Detector Data Rates

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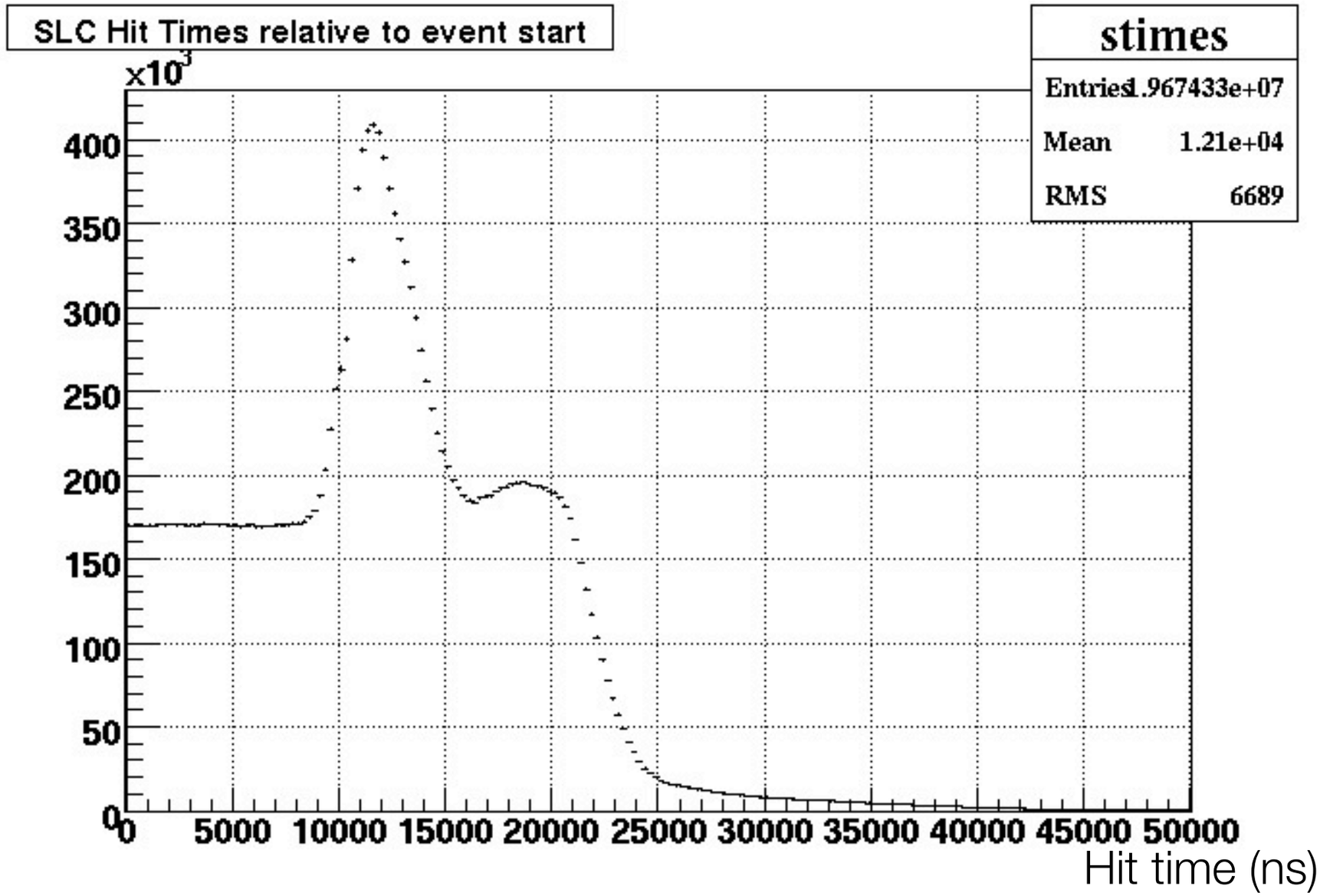
New Items in IC59 physics run

- Readout of SLC isolated hits
  - These hits are not used in online filtering or trigger decision
  - Expected to help sensitivity to low energy tracks (~100 GeV)
- Modified readout windows (reduce SLC data rates)
  - For SMT8/std String trigger, readouts for InIce DOMS (-4usec,6usec)
  - IceTop and other triggers still use +/- 10 usec window as before.
- Anti-Meteor settings.
  - Increased gains for ~100 DOMs
  - Keeps 0.25 PE threshold (new this year) on all InIce DOMs

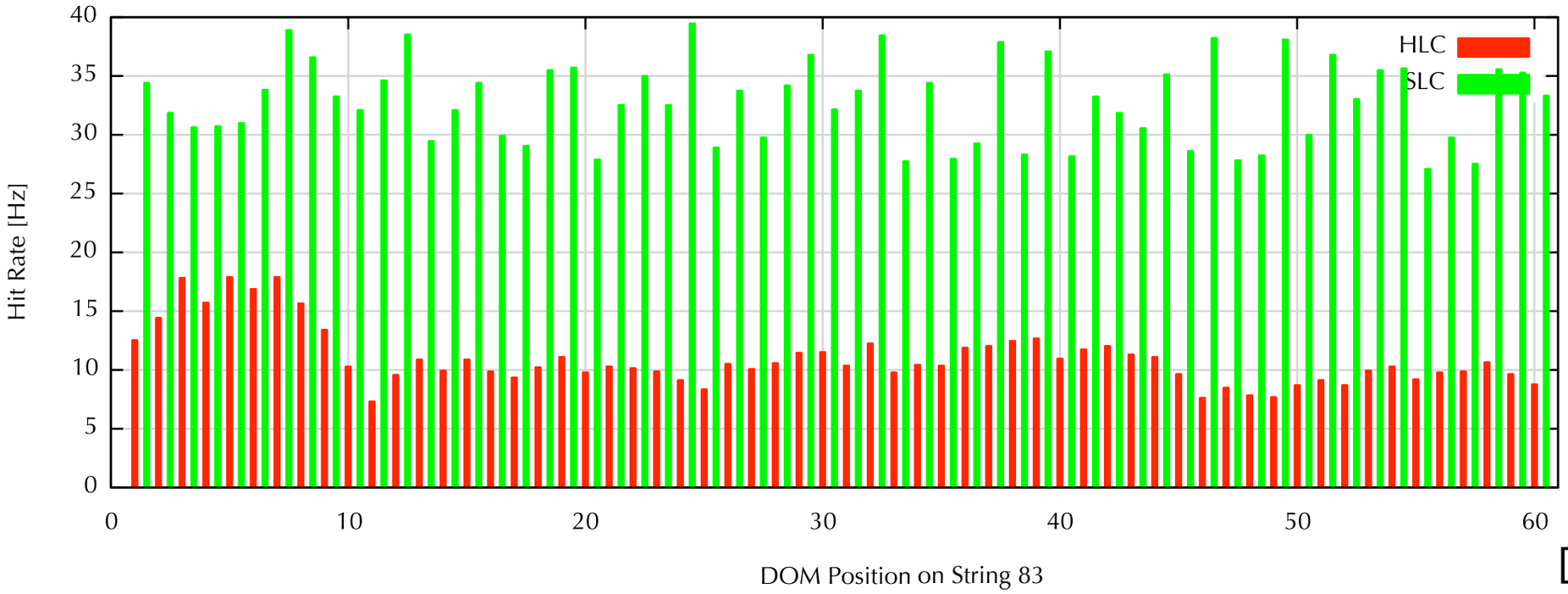


- Time distribution of in-ice SLC hits.
  - Flat noise component
  - SLC hits correlated with the trigger (@10000) clearly visible
    - Time/Space cuts can be used to separate noise.

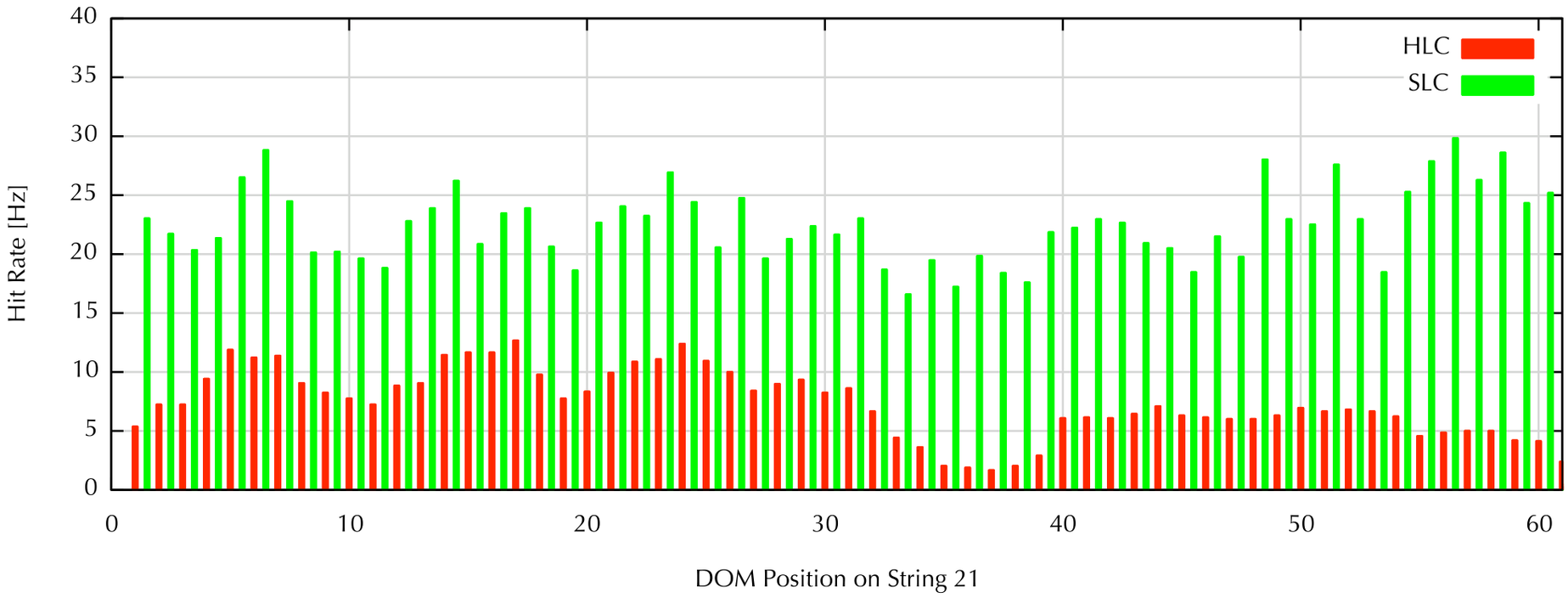
IC59 - Current status.

- Addition of SLC hits increased the raw data rate more than originally predicted.
  - IC40 DAQ output data rates (HLC readouts only): 4.5 MB/sec
  - IC59 DAQ output data rates (HLC+SLC readouts): 14 MB/sec (up to ~18)
    - Originally expected ~9 MB/sec
- Reasons are understood:
  - Underlying readouts from DOMs is very small (12 bytes) but DAQ adds similar overhead as HLC readouts (full time stamps, full payload wrapping)
  - Small impact from High QE doms in Deep core string.

SLC and HLC DOM readout rates for 2 strings



DeepCore

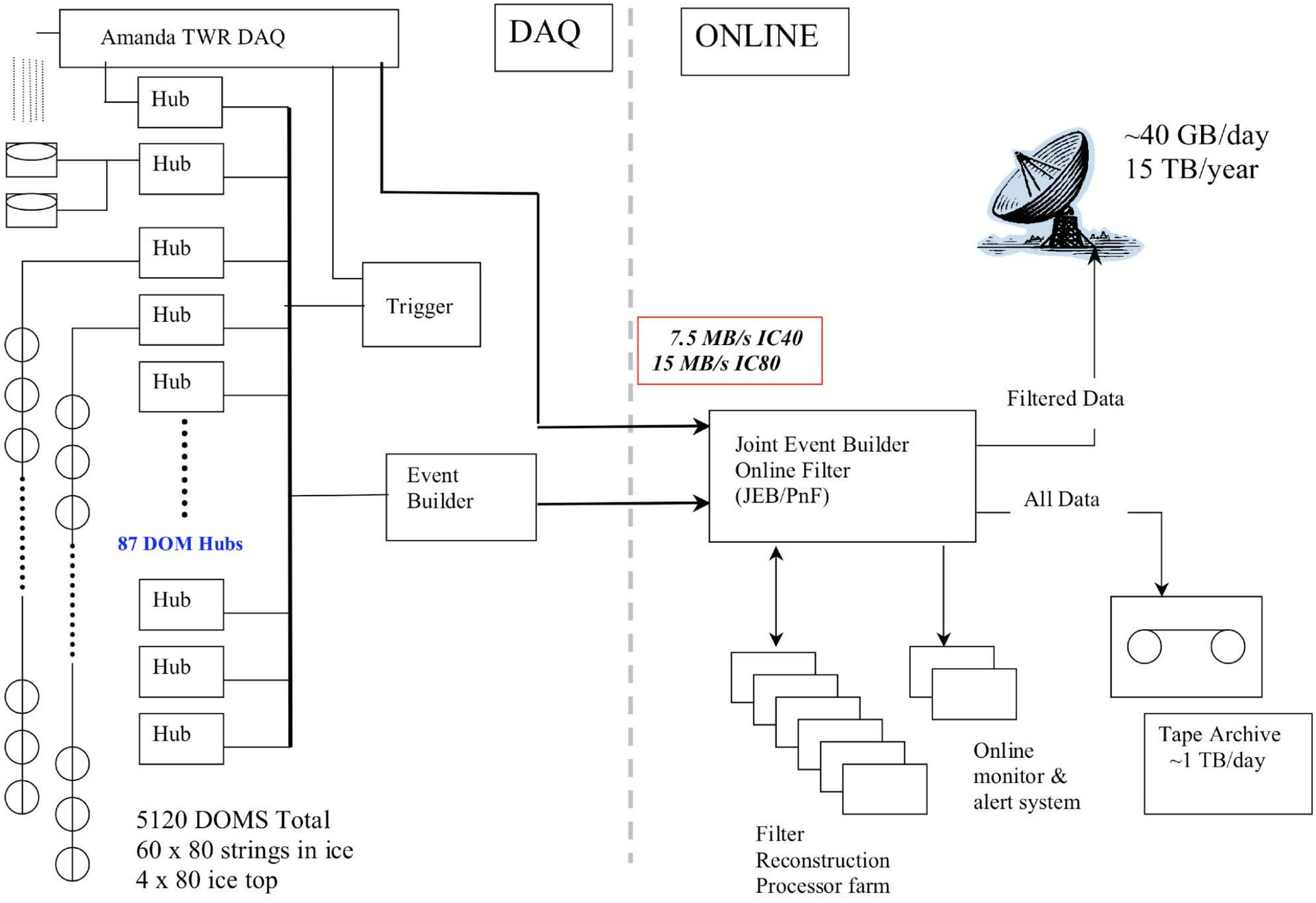


Standard

IC59 - Current status.(2)

- For IC59, we are handling this rate, with several plans to mitigate this:
    - Reduced the readout window around each trigger from 20 usec to 10 usec minimum.
    - Repeated structure of headers gzips very well (reducing amount of satellite BW and tapes needed)
    - DAQ plans to “reformat” payloads in the next few weeks.
        - Early studies indicate ~10 MB/sec achievable.
- Still added bandwidth a challenge for downstream systems.
    - Online filtering system
    - Online taping system (specifically gzipping overhead)

Online systems overview



Future seasons

- Going forward in future seasons, some optimization of configurations may be required to go forward.
  - Balance physics needs with the system capabilities to achieve a stable operating detector configuration (job of TFT board)
  - Several options available
    - Increased trigger thresholds -> physics needs met by specialized trigger algorithms
    - Not write all every triggered event to tape -> Write only events above a higher trigger threshold to reduce taping load.
    - Another compression system for “simple” single pulses.