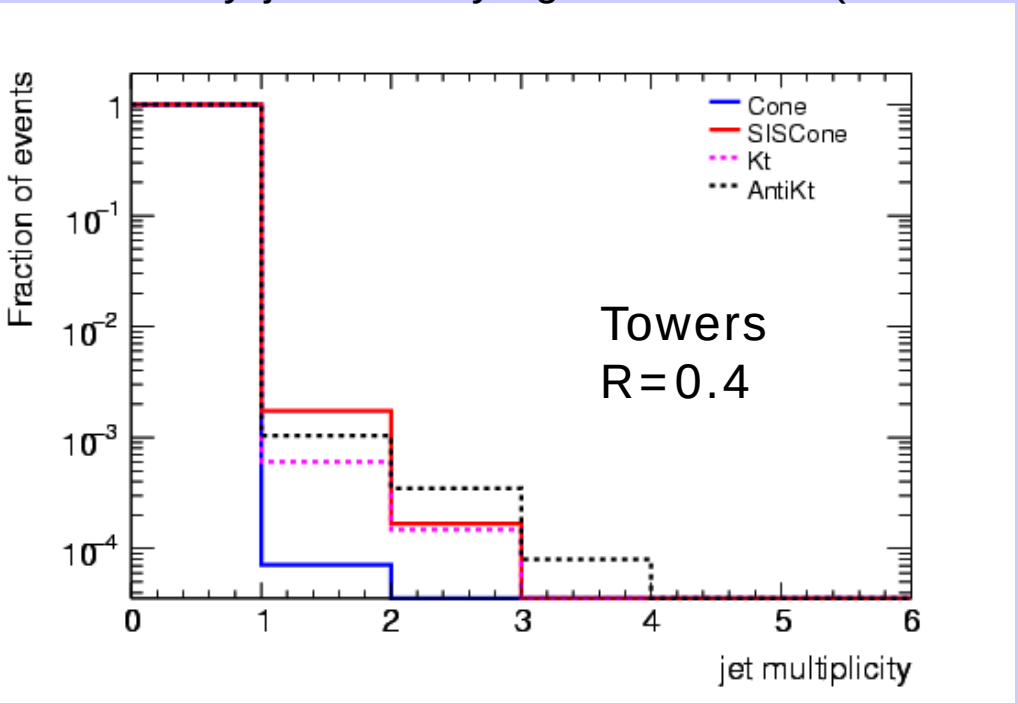
Tower jets : multiplicity

- March reprocessed commissioning data
  - Standard bad channel masking is applied
  - 60 runs with LAr and Tile (10Sept2008→23Oct2008)
  - 1.1 million events analyzed

Consider only jets satisfying Et > 7 GeV (em-scale)

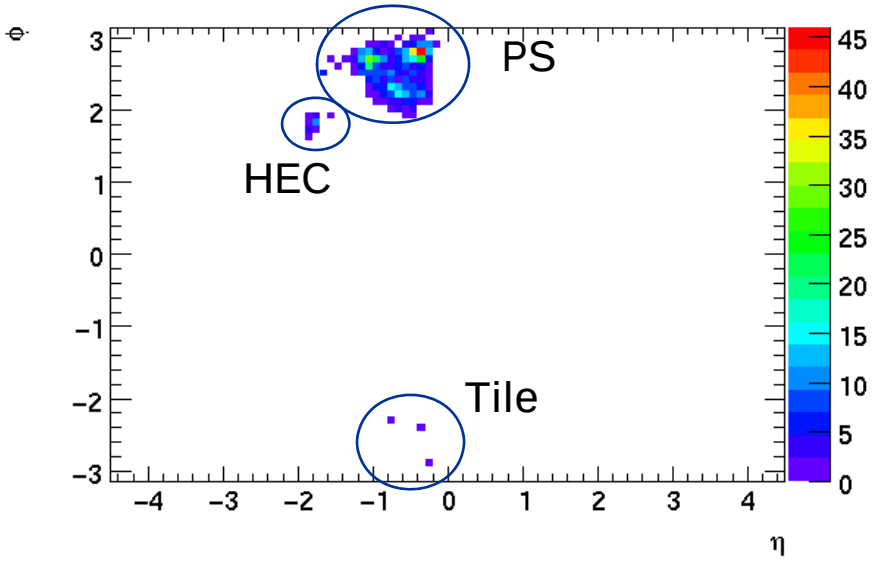


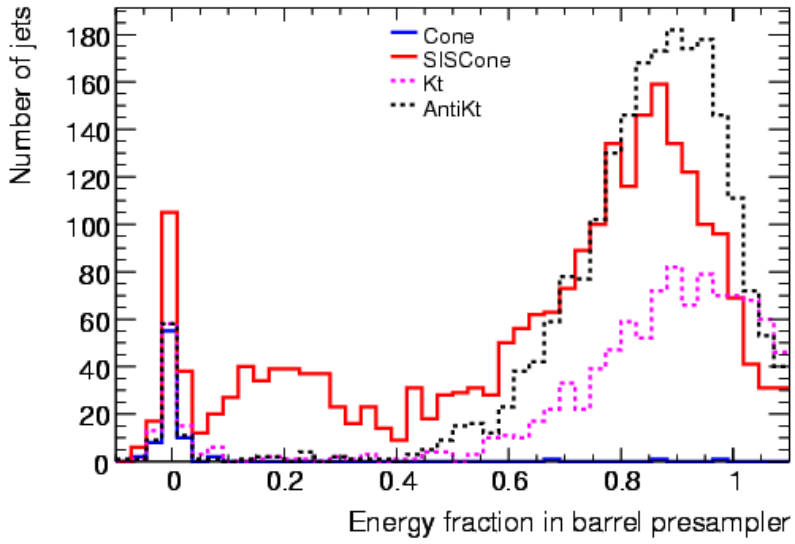
- Towers don't have any noise-suppression
- Much more jets with seedless algorithms
- Less jets are found with the ATLAS cone algorithm due to the seed cuts
  - Start a jet if $E_T^{tower} > 1GeV$

Tower jets (R=0.4)

- Jets in randomly triggered data are due to:
  - Coherent noise in the barrel PS
    - Problems identified and fixed at hardware level for 2009 data
  - “Sporadic Noise Burst” in the HEC
    - 6 cells which don’t belong to the problematic channels list

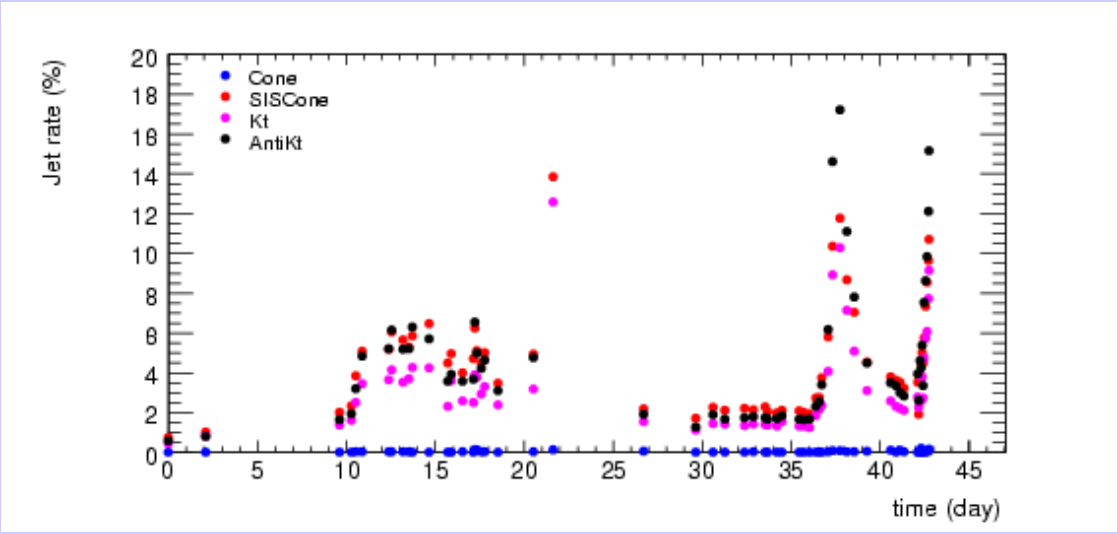
Jet Occupancy for AntiKt4TowerJets

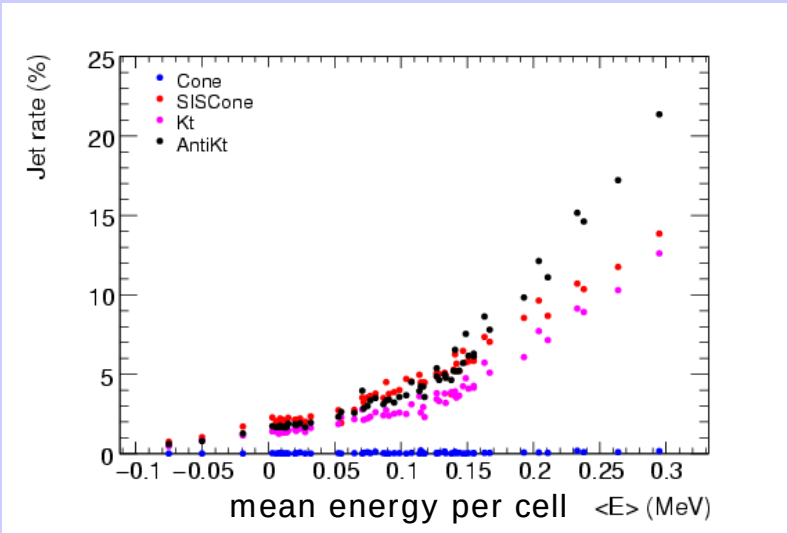




Tower jets (R=0.7)

The fraction of events with at least one jet with Et>7GeV varies with time.
It is correlated with the pedestal shift in the LAr barrel



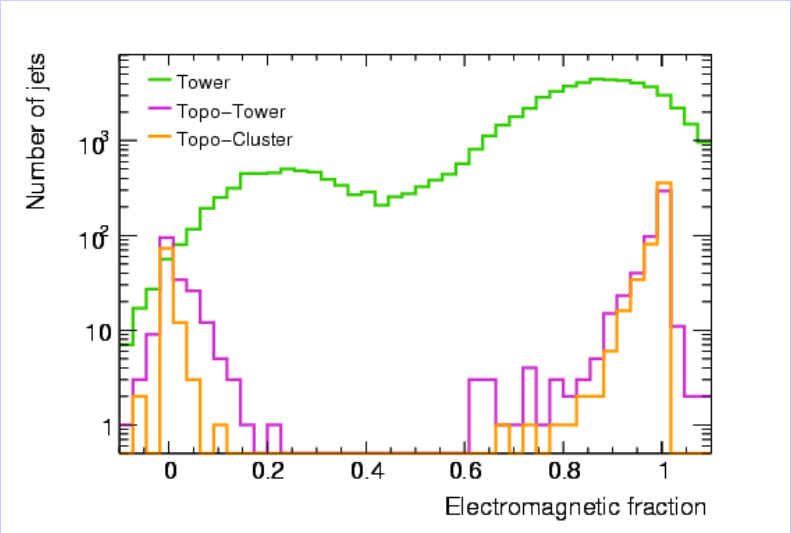


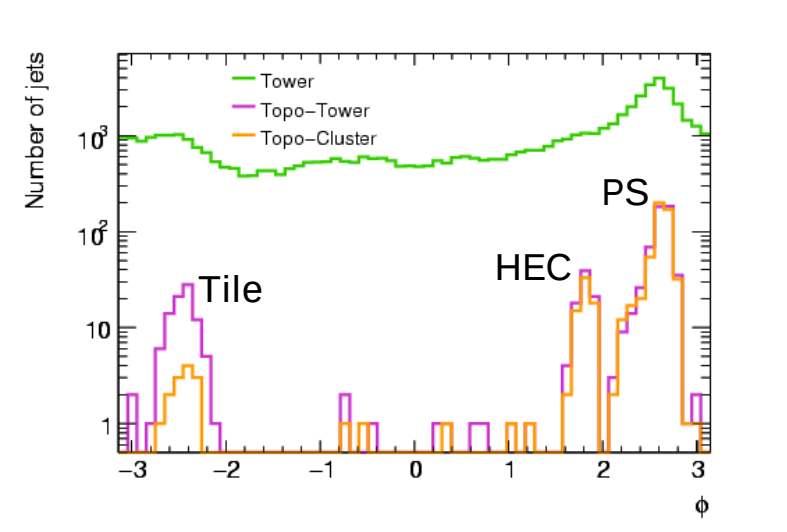
Jet (R=0.7) ~10000cells
$<E> = 0.1\text{MeV} \Rightarrow E_{jet}$ increases by 1GeV

Only 1 set of pedestal values were used to process the data
During standard ATLAS running mode, pedestal runs will be daily taken and the database will be modified accordingly.

Noise suppression (AntiKt, R=0.7)

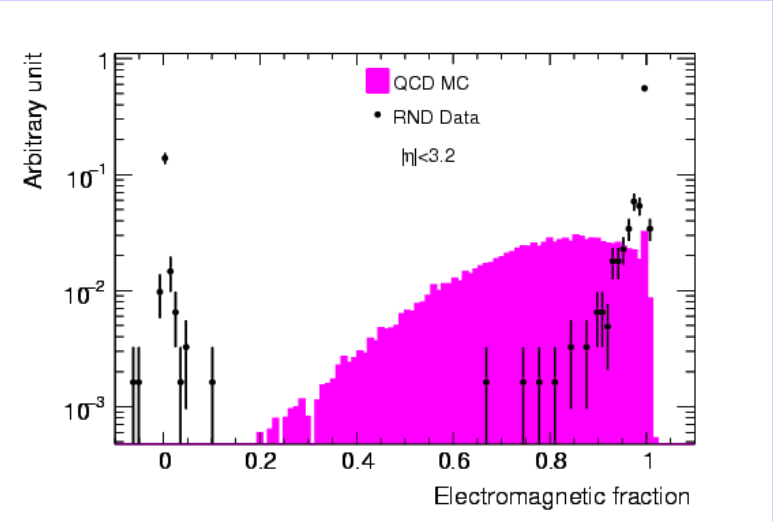
- Seedless algorithms are infrared-safe but require good understanding of the noise.
- Inputs to these algorithms should have noise suppression
  - Topoclusters
  - TopoTowers
    - Towers build only with cells belonging to a topocluster
- Fraction of evts with at least 1 jet (Et>7GeV)
  - Towers : 4.14%
  - Topotowers : 0.04%
  - Topoclusters : 0.05%

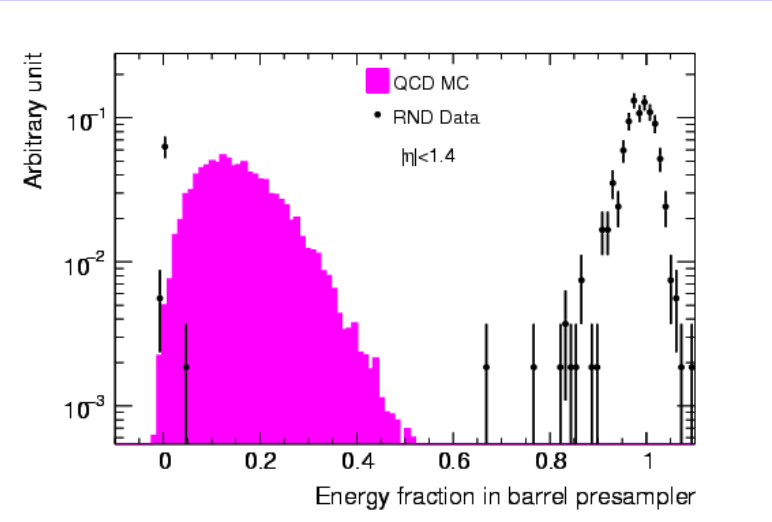


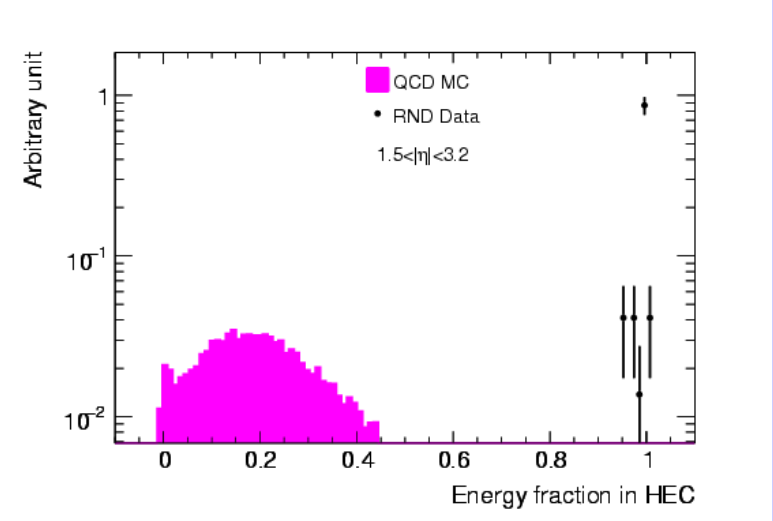


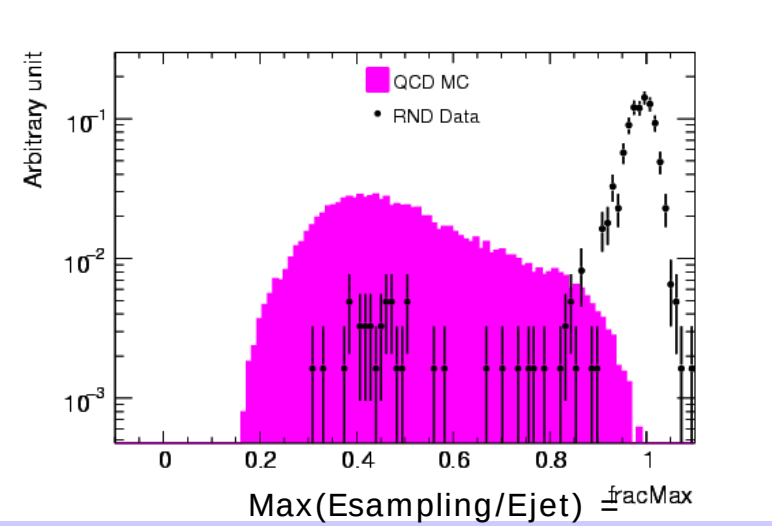
Cleaning cuts : AntiKt7TopoJets

Histograms normalized to the same area









Noise can be suppressed using quality cuts

Conclusion

- The theoretically safe algorithm are more sensitive to the noise since they doesn't use seed
- They are also more sensitive to slight pedestal shift
- Need interaction with detector people
  - For instance, the noise in the barrel PS has been understood and fixed at hard-ware level
  - Looking forward to 2009 data
- Inputs to these algorithms should have noise suppression
  - Topoclusters or TopoTowers
- Important to define quality criteria to further remove noisy jets
  - Electromagnetic fraction, energy fraction in presampler,...
  - And also : jet area, fracmax, tracking information, cells Q-factor,...