MOS cooling test

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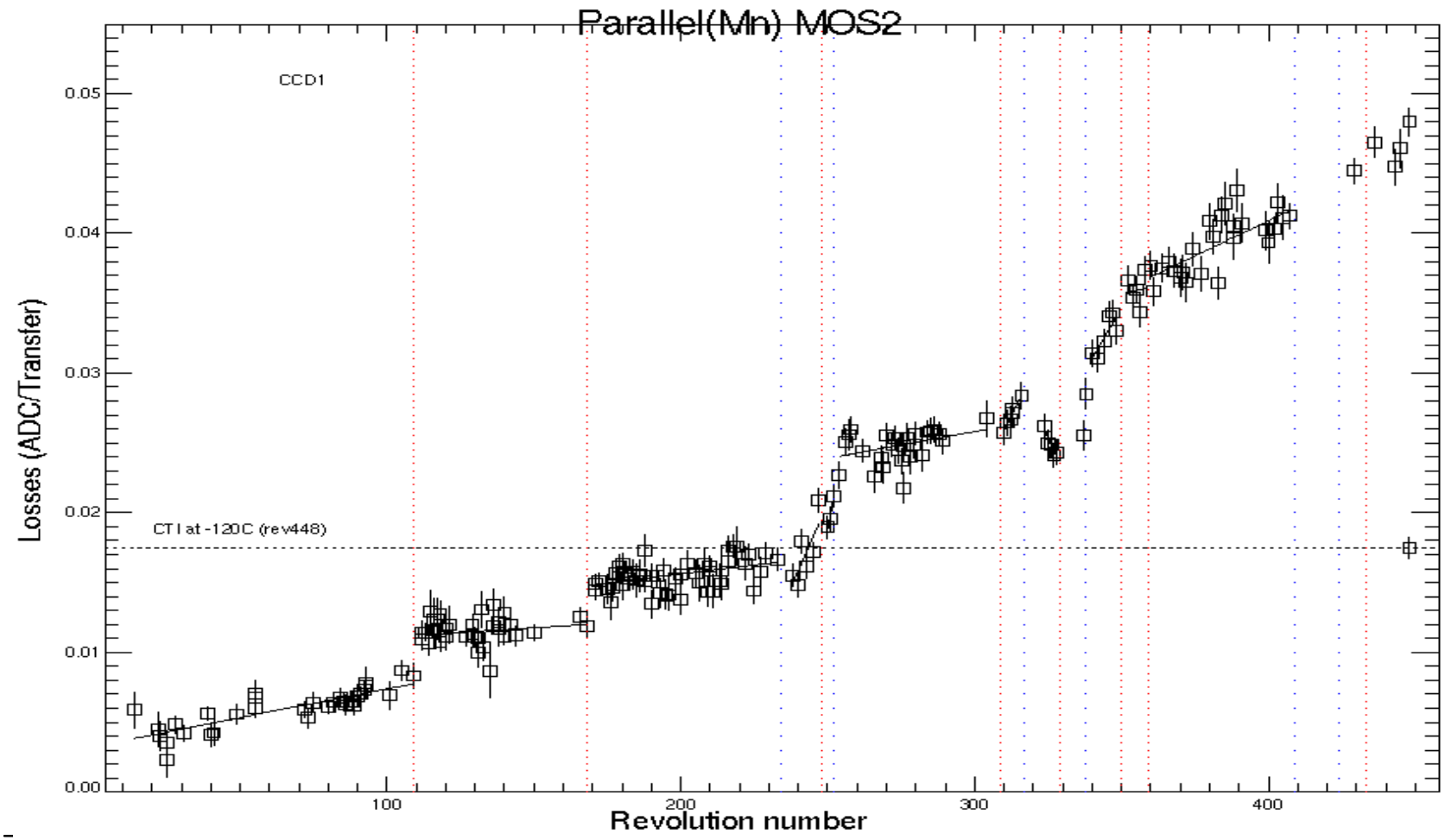
Rev 448 cooling test

- **<u>Rationale</u>:**
  - While ground software corrects for CTI manage to recover most of the energy loss, inevitably the detector energy FWHM has widened due to imperfect correction and statistical noise of charge trapping.
  - MOS CCDs are qualified to operate down to -130 degrees
  - CCDs shall exhibit improved CTE at low temperatures (optimized at -120C)
  - Many bright pixels have developed as expected due to radiation and micro-meteorites

- **Demonstrate the expected performances improvement in a first test with MOS2, in rev 448**
  - internal calibration measurements
  - VELA SNR
  - hot pixel check.

CTI reduced by a factor ~3



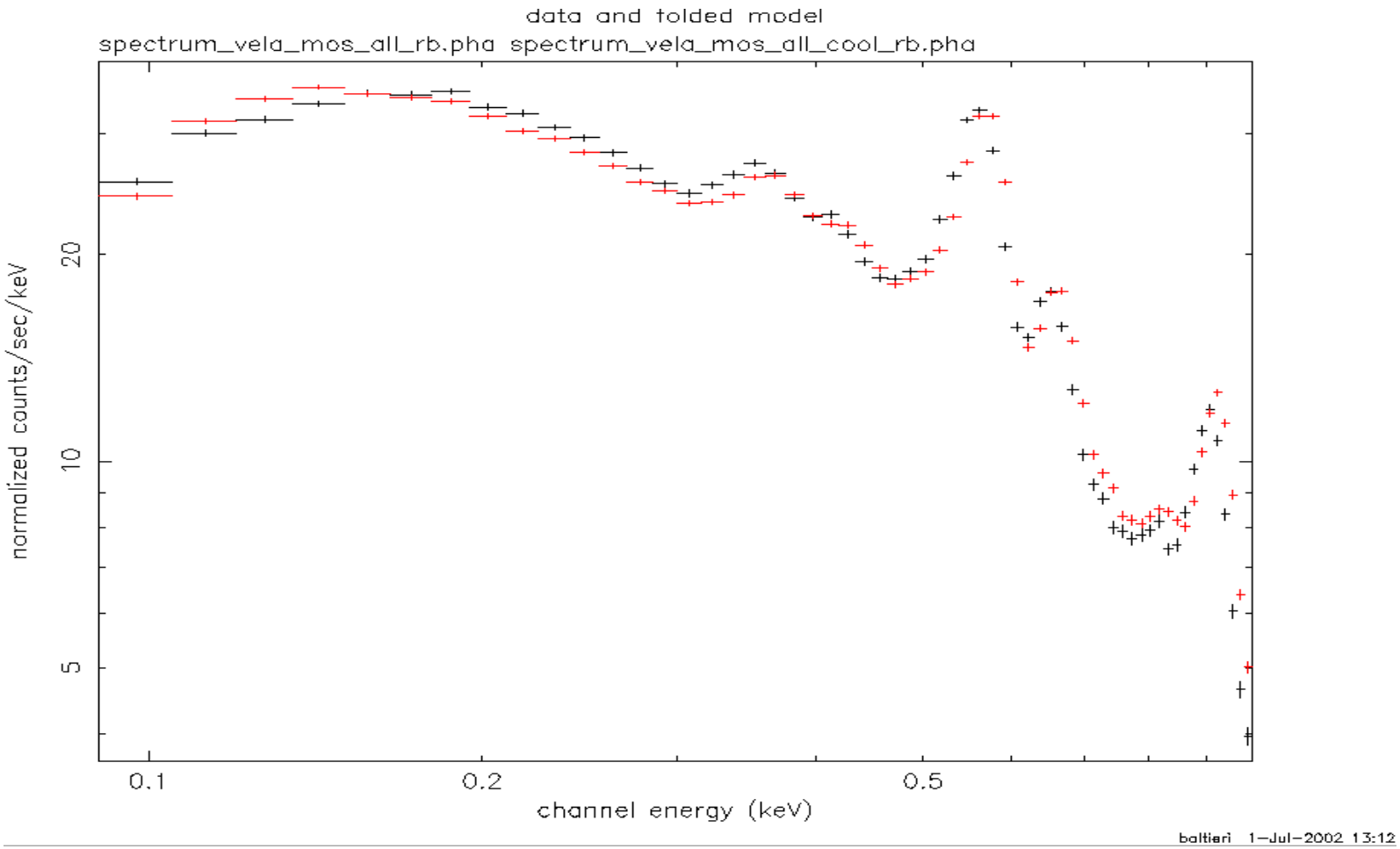
Number of bad pixels significantly reduced

- **Number of hot pixels reduced by a factor ~7**

recurrence frequency	1%	0.5%
.-120C (rev448)	25	52
.-100C (rev444)	179	244

- **A few energetic hot pixels from the first micro-meteorite impact have appeared when cooling**
  - should be introduced as dead are defects

No change in soft energy response ?



Energy scale re-calibration: CTI + gain

- **CTI is reduced from ~0.047 ADU/transfer at rev 448 down to 0.0175 ADU/transfer.**
- **Using a hand-made tuned CCF, energy (PI) is reconstructed homogeneously across the CCD but … over corrected by ~38eV at Mn (resp. 10eV at Al)**
- **Reason: the gain is changed (11 ADU at Mn)**
  - 3.39555 eV/channel (rev448)
  - 3.37696 eV/channel (rev105)
    - Note in MOS2 ADUCONV CCF: 3.41403 (Pat0) because of negative quadratic term 21.6eV at Mn)