LNGS background data

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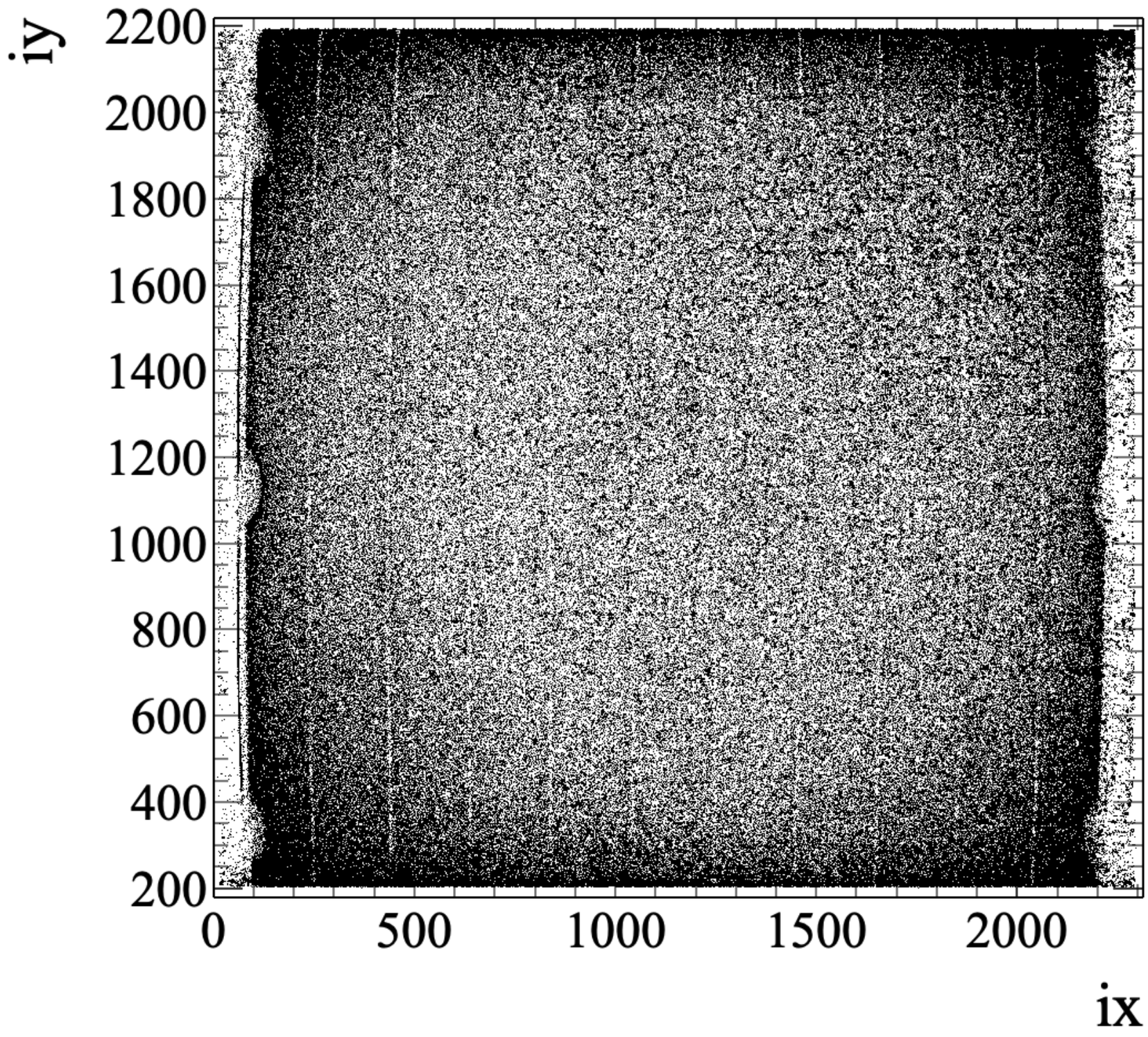
Reconstruction & analysis meeting, 22 September 2022

LNGS Summer 22 data

- Data taken end of June - July 2022. Total of 60k events (pictures) analyzed.
- Runs [1700-2308] analyzed
  - trigger with at least 2 PMTs; exposure = 200 ms; 100 images each.
  - PMTs response was inter-equalized. HV: 730 V, 895 V, 785 V, 895 V
  - one pedestal run every 10 runs => eventual pedestal drifts tracked with $\Delta t \approx 5\,\mathrm{hrs}$
- Reconstruction setup:
  - Summer22 tag (ref. here, with details on where trees are located at LNGS)
  - took < 1/2 a day on cygno batch queue at LNGS to reconstruct all 60k events
  - no need of other resources

occupancy of all clusters



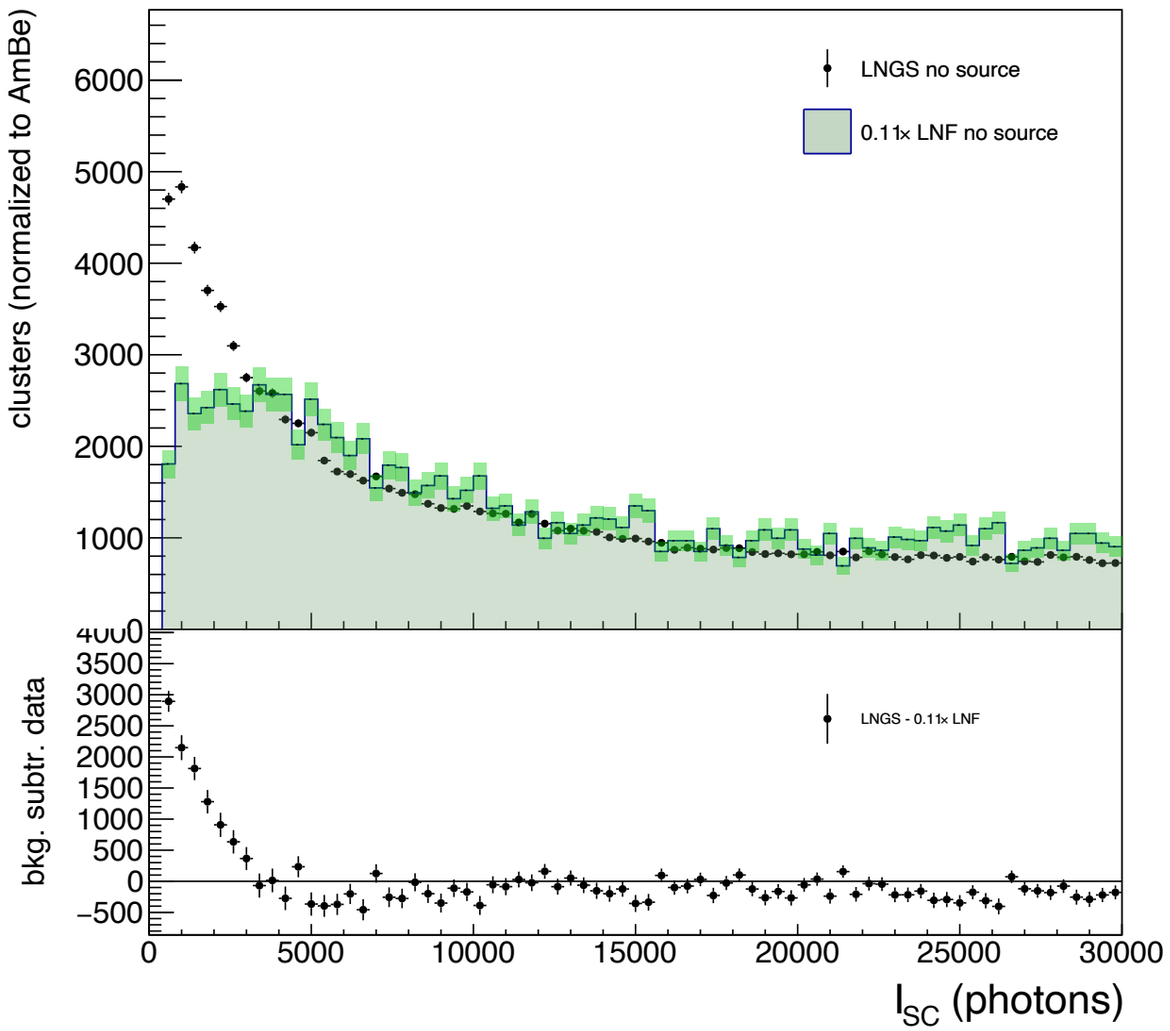
Selection applied

- Loosest one possible, to look at every cluster:
  - even if vignetting correction is active, to be rock-solid ask for the center of the lens: distance from center < 900 pixels
  - remove the noise fake clusters with the loosest selection: $\mathrm{rms}_{\mathrm{clu}} > 7\,\mathrm{counts}$ OR integral < 1k counts

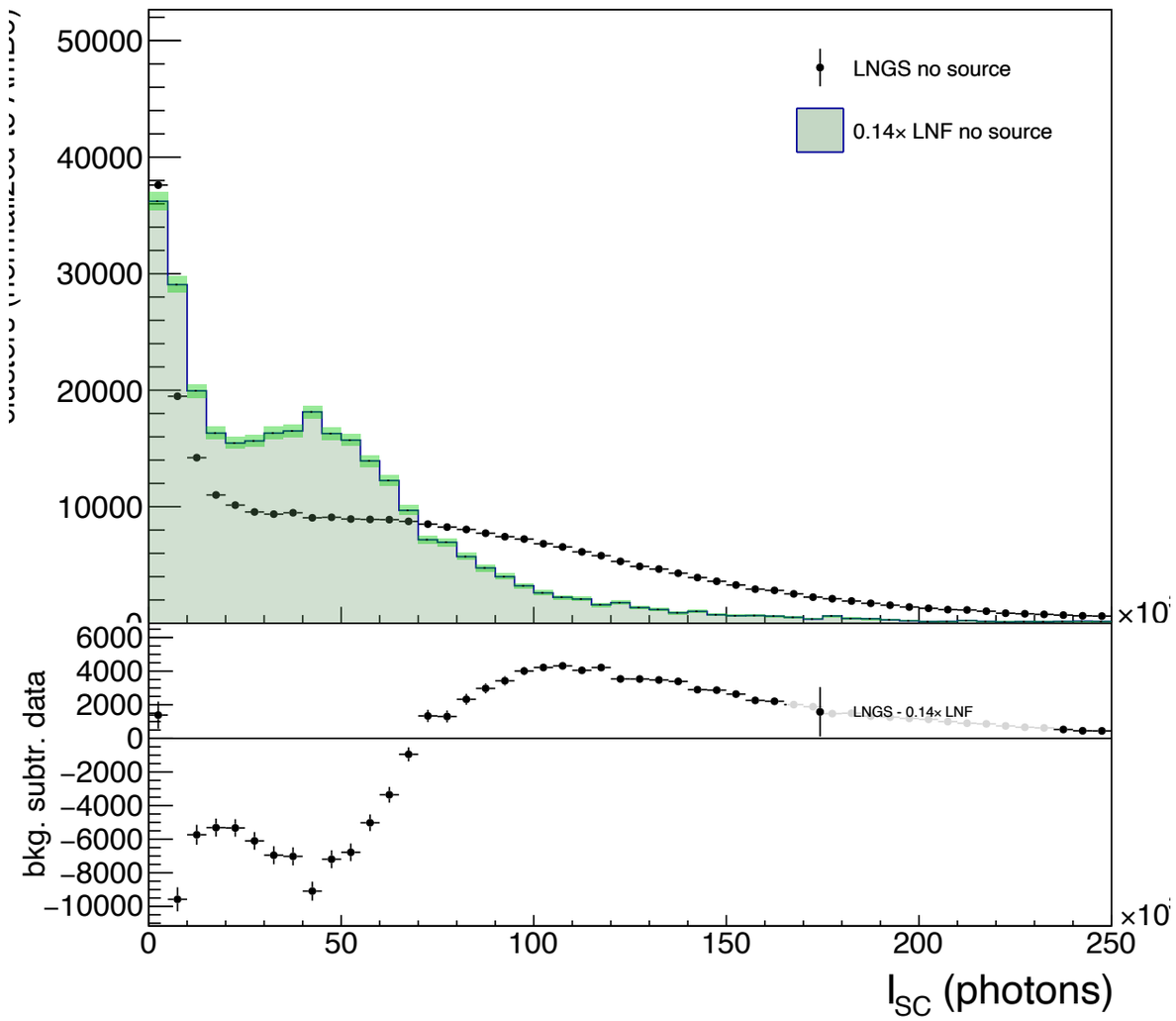
- NB About comparison with LNF bkg data:
  - The clustering for LNGS has slightly lower thresholds on pixels, since the lower occupancy at LNGS allows it
  - The aperture at LNF = 50 ms, at LNGS is 200 ms. The rate is normalized for this factor 4, but:
    - 50 ms can have lower sensor noise
    - 50 ms has a larger bad effect on cutting tracks longer than ~10 cm (depending on the angle, see D. Marin presentation)

Raw cluster integral

- The part of the spectrum with I < 3000 counts could be due to the lower pixel threshold at LNGS. This also affects the rate normalization (LNGS/LNF ~ 10%): should be redone for clusters with enough energy



integral

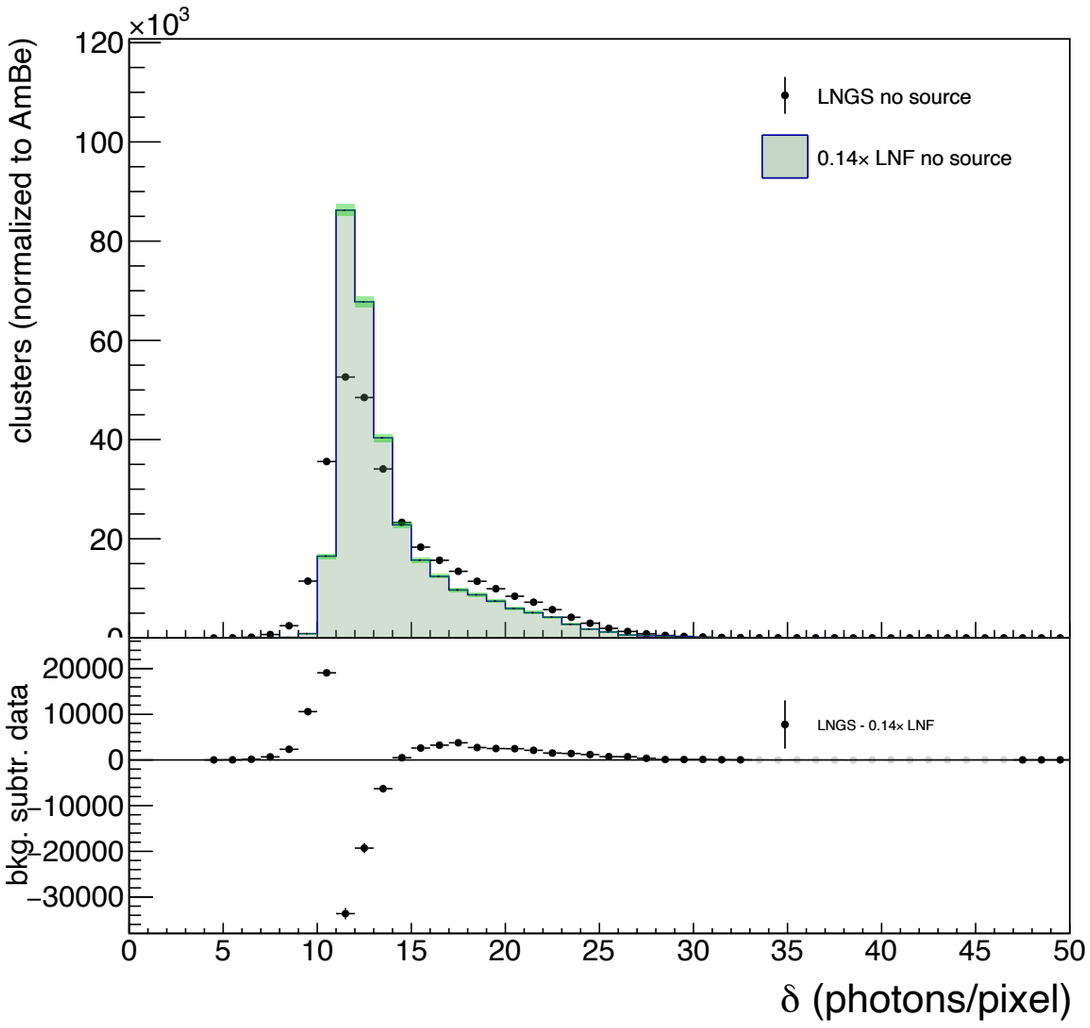


integral (larger range)

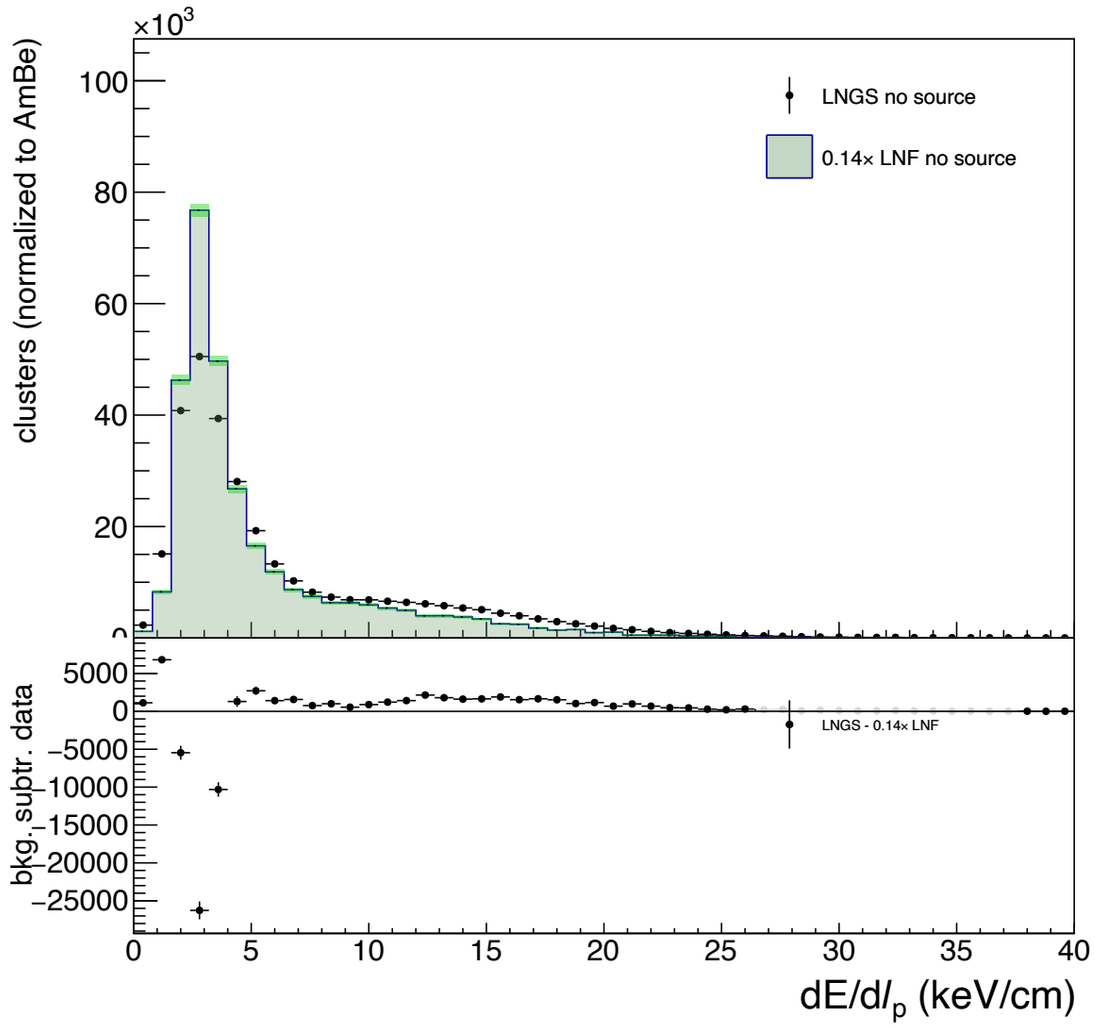
cluster density

- density δ = photons/pixel almost the same. So LNGS and LNF could be almost intercalibrated.

- => showing dE/dx (keV) using LNF ^{55}Fe calibration



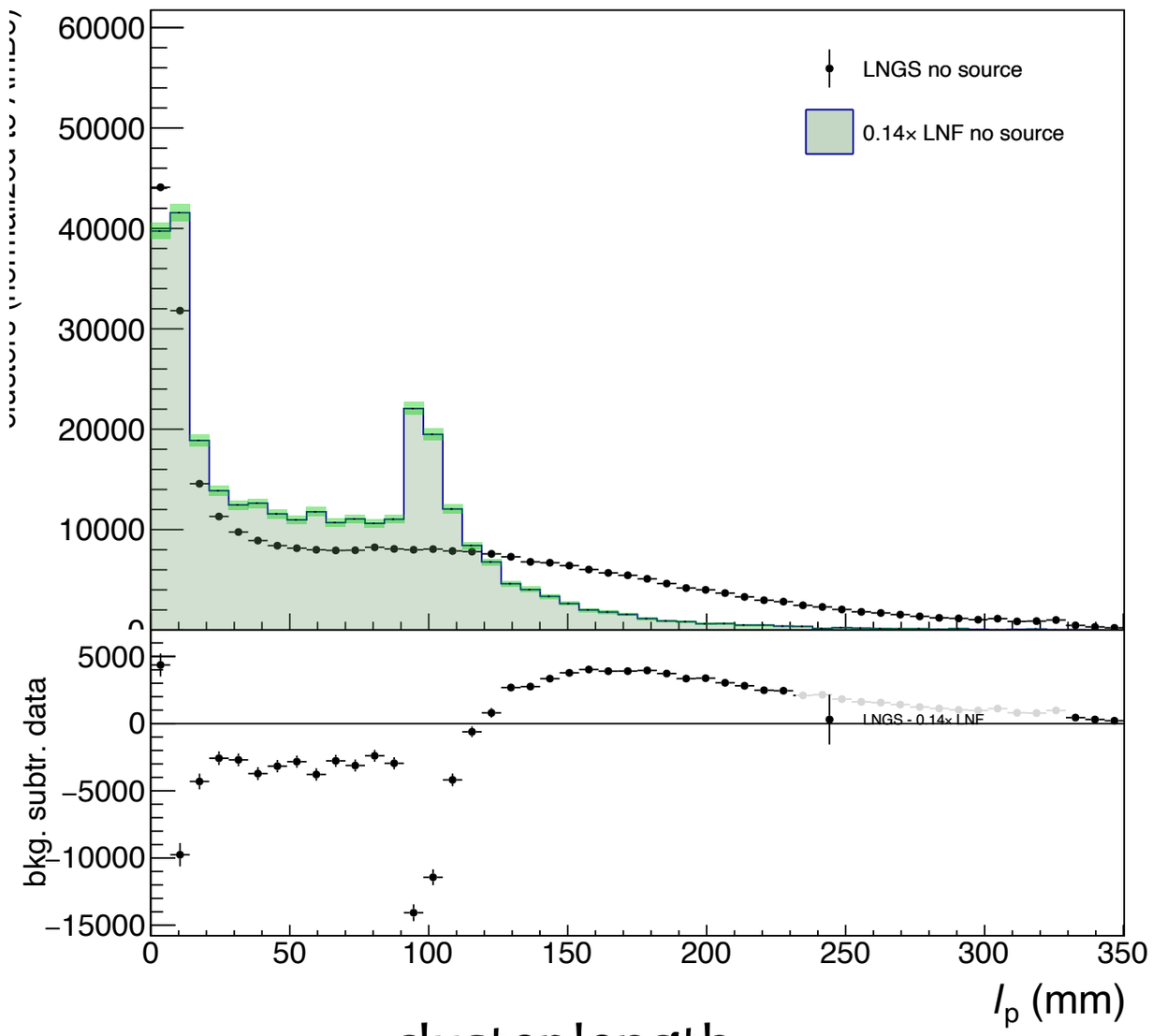
raw δ



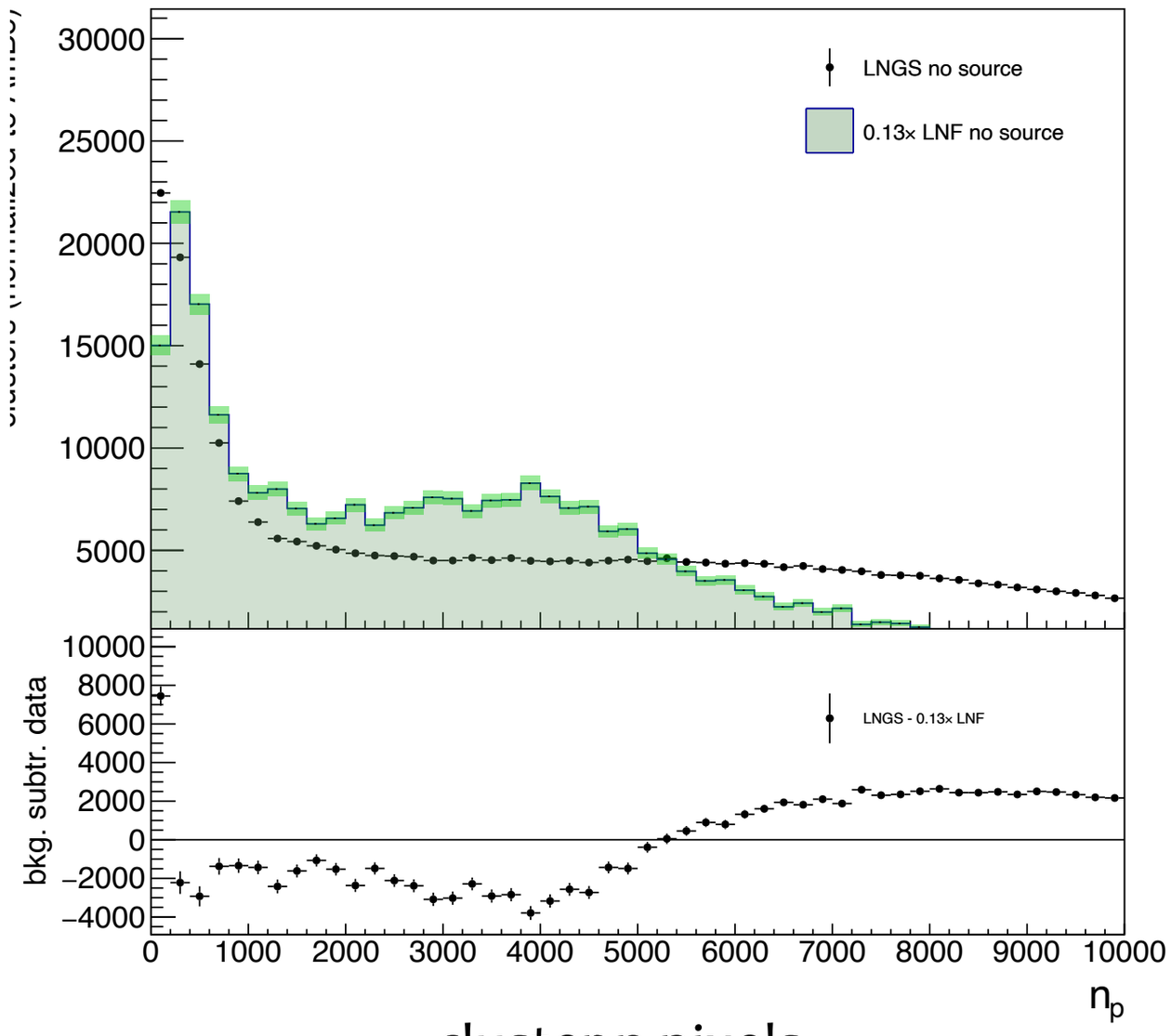
dE/dx using LNF calibration

Length

- Peak at length=100 mm due to 50 ms aperture. This is probably the reason of the shoulder still present in LNGS distribution (200ms aperture, effect reduced)
- Low nhits clusters maybe due to more fake clusters at LNGS with lower pixel thresholds



cluster length



cluster n pixels