QC and ML plans for EMCAL for run3
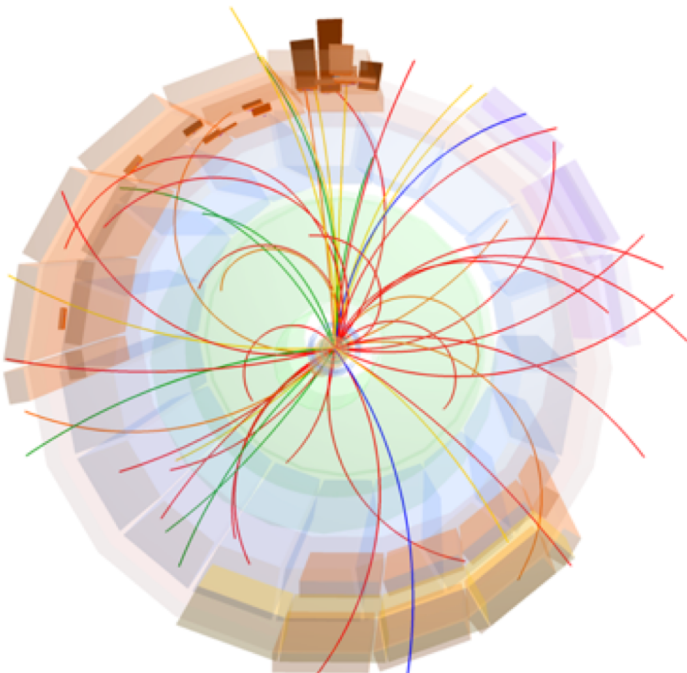
Markus Fasel (ORNL)

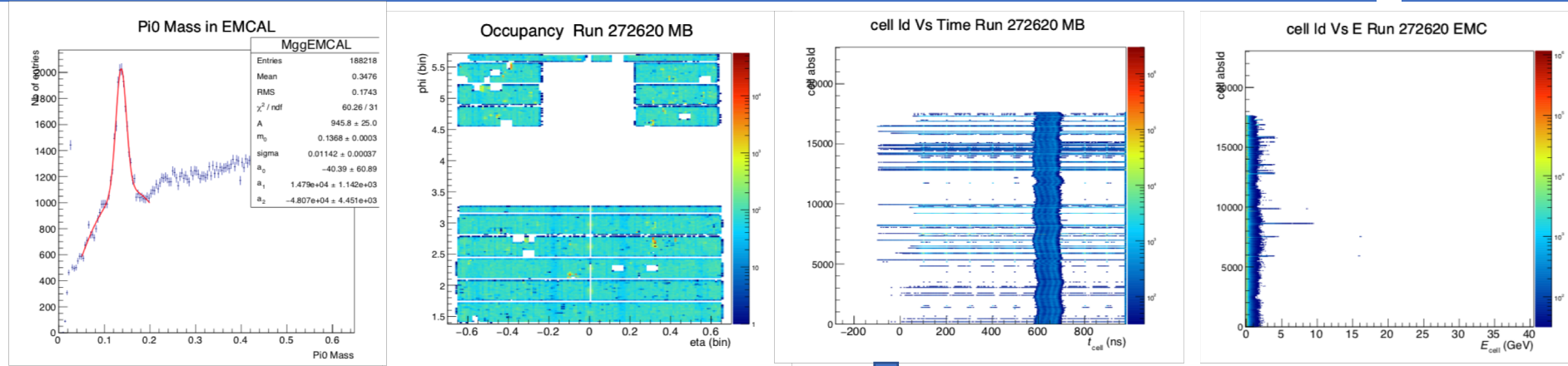For the EMCAL collaboration

Machine Learning and Quality Control in ALICE
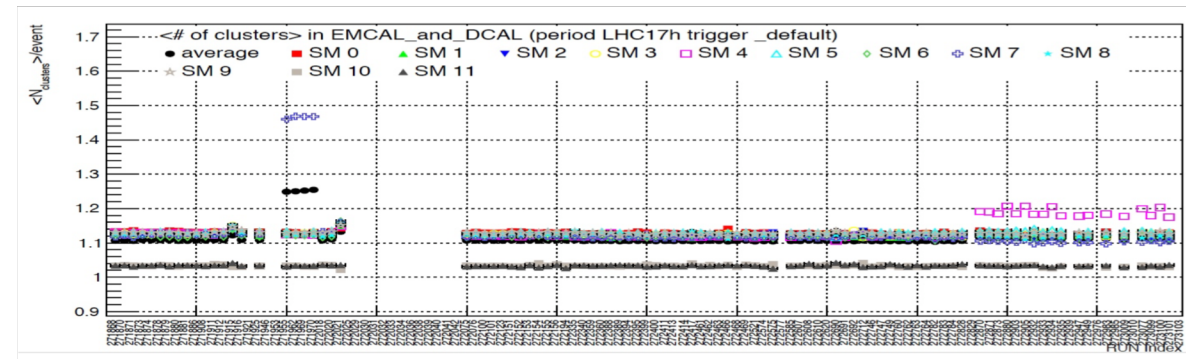Dec 3-4, 2018

3 Levels:

- Cells
  - Energy
  - Time
  - Occupancy
- Clusters
  - Energy
  - Time
  - Occupancy
- Pi0
  - Mass peak

Trigger to be defined, probably related to L1 triggers

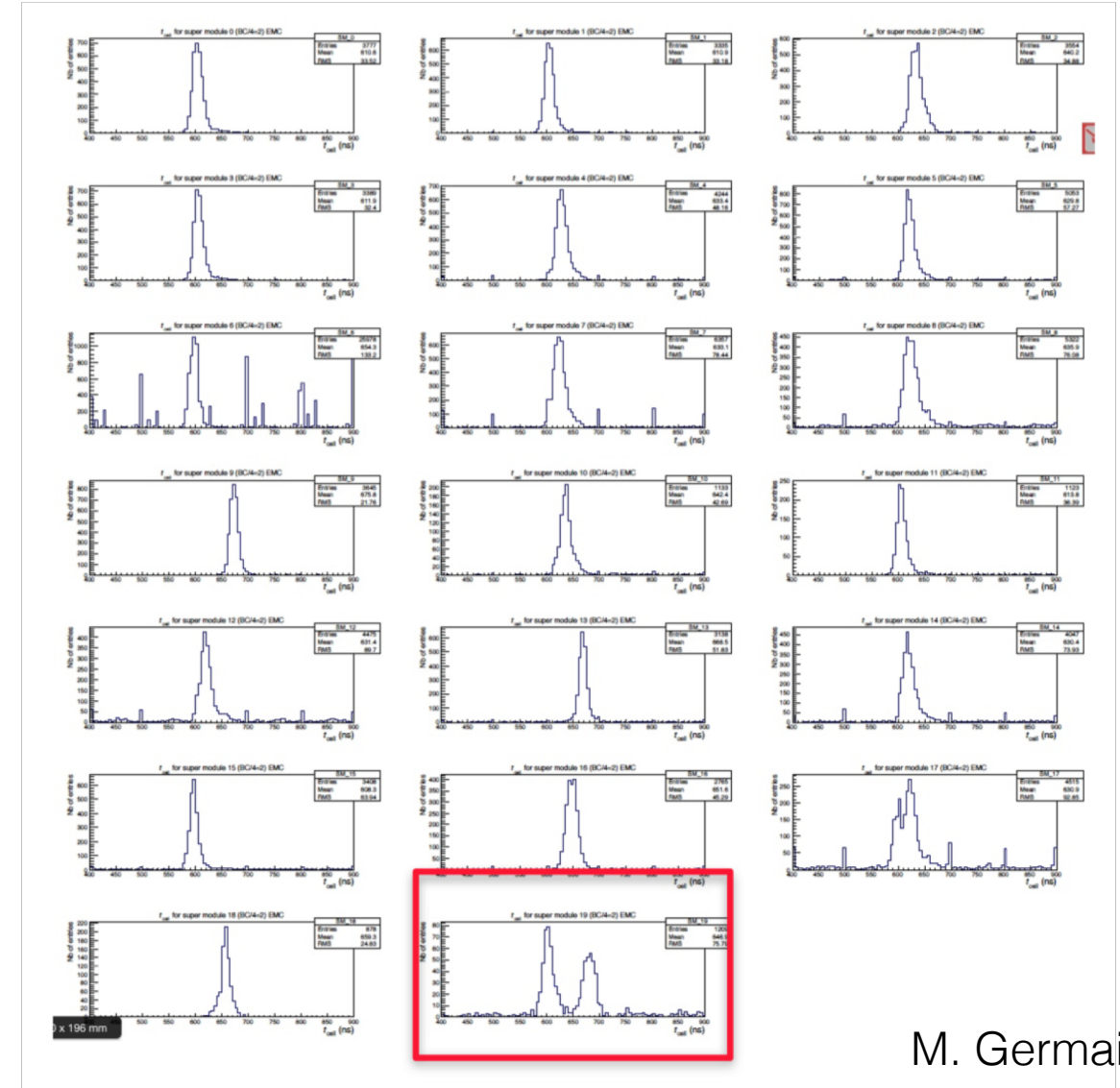Trending per run / time interval

Classification

Marie Germain

- Find problems in certain runs
  - PAR/L1 phase problems
    - Shift of L1 phase in runs with PAR -> multiple peak structrue in certain supermodules

- Automatic run classification using multiple QA observables

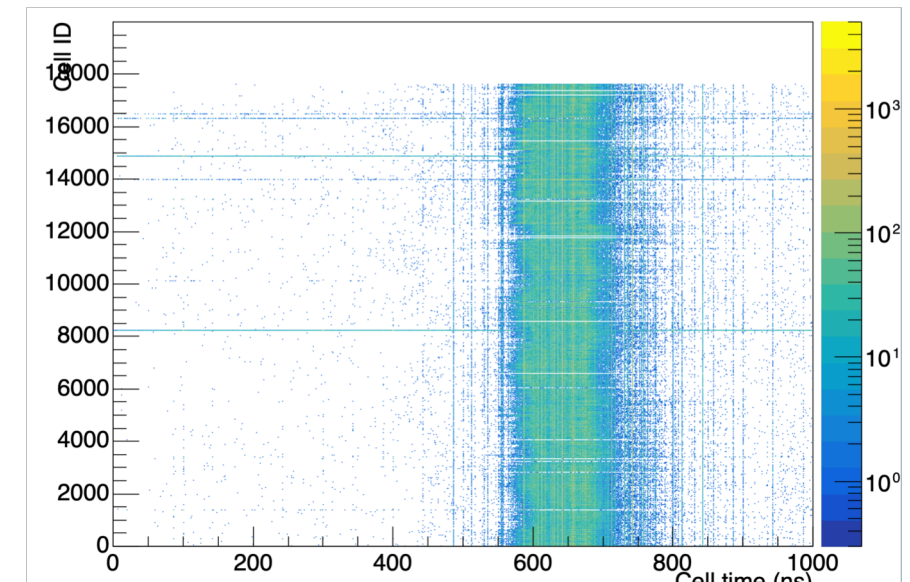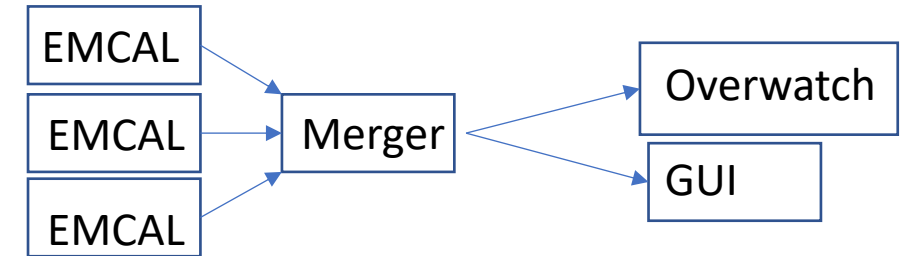M. Germain

Focus on operational issues

- Preliminary calibration, not as accurate as with final calibration
- Used to spot severe problems which can be fixed during the data taking
- Observables roughly overlapping with offline QC
  - Cells
  - Clusters
  - Pi0
  - Trigger

- Implemented on the HLT
  - Trigger QA (since 2015)
  - Cells, Clusters, Pi0s (since PbPb run 2018)
- Time sliceing via merger time interval
- A-priory bad channel map, taken at the beginning of the heavy-ion run

- Candidates for machine learning:
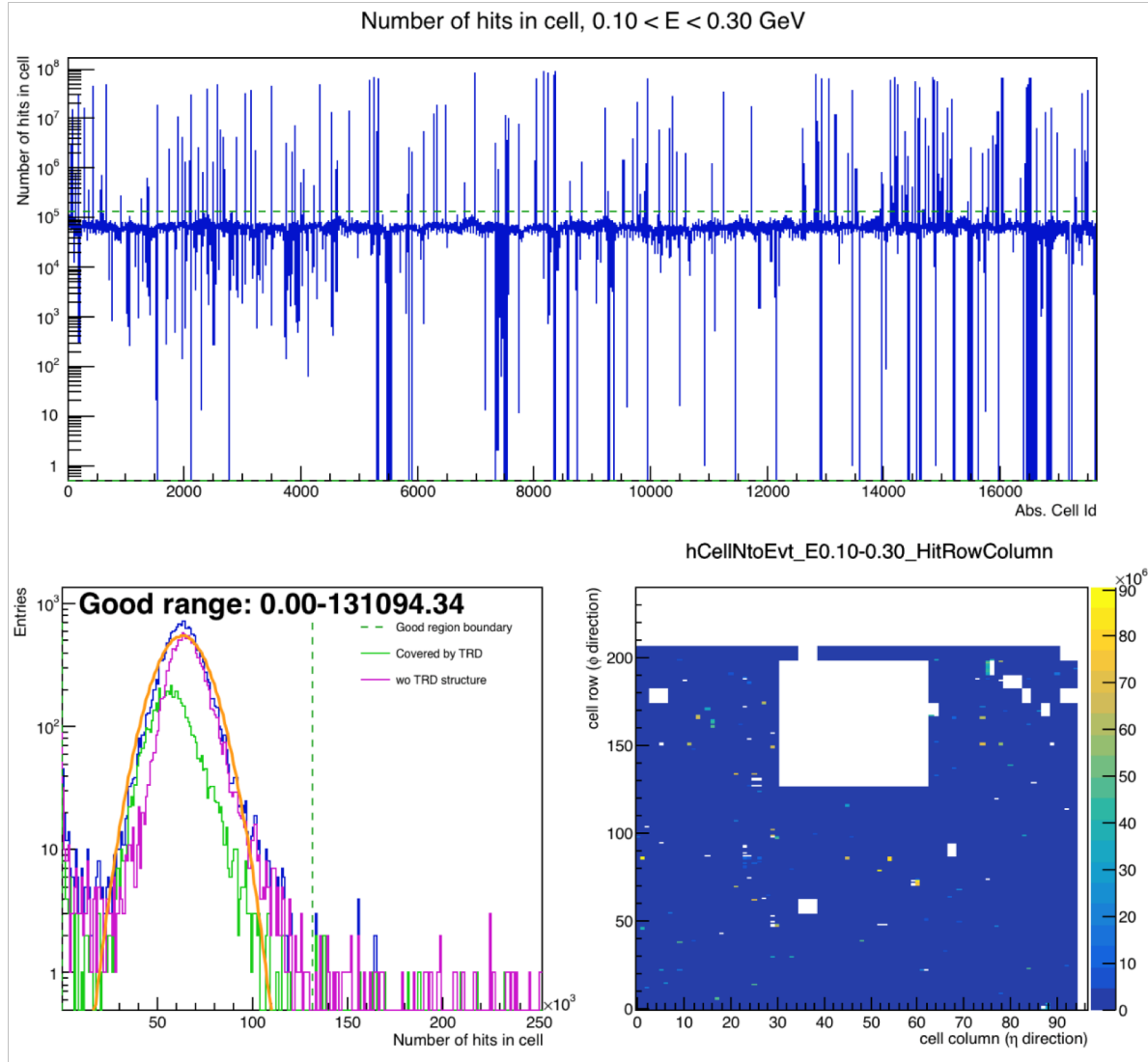 - i.e Find noisy cells (particularly for trigger)

Overwatch: R. Ehlers
(https://indico.cern.ch/event/766450/contributions/3225214/attachments/1763758/2862848/2018-Dec-3.rehlers.overwatch.v4.pdf)
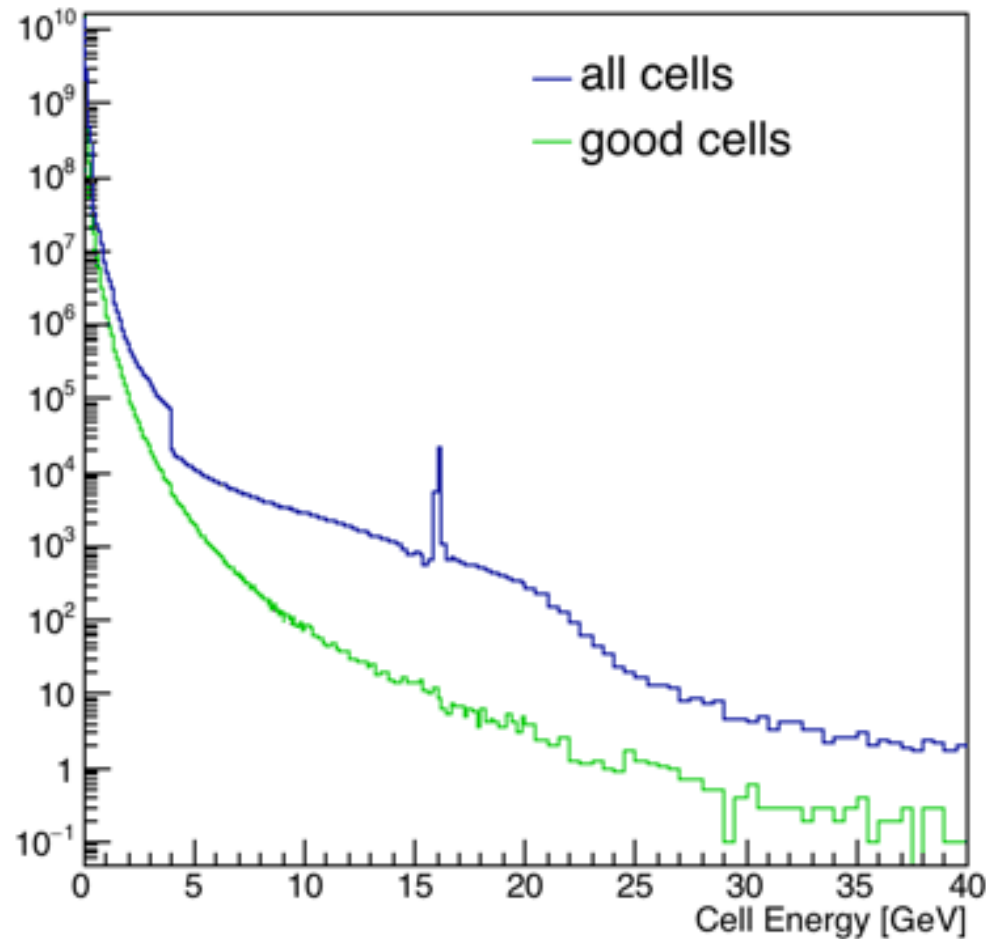

Large sample taken with the HLT in 2015-2018 – to be used for training for run3

Example: 17g

First selection criteria for bad cells.

Energy range 0.1-0.3 GeV
No. of Hits in cell for entire period.

Eliane Epple

Promising candidate for machine learning:

- A-priori information for signal (bad channel) and background (good channel) available from run2 data
- Observables from the current procedure well defined (i.e. spectral shape, number of hits per cell, ...)

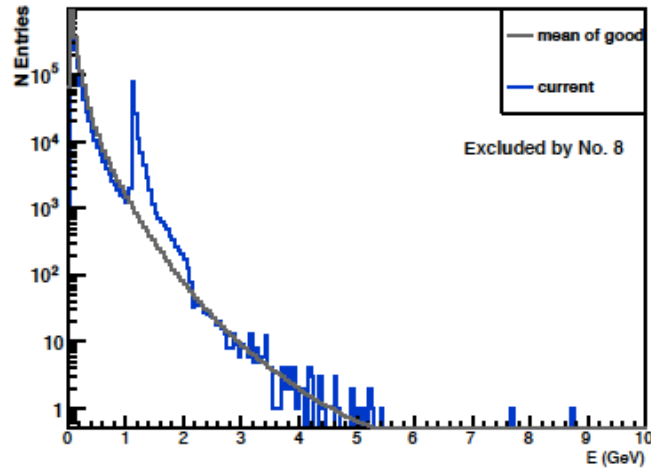Goal: Reduce statistics need to be able to perform calibration per run / set of time frame

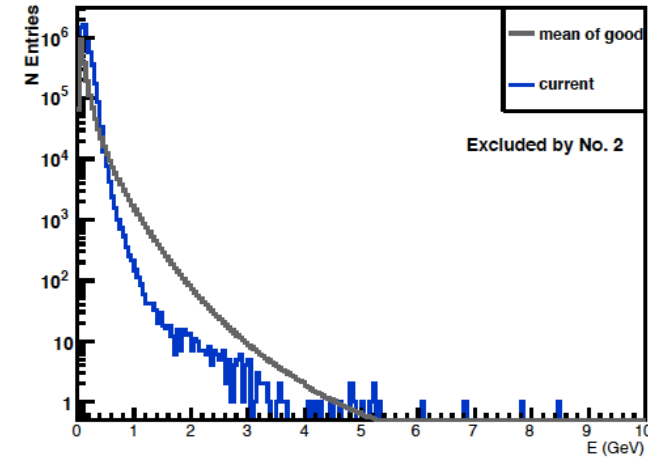Large amount of statistics needed in order to cover the enire EMCAL   Eliane Epple
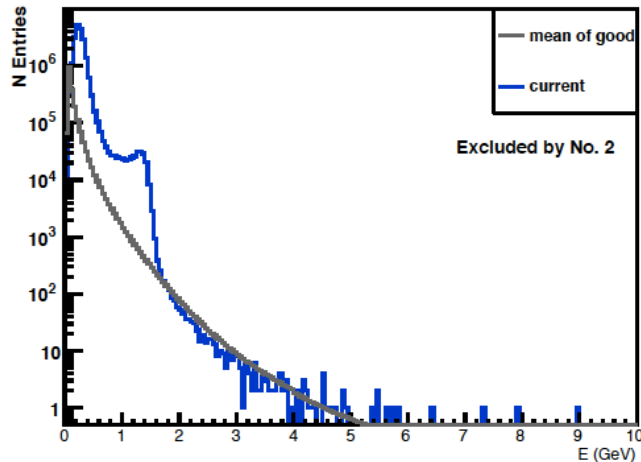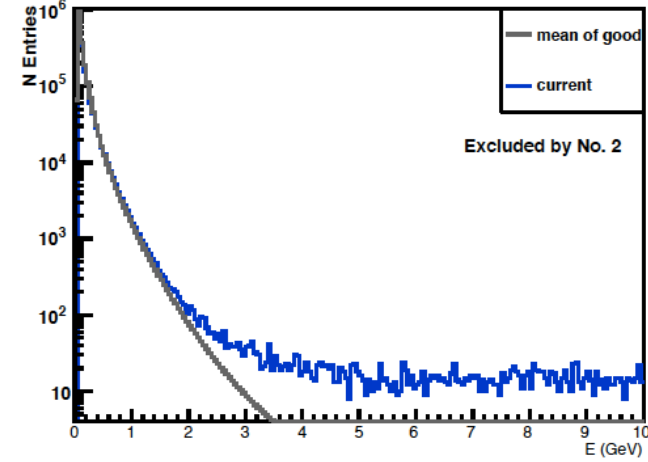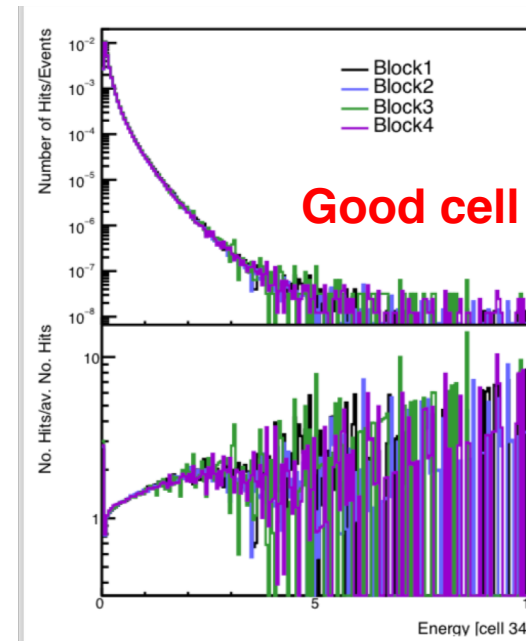
Different types of bad cells

- Structures, i.e. peaks
- Change of spectral shape

Non-unique classification of bad cells

Eliane Epple

ADC time series -> (center time, max amplitude)

Current method: Minuit fit of template to time series
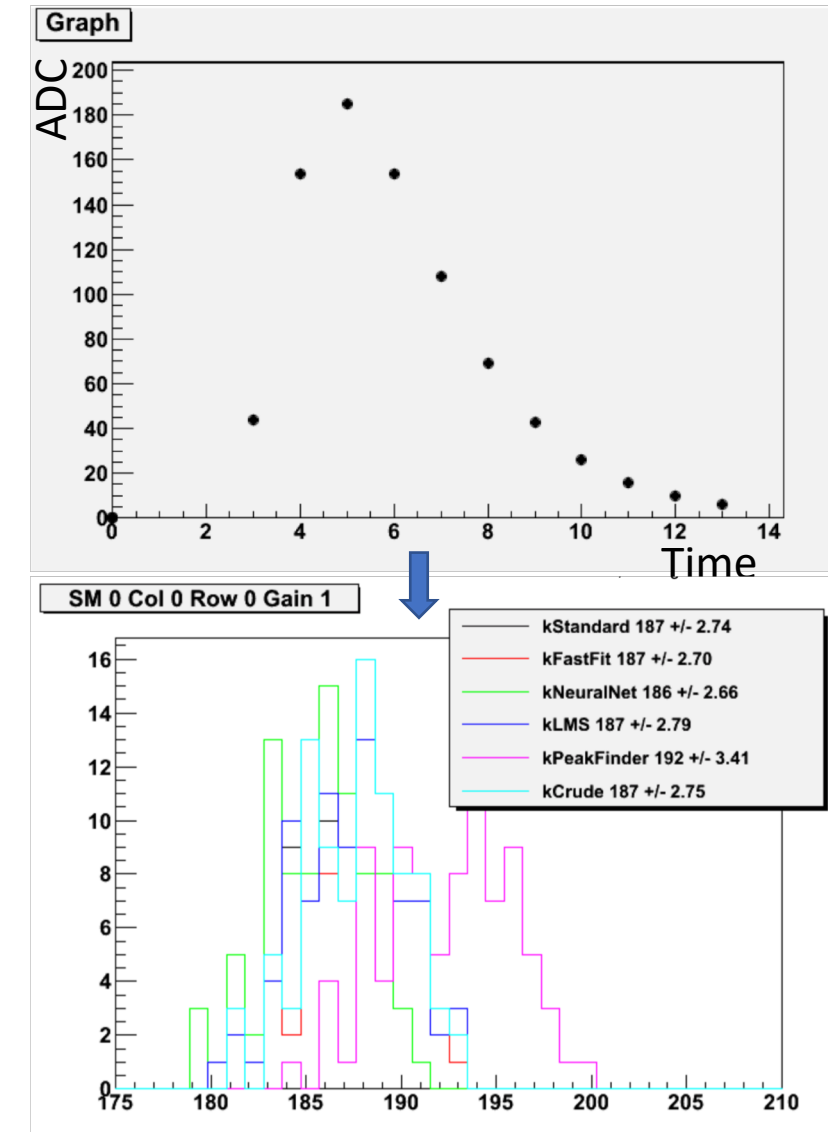
- Most accurate method
- Slow

Neural-Network based signal extraction implemented for EMCAL

- Training data: LED run
- Fast
- Good time resolution (similar to standard method)
- Amplitude underpredicted

Not yet production ready

Re-assessment for run3

Paola La Rocca
Franco Riggi
David Silvermyr

- Several candidates for machine learning identified
  - Offline QC
  - Online QC
  - Calibration
- Feasibility to be studied in the upcoming year