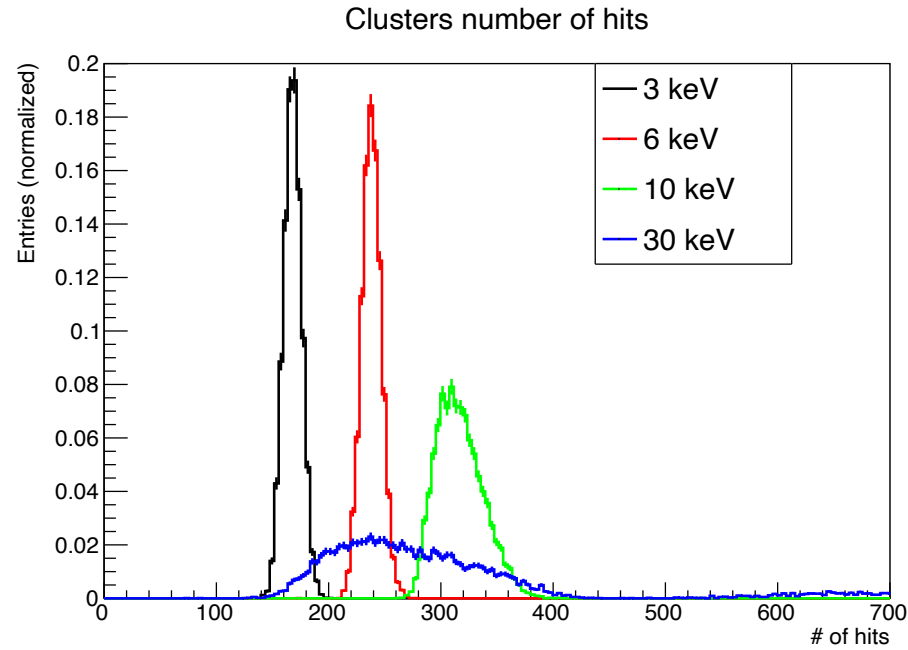
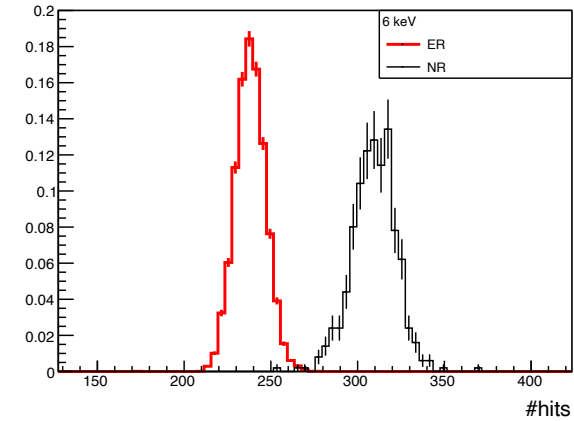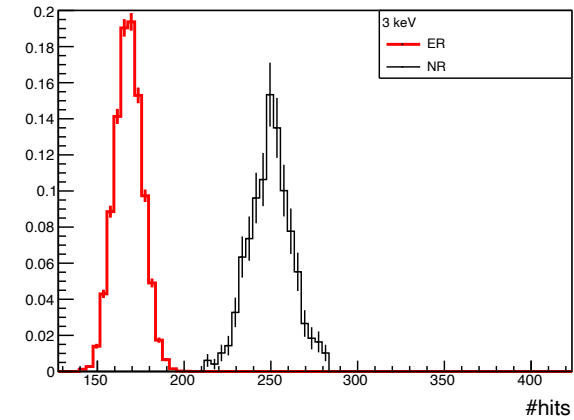
Sorry, this plot is cut @10k.
No time to regenerate it but it gives the idea anyhow…

Number of hits per cluster

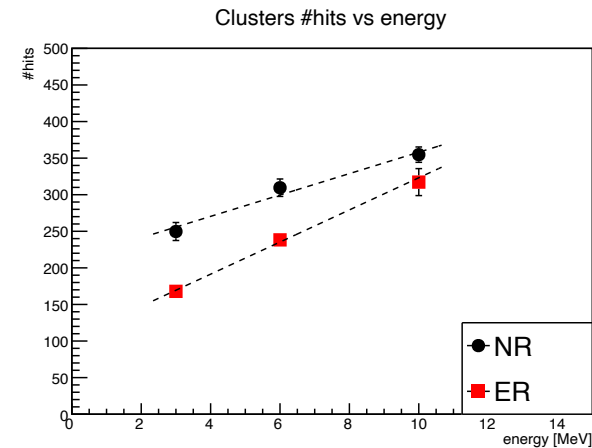Can we distinguish ER from NR at the same energy looking at the number of active hits in a (S)cluster?

At very low energies the separations is reasonable.
Already @ 10 keV it is not.
Naively, we would expect the opposite behaviour…
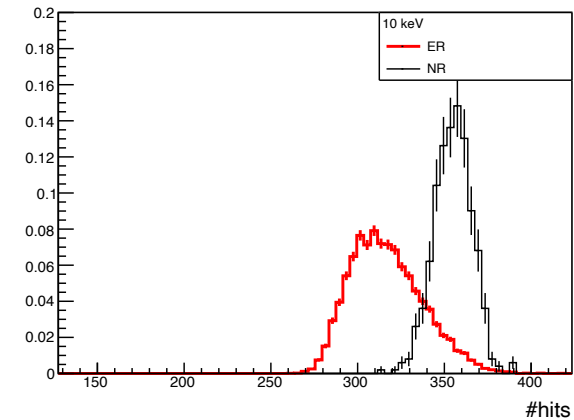
Comparison (NR and ER)of the most relevant quantities: Integral, Nhits & density vs energy
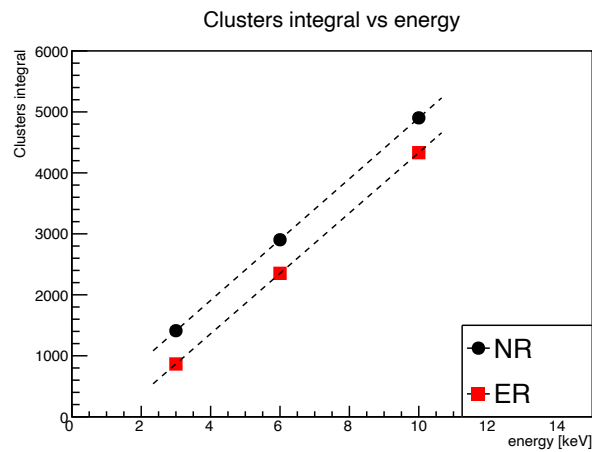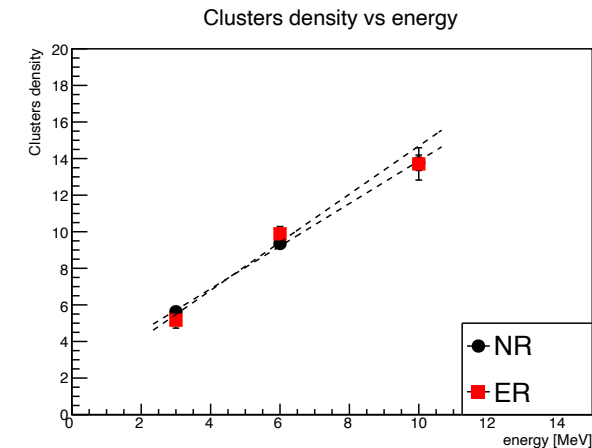

Same slope is ok, but why a different offset?

Different slopes with energy; one would expect a different behaviour (more similar at low energy, the crossing at ~10keV is strange).
Having the points at highr energies would be useful.
Could this be a problem of offset (like for the integral)?

Changing 0-suppression cut (ER) (1*ped$_{RMS}$ instead of 1.5* ped$_{RMS}$)

The integral is not affected from the 0-suppression cut. Digging into the code it turns out it is difined using all the hits (not only those above the threshold). Why is that? Is it what we want?

As expected, the number of "active hits" increases reducing the cut
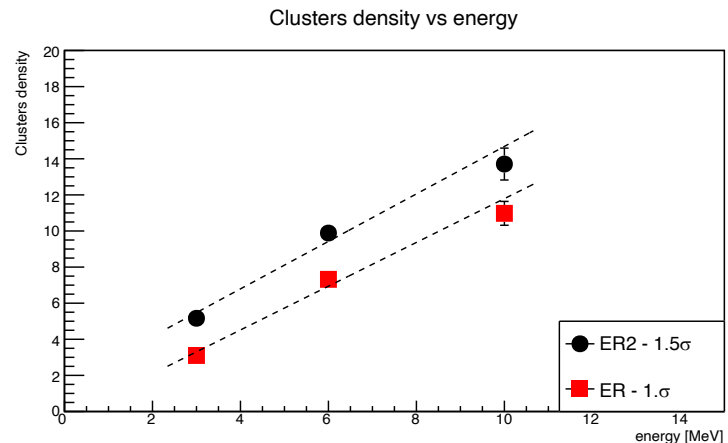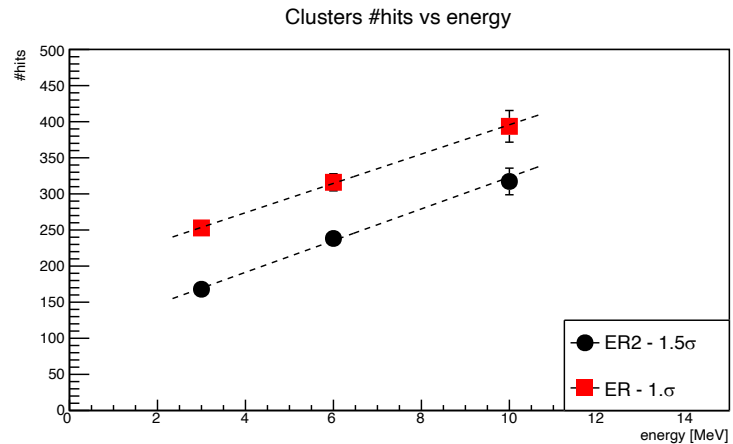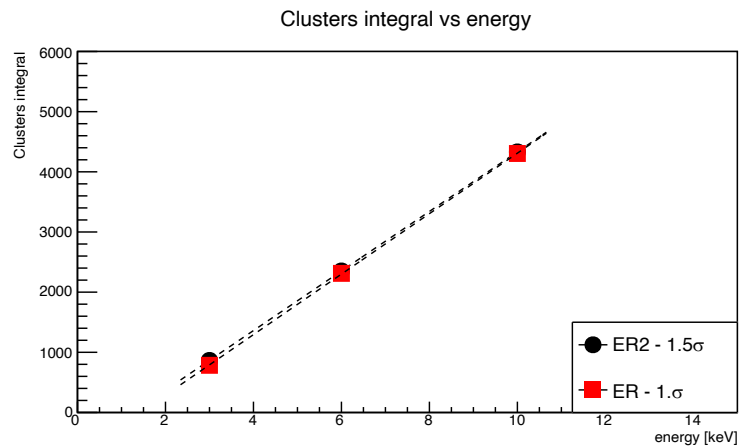
Warning: trying to run on NR with the same cuts results in strange results, i.e. a mean of 10 SC are reconstructed per track (instead of 1)...
Another example of the "instability" of reconstruction parameters...

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Outlook & last remarks

- Issues with reconstruction:
    - 0 efficiency @ 1 keV;
    - Strange integral and nhits computation for E>=30 keV;
    - Stange number of cluster reconstructed for NR changing the 0-suppression parameter.

- Reconstruction parameters should be checked;

- I would also like to review the definition of some quantities (for example the integral, the lenght, …)

Longer term plans:

- It would be good to study the analysis at the different stages of the simulation to understand in details (separately) the effect of the diffusion and of the background superposition

Backup

Digitization parameters

3 different configurations of the digitization for Orange, LEMON and Lime/CYGNO

(Lemon parameters used in the following examples)

	Orange	Lemon	Lime/CYGNO
Diffusion parameter (mm)	0.11	0.5	0.8
Conversion factor (ph/keV)	5.82*3000/6	3000/6	0.56*3000/6
Electronic noise mean	99	99	99
Electronic noise sigma	2	2	2
Dimension of the detector (mm2)	100*100	260*260	350*350
pixels	2048*2048	2048*2048	2048*2048