Update on the performed analysis for the electronic noise on wires readout

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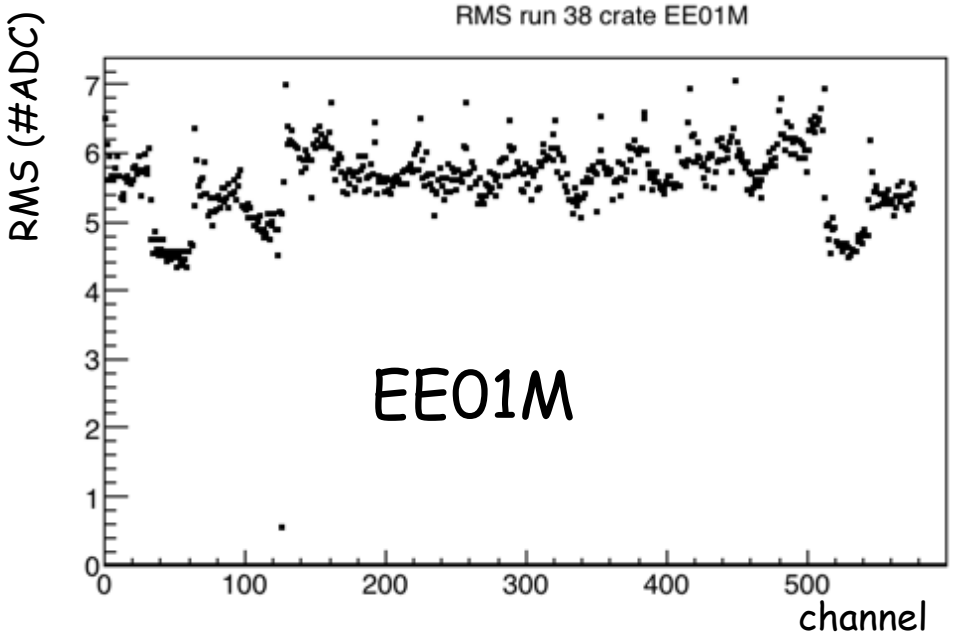
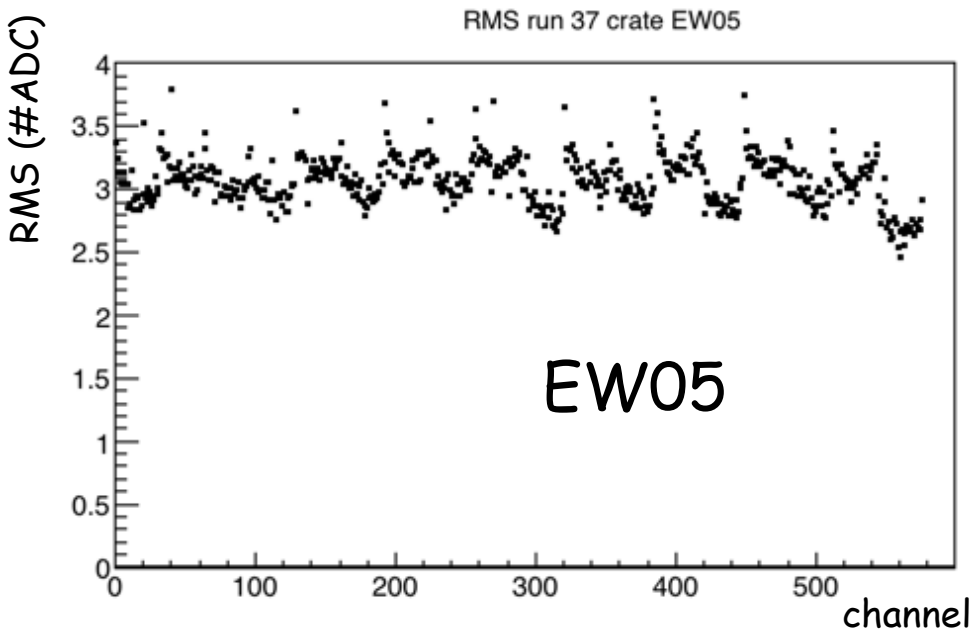
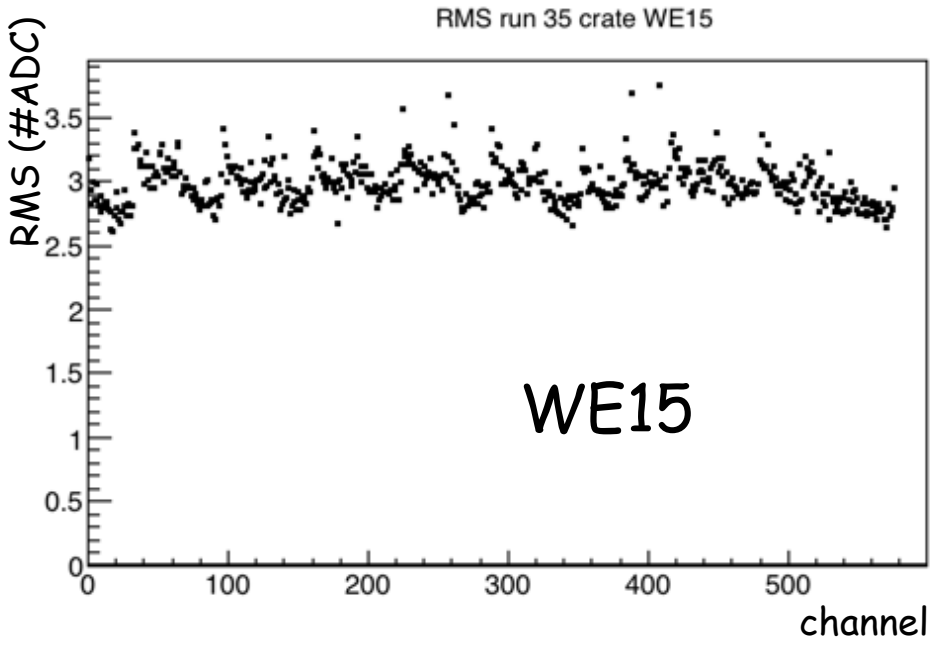
Tests on the crates to improve the noise conditions

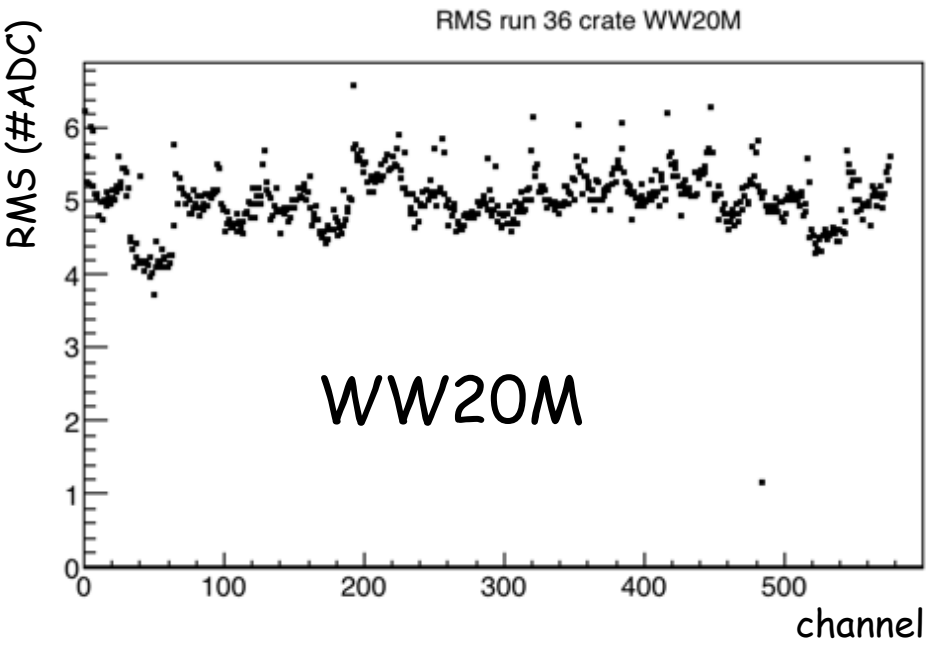
- At the end of July, different tests have been performed in order to understand/improve the noise conditions in the crates:
  - ✓ Evaluation of the noise conditions in 4 different crates (one per TPC and in different positions along the longitudinal direction of the detector: EE01M, EW05, WE15, WW20M) switching off possible external sources of noise (July 26th)
    - A "pedestal" run has been collected for each selected crate on July 25th to verify the starting noise condition with all the considered possible source switched on
    - On July 26th in the morning all the considered external sources have been switched off (Wifi, Air conditioning, Lights, Control system for the cryogenics, cranes)
    - A "pedestal" run has been collected with all these elements switched off and then switching on one by one the different items. At the end also the vacuum pumps have been switched on
  - ✓ Activities on 16 crates, mainly the standard ones, in order to verify anomalous behavior on single boards (July 27th – August 1st)

Reference measurements (data on July 25th)

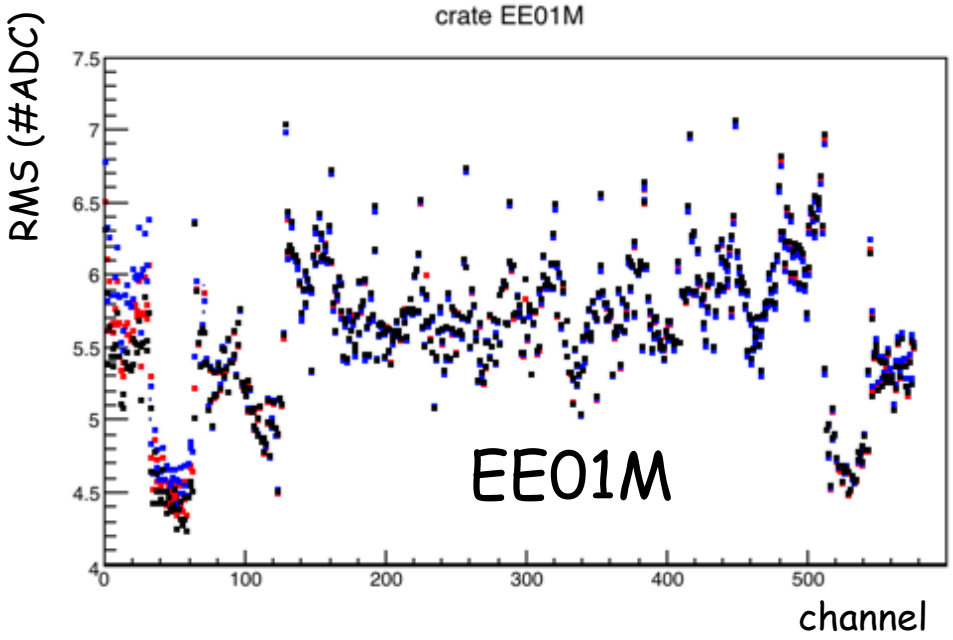


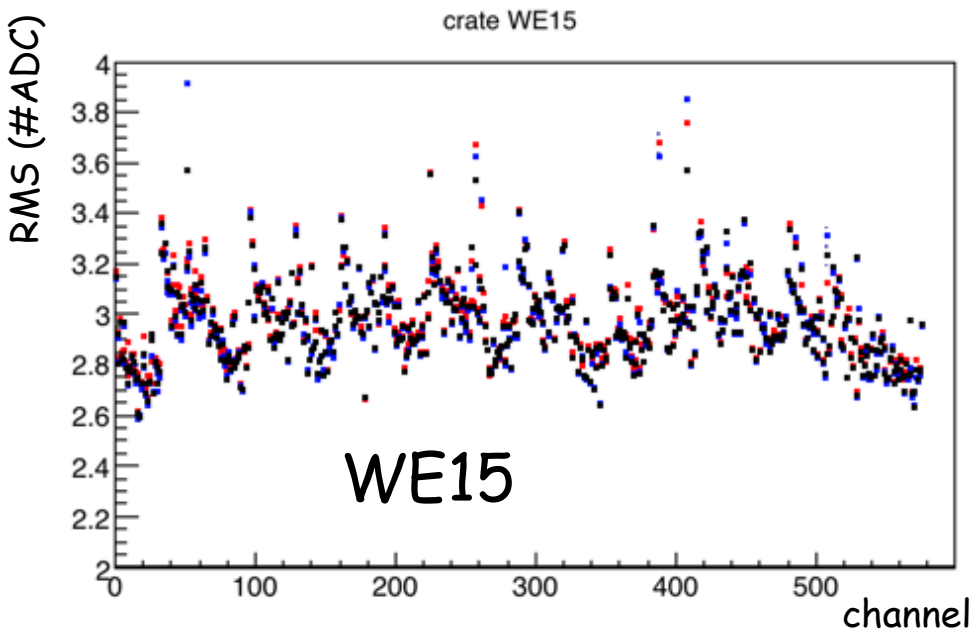






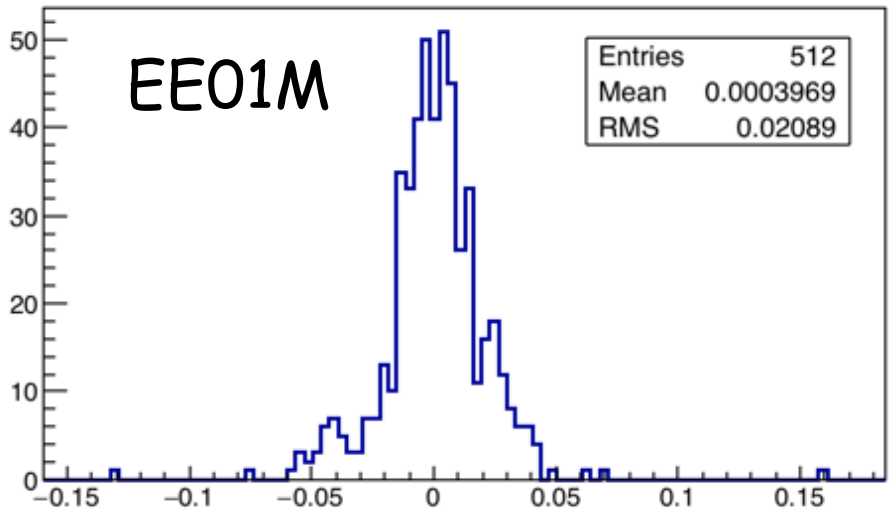
Comparison of the measurements on July 26th



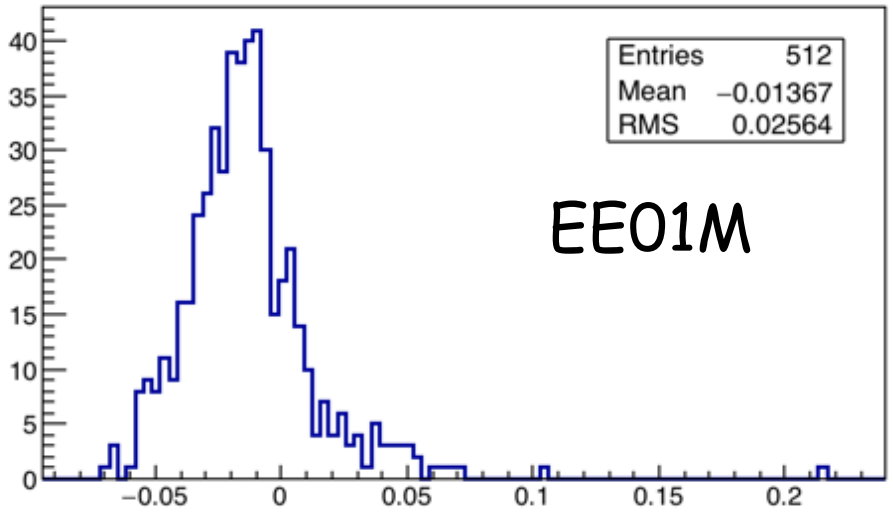


- On RED: measurements made the day before (vacuum pumps switched off)
- On BLUE the measurements made with all the elements switched off
- On BLACK the measurement with all the elements switched on, including the vacuum pumps
- No evident differences seem to be visible

Comparison measurements on July 26th



Difference between the RMS measured the day before (all switched on) and the RMS measured at the beginning of the day, when everything is switched off

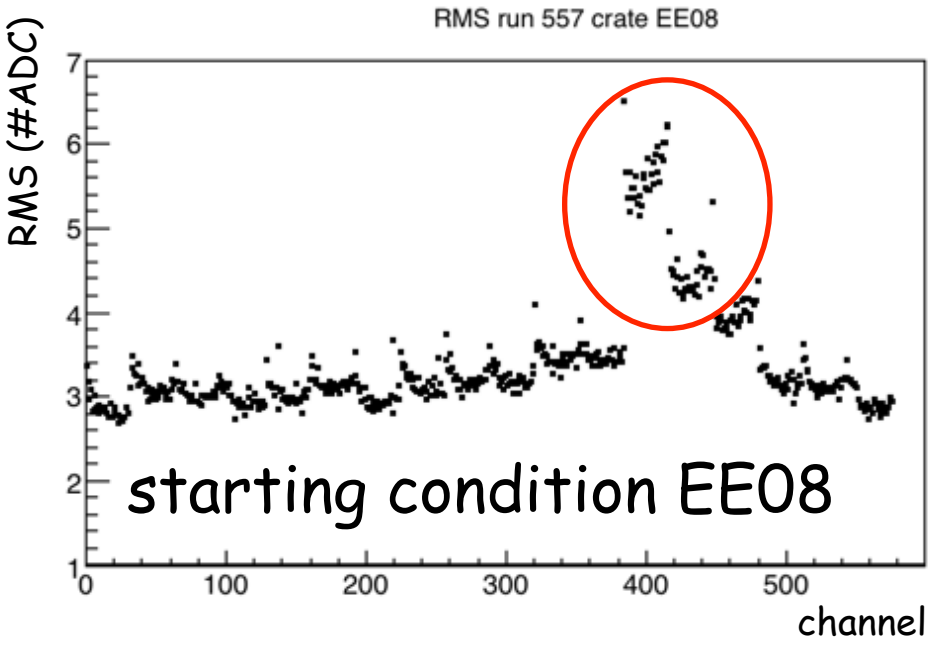


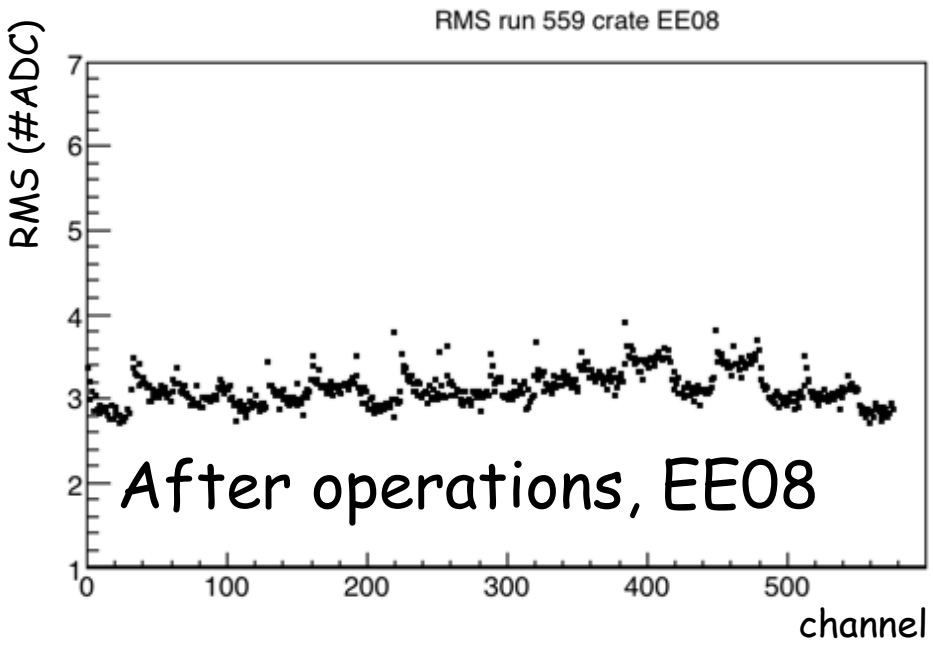
Difference between the RMS measured at the beginning of the day, when everything is switched off, and the RMS measured at the end of the operations, when everything is switched on, including the vacuum pumps

- Excluding the board on slot 0, where there are variations not related to the operations we are doing, no big differences seem to be visible

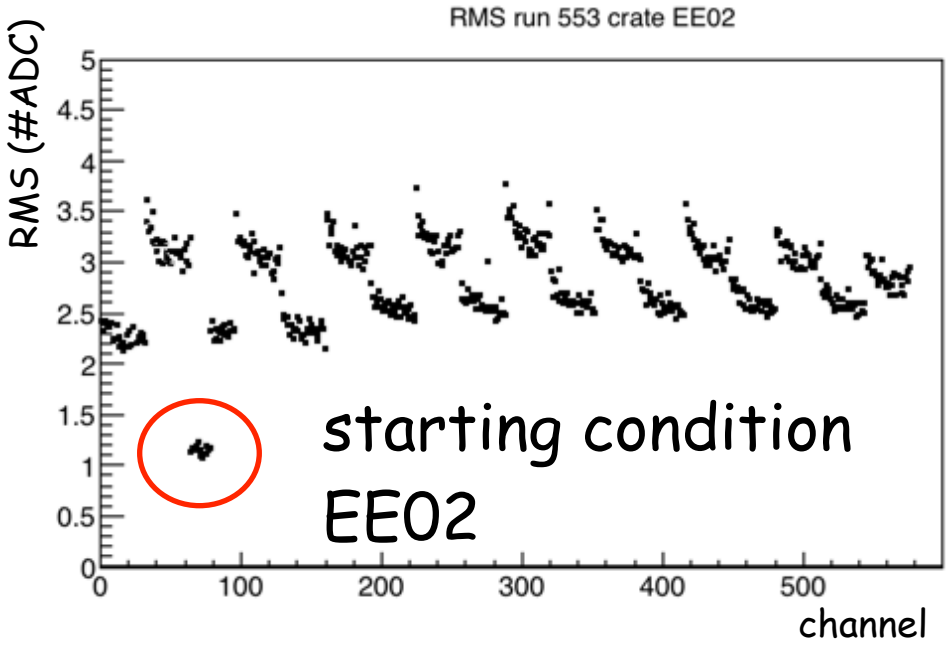
Activities to improve the noise condition on standard crates

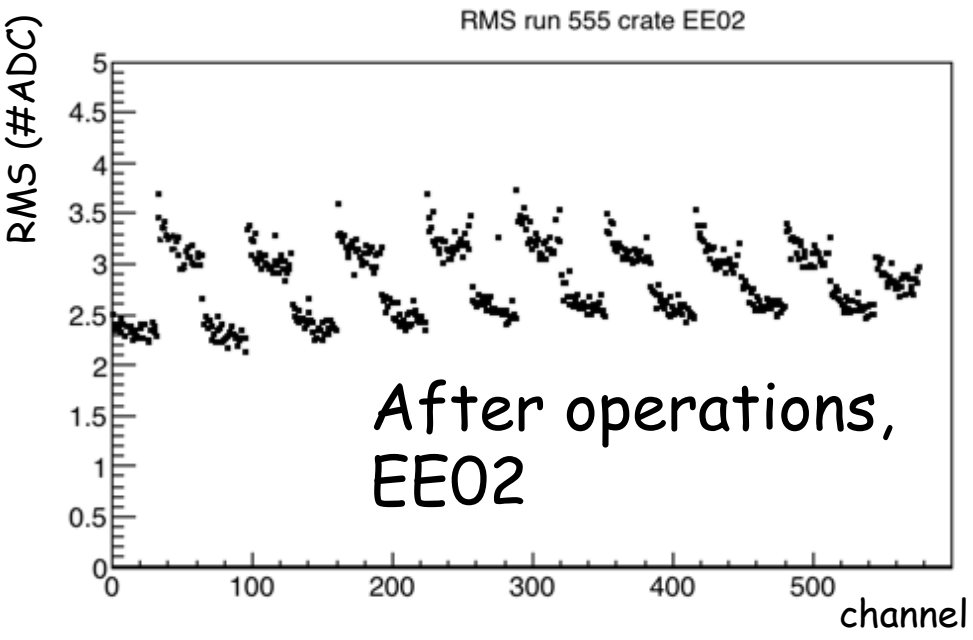
- All the standard crates (from 02 to 19) have been reviewed in order to identify and solve possible anomalous behaviors in single boards
- Starting from the measurements previously collected (April/June), when an anomalous board was identified
  - A new "pedestal" run was collected to verify the noise condition status
  - The anomalous board was re-installed, swapped with another board or replaced and to each variation a new run was collected
- Few examples of the obtained improvements are shown in these slides

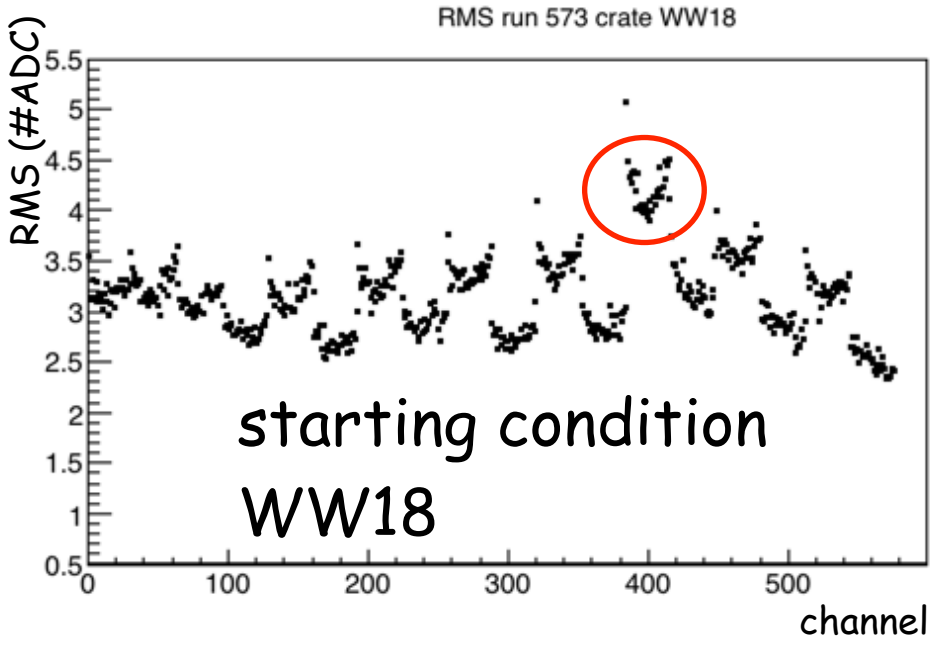


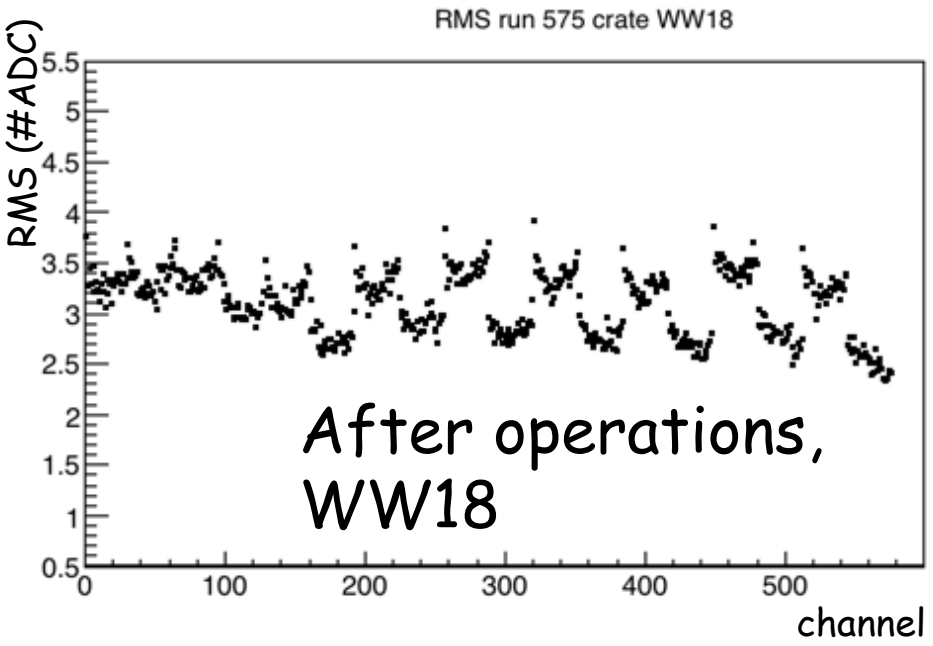


Activities to improve the noise condition on standard crates



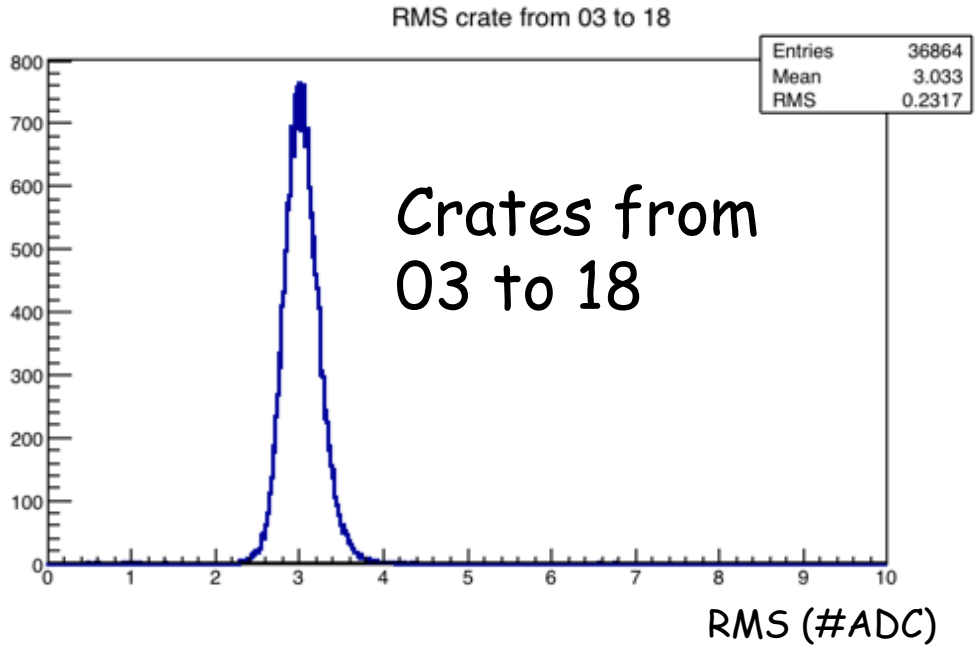


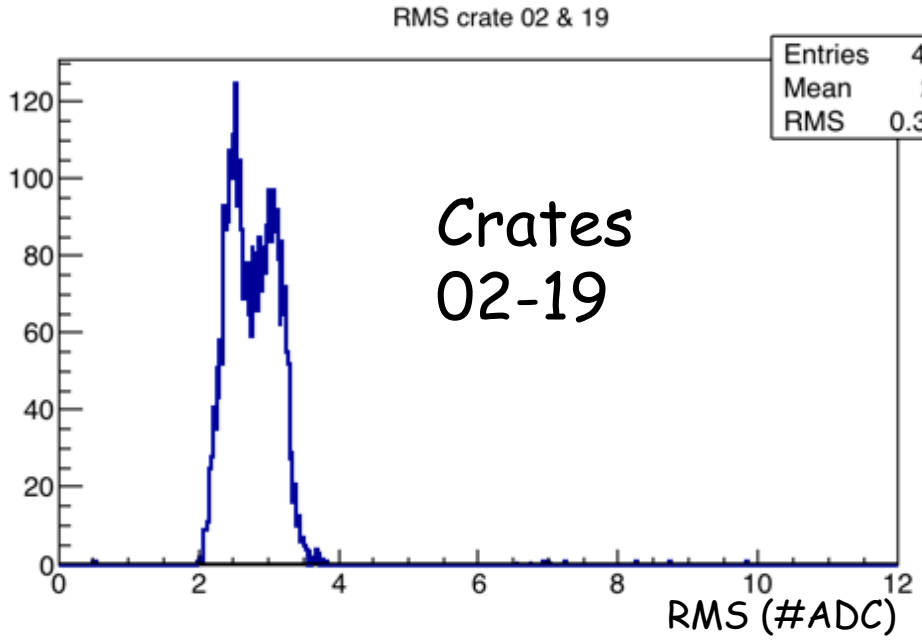




Global RMS distributions – standard crates

- The RMS evaluations obtained for all the channels belonging to similar crates have been grouped in a single distribution





- The global average RMS in the standard crates results ~ 3 #ADC that are equivalent to ~ 1640 electrons

Global RMS distributions – corner crates

- The RMS evaluations obtained for all the channels belonging to similar crates have been grouped in a single distribution