Update on LNGS data and comparison with LNF

G. Cavoto, E. Di Marco, D. Pinci

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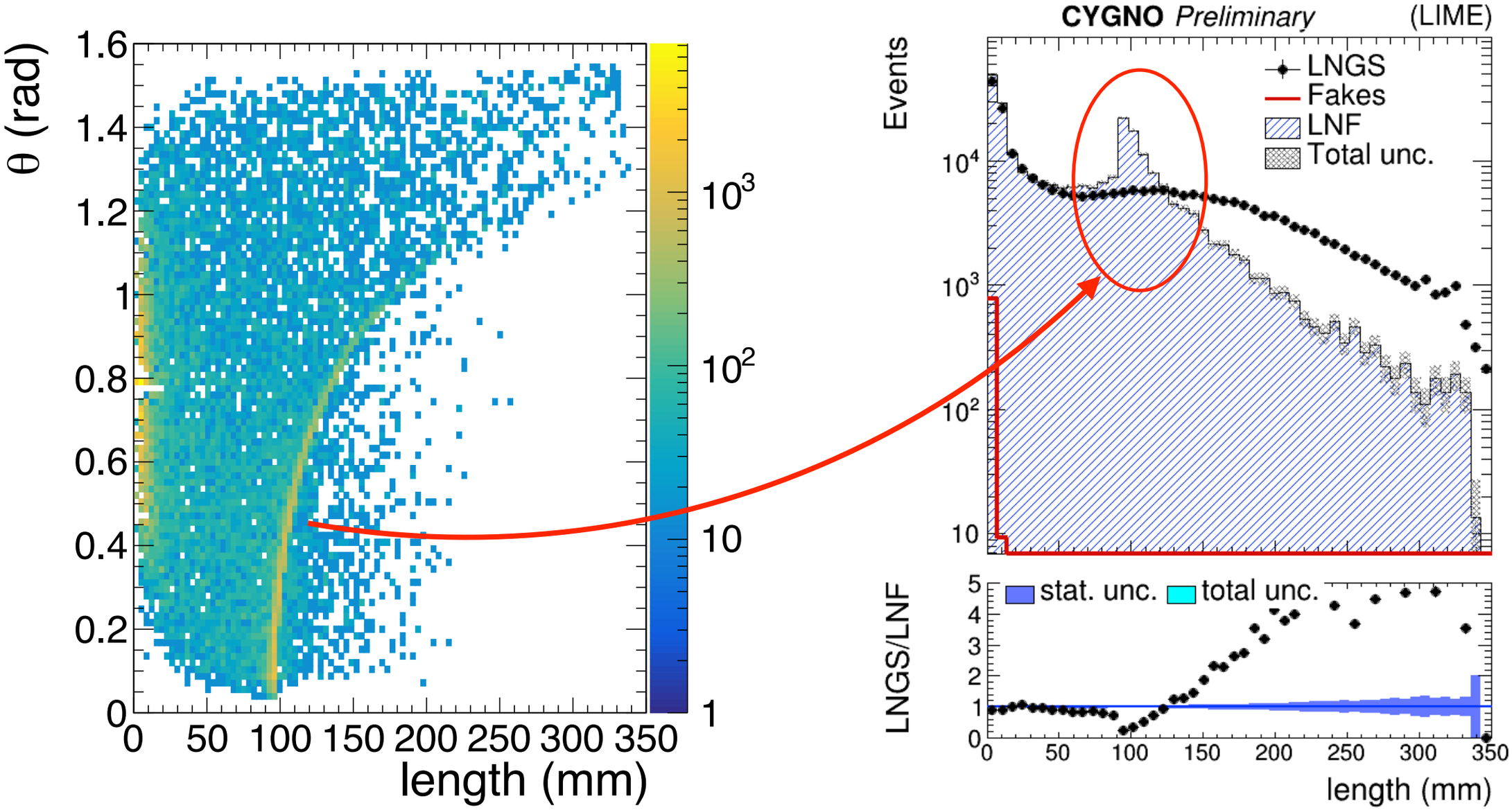
LNGS Summer 22 data

- 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
- Link to previous presentation here
- News in this presentation:
  1. rate normalization of LNGS/LNF,
  2. LNF cosmics background removal with D. Marin algorithm

Saturated cosmics at LNF

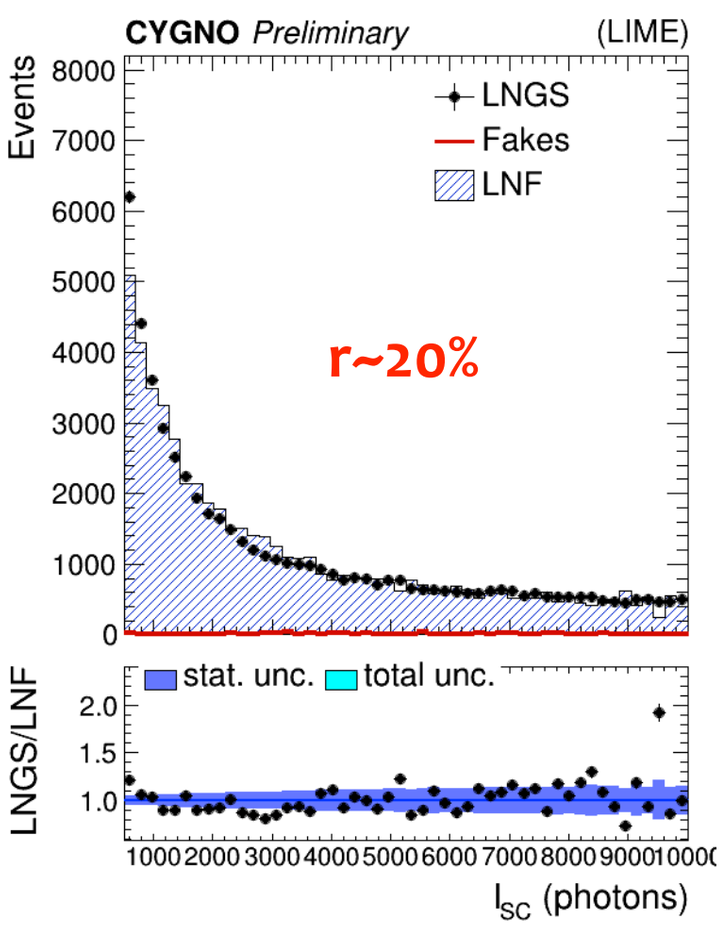
- Clusters selection:
  - minimum amplitude (to reject most of random clusters) I > 500 photons (~ E > 300 eV)
  - remove cosmics with Marin's selection (i.e. the ones which are saturating in length at $\ell \approx 10$ cm because of global exposure time limitation at Δt=200 ms)
    - see D. Marin's presentation on 16 June 2022



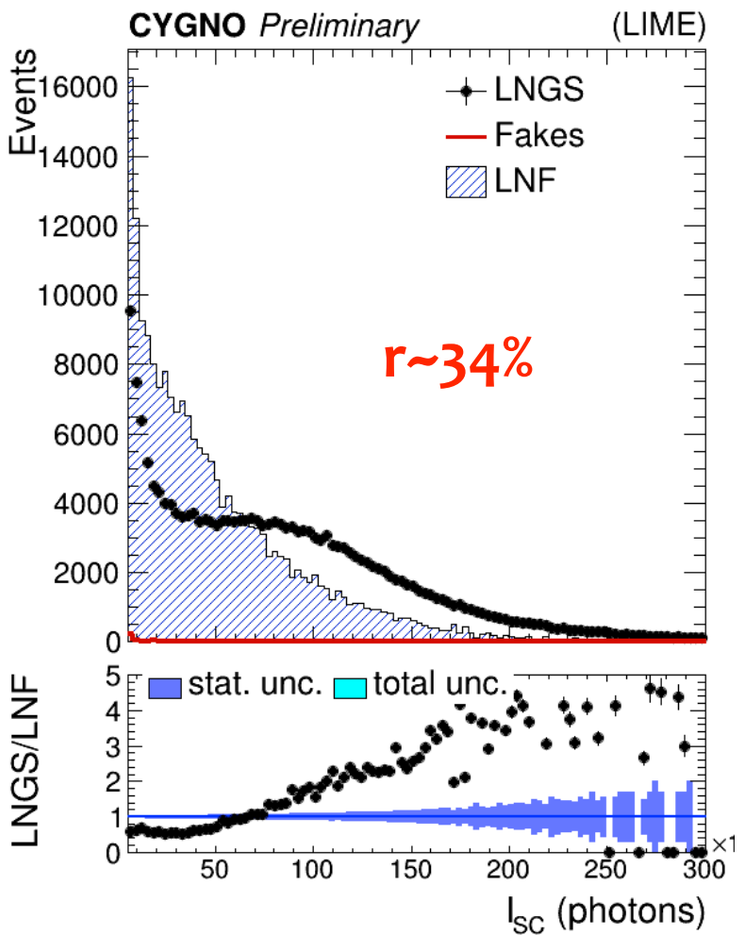
Uncalibrated energy spectra

- Components normalization:
  - LNGS: number of reconstructed clusters
  - Fakes: clusters reconstructed on pedestal runs, normalized to LNGS livetime (1% for $E \lesssim 6$ keV)
  - LNF: clusters reconstructed with exactly the same LNGS reco, few runs (5862-5867), normalized to LNGS livetime
    - Further normalization to fit LNGS rate, with no on energy selection : **r=NGS / LNF = 31%**

$0.3 \lesssim E \lesssim 6$ keV



$6 \lesssim E \lesssim 200$ keV



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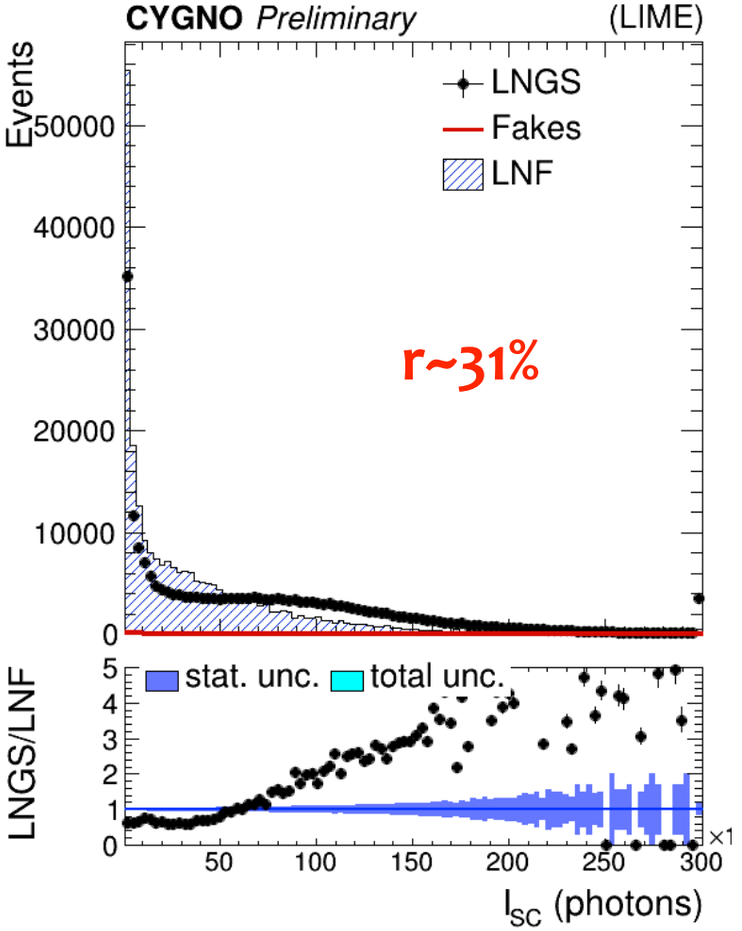
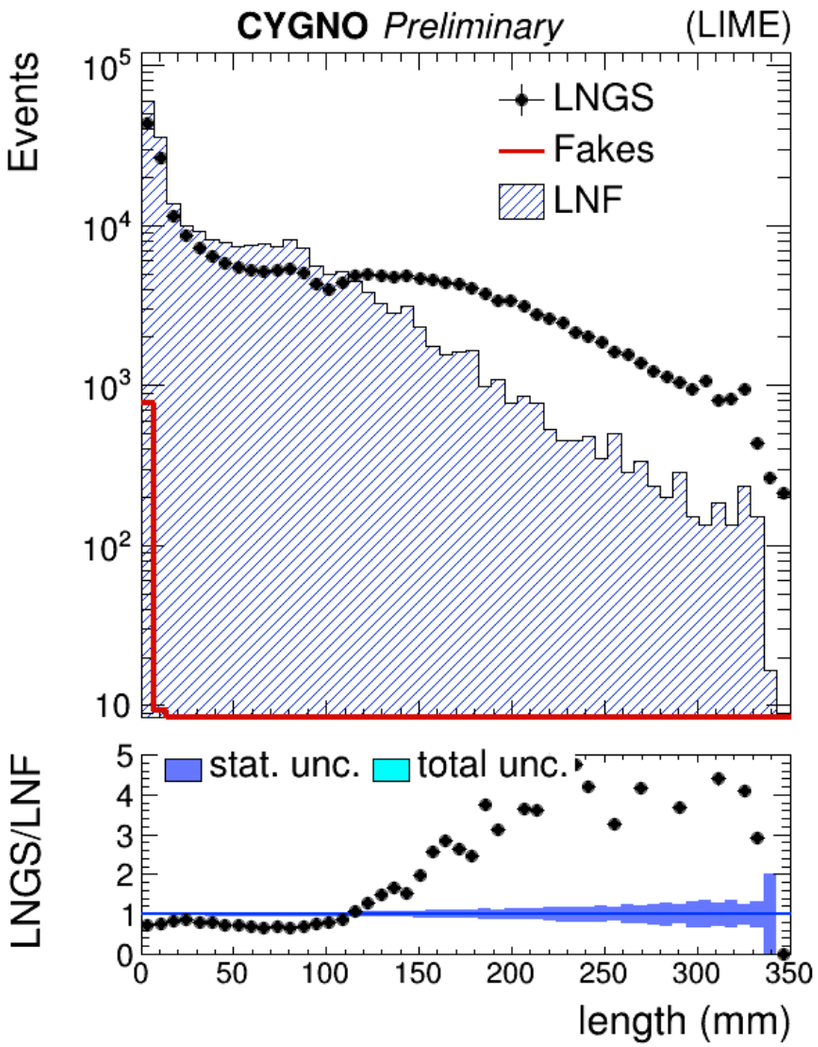
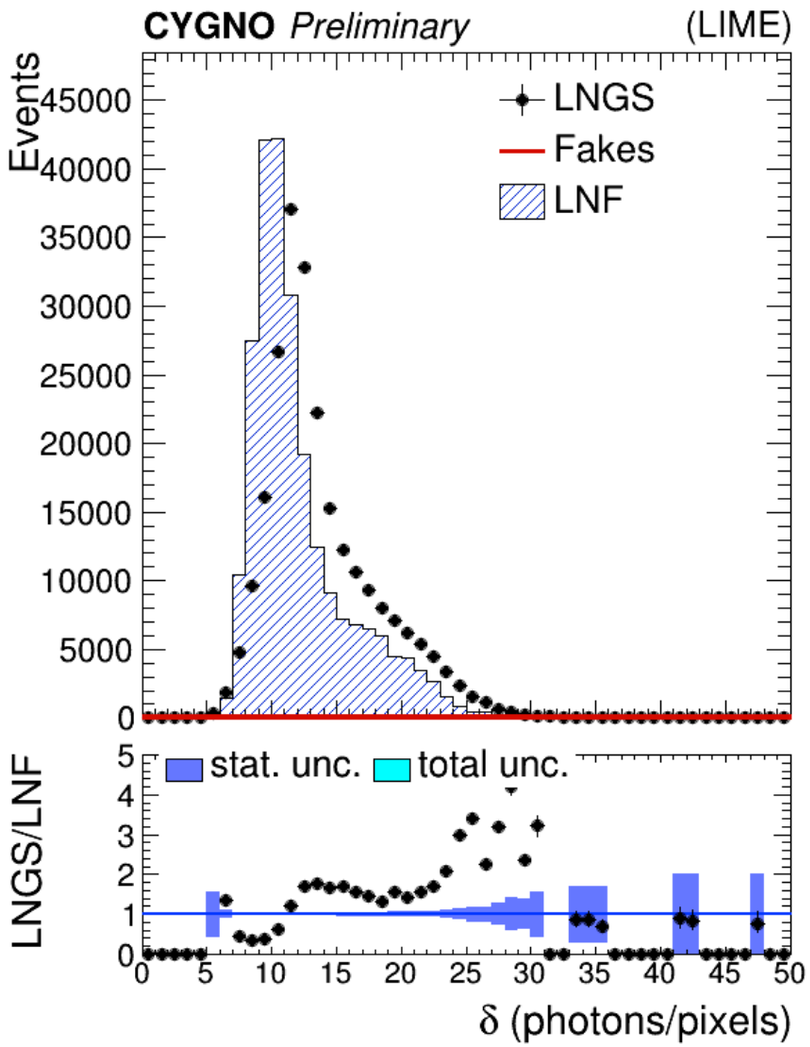
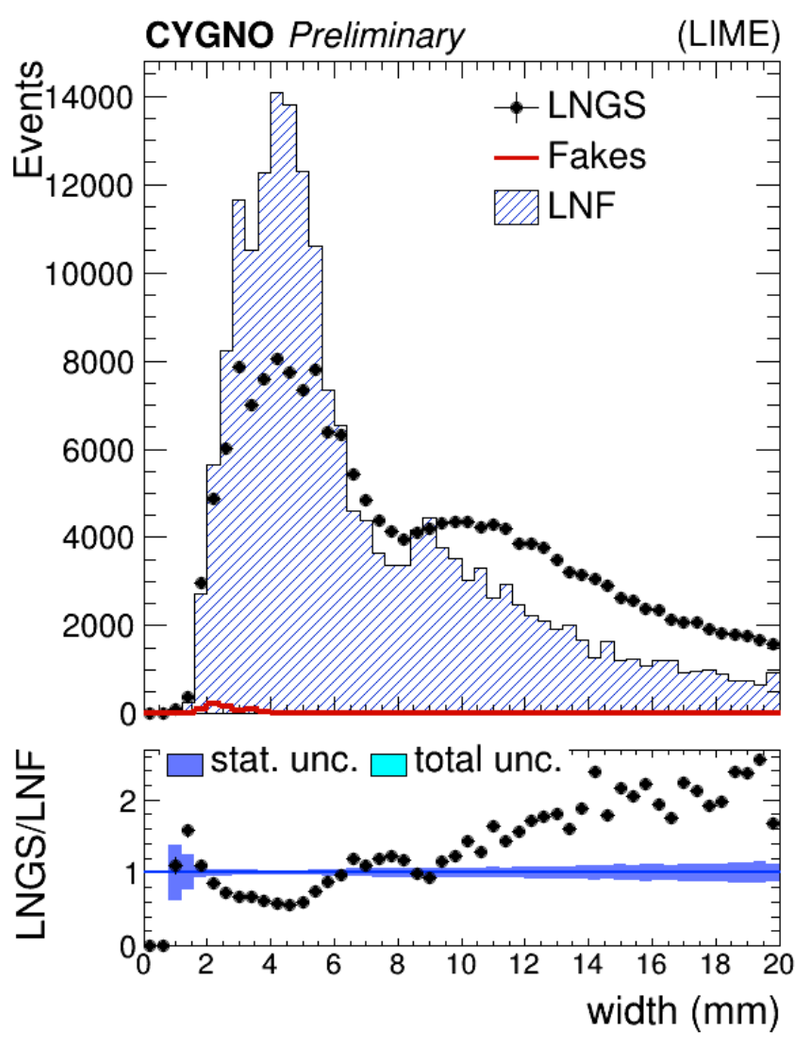


cluster properties

- Length for LNF for $\ell \gtrsim 10$ cm biased by the cosmics saturation (what is lost is not recoverable)
- Density (photons / pixels) shows that energy response is shifted wrt LNF by ~ +20%
  - full set of plots here

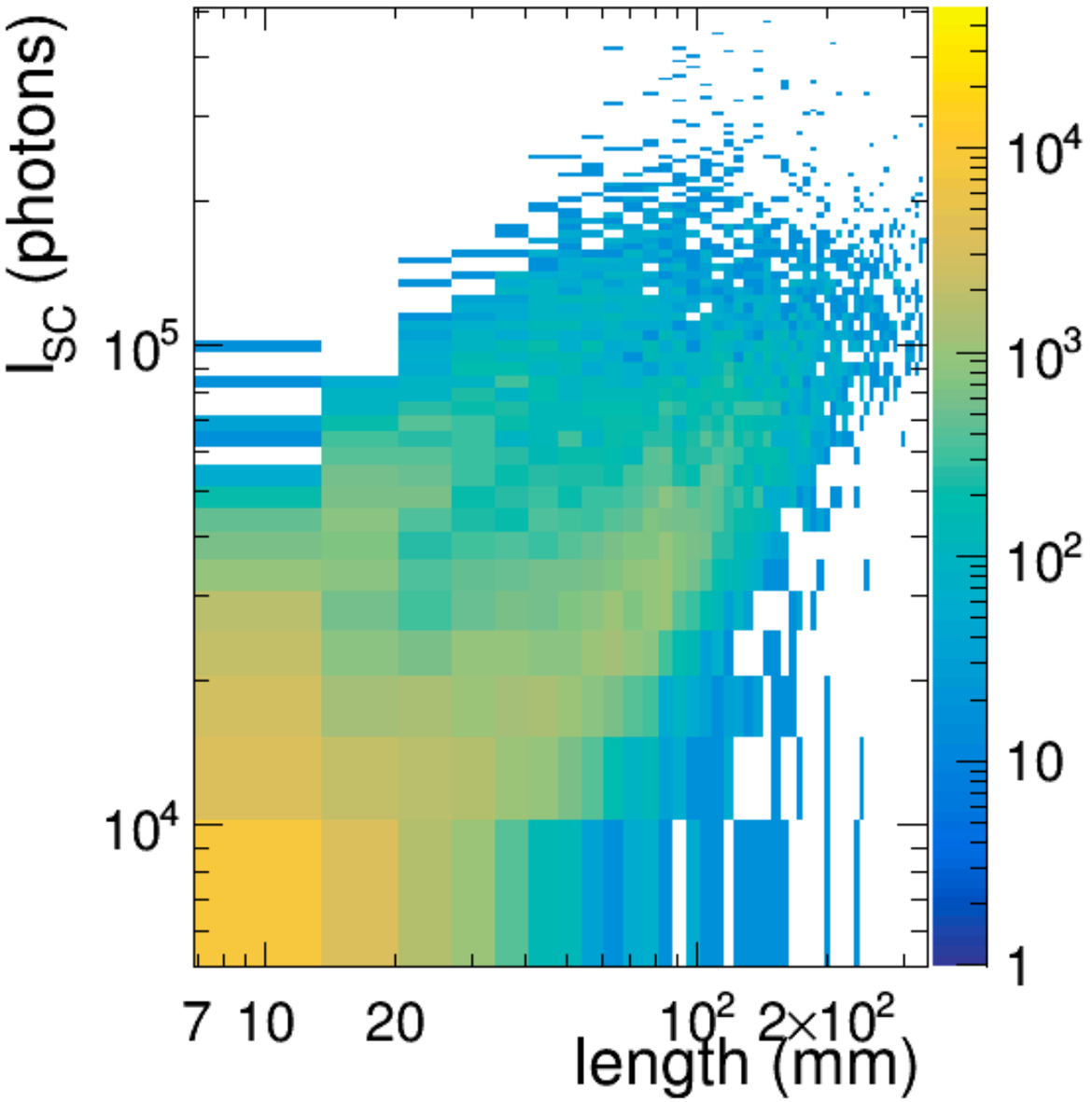




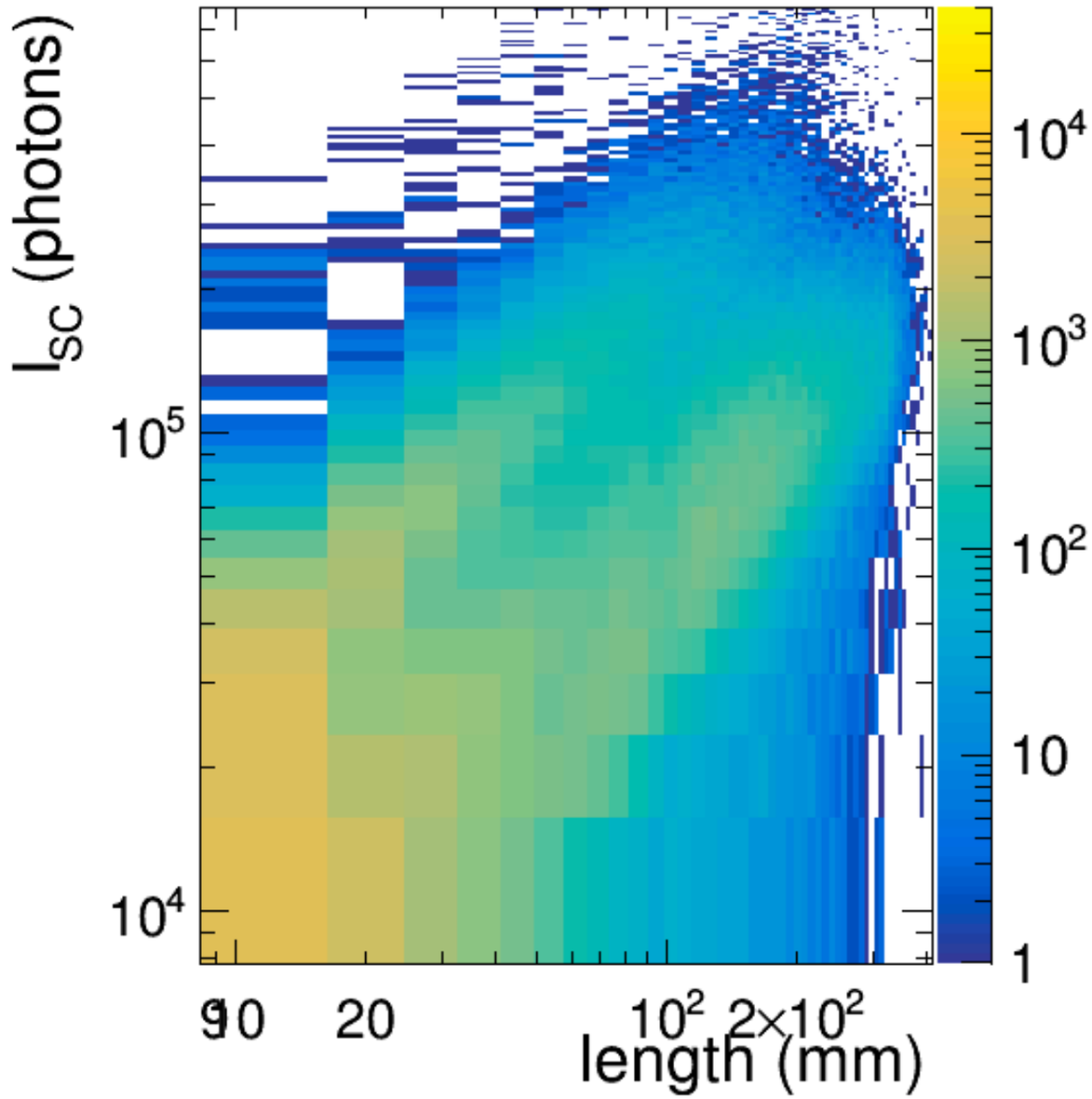


energy vs length

- Two components of clusters with E proportional to length, with different coefficients (same for LNGS and LNF)



LNF



LNGS