

# LIME background simulation

CYGNO simulation meeting – 30/05/23

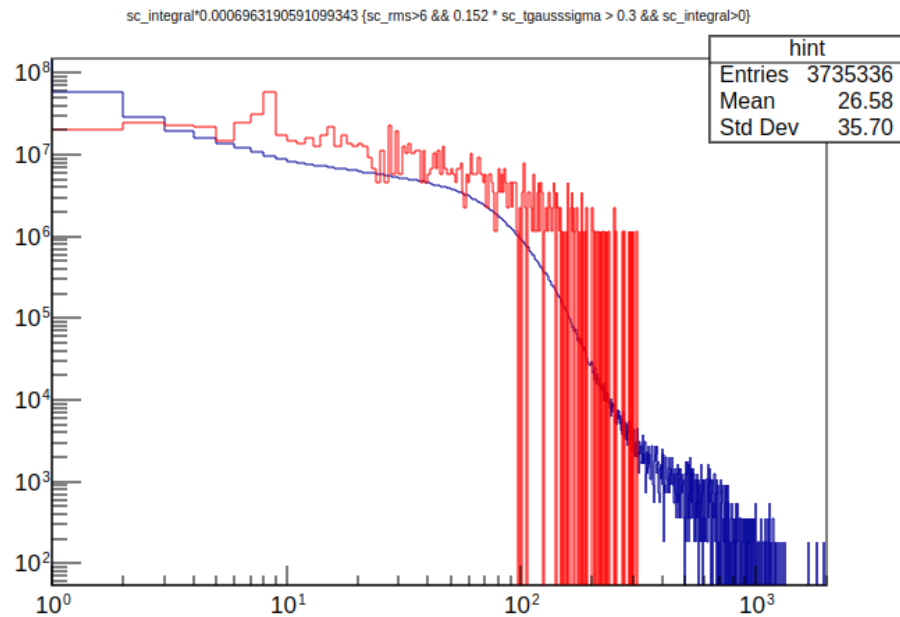
F. Di Giambattista

# Digitization

- Digitization of LIME background ongoing:
  - about 30-35 s per event (energies between 0 and 500 keV)
  - Using cygno-custom with 32GB (but even less should be enough)
- Issue on output format: root\_numpy is no longer compatible with some python libraries used in the cygno lib, but uproot has a memory leak when accessing the simulated ROOT files
  - We will contact uproot developers to try to solve the issue
  - Alternative: saving output as numpy arrays
  - Temporarily: to reconstruct the simulations I am using 32GB per job (nthreads=1)
- Disk space issue: /nfs/cygno2 on LNGS cluster is running out of space
  - I deleted some old files from /nfs/cygno (2.2TB free)
  - We should use the cloud storage space and free LNGS cluster

# Data/MC comparison

- Run1:
  - need to re-simulate with GEANT4 the external gammas (+digi+reco)
  - Internal background simulated with GEANT4 (cut on step corrected, now digitized and under reconstruction)



Data(blue):  $6.71e8$  ev/yr

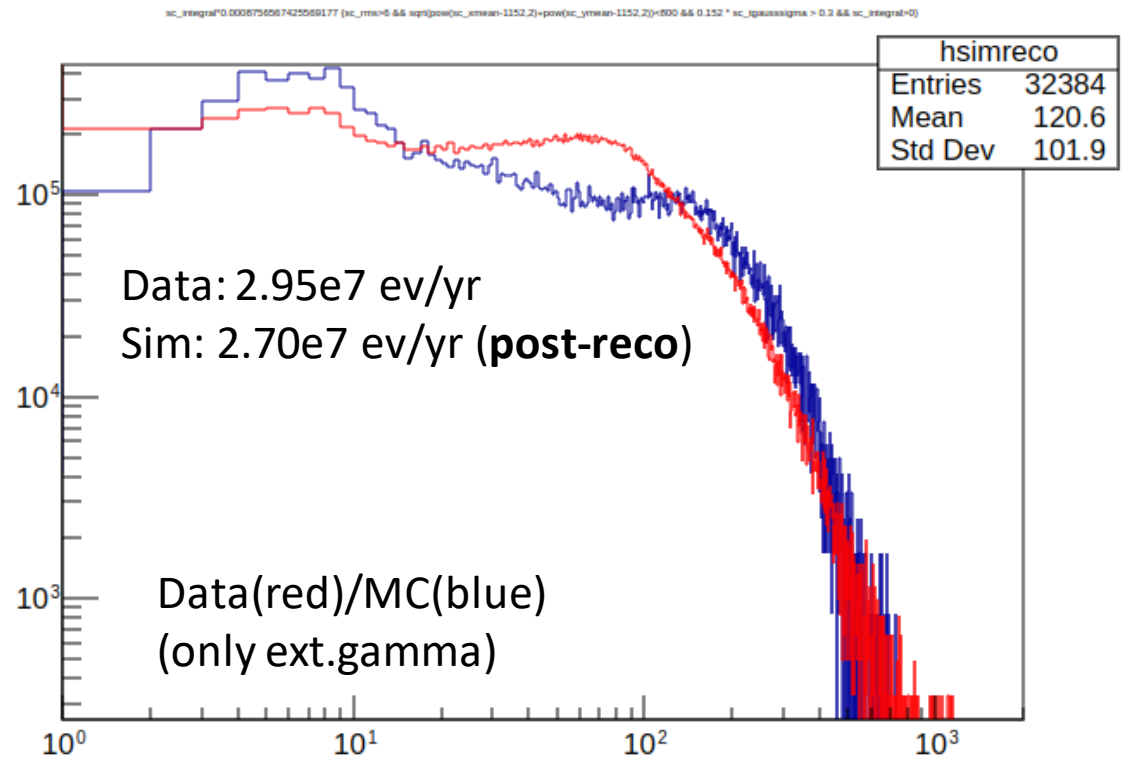
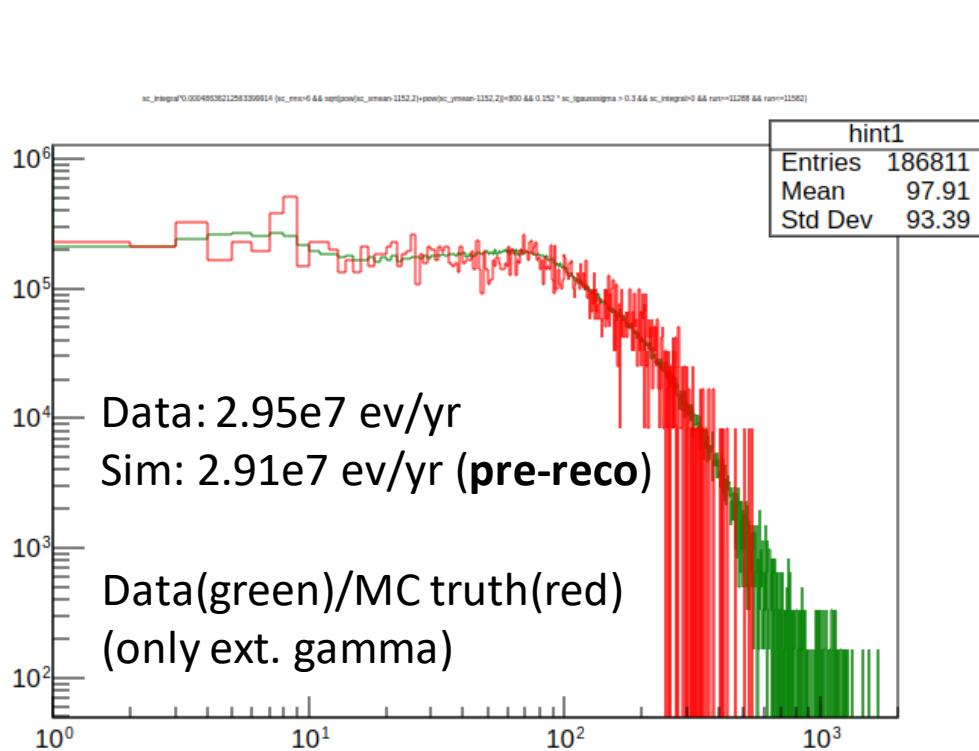
MC(red):  $11.0e8$  ev/yr (only external gamma)

No geometrical cut applied (no hits in MC)

Internal background rate:  $7.3e6$  ev/yr ( $>1\text{keV}$ )

# Data/MC comparison

- Run2:
  - External gamma GEANT4 simulation+digi+reco **done**
  - Internal background simulated with GEANT4 (cut on step corrected, now digitized and under reconstruction)
  - Geometrical cut applied (only image center)



# AmBe simulation

sc\_integral\*0.000645(sc\_length\*0.152);sc\_integral\*0.000645 (sc\_integral\*0.000645<20 && sc\_integral>0. && MC\_particle\_type<1e9)

