SDAST Meeting #41

DNSI, Copenhagen, 24th November 2009

DTU Space
National Space Institute

Xe Line Analysis, Gain Aging and Temperature Dependance

- Keeping an eye on energy correction in every revolution
    - Confirmation of trends with Mo line
- Looking for trends in gain dependence on:
    - Time (gain aging)
    - Temperature (non-linear gain effects)
    - Countrates (none seen yet)
- Providing new reference channels in IMOD tables to counteract longterm gain drifts (gain aging)
- Providing IC gain history tables to correct individual revolutions with oddities in their gain
- Looking out for any other peculiarities in the energy data

Longterm Drifts - Gain Aging

- For JEM-X1, differential gain aging, steady upward drift of Xe line with time, as seen in the past has stopped

- This could be for several reasons:
  - Calibration areas are no longer heavily irradiated compared to the rest of the plate
  - Gain in general has ceased to change as rapidly as it did in the past
  - Ion mobility in the plate has reached some saturation level dependent on HV value
  - The rest of the plate has finally caught up with the rapidly changing calibration areas

- The good news is that we haven't needed new reference channels for JEM-X1 for several years.

Temperature-dependant non-linearities

- However, increasingly, JEM-X1 has shown gain non-linearities which cause the Xe line position in the science data to drop as temperature and gain of the instrument rises
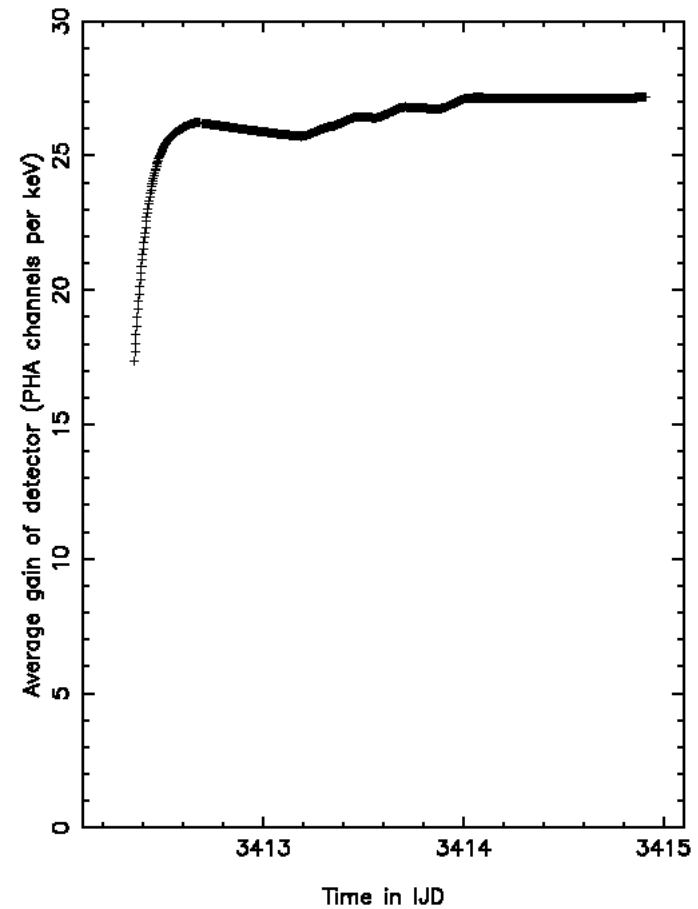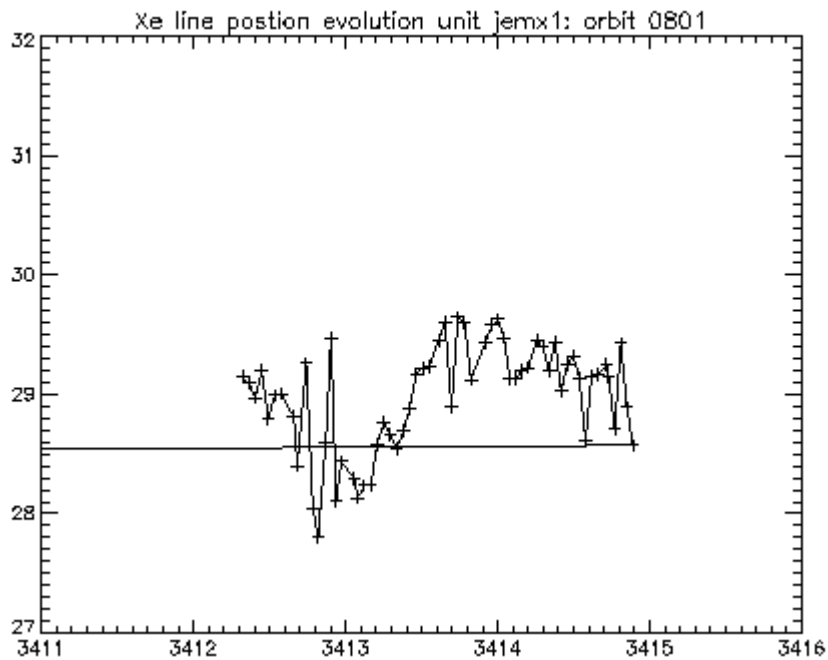
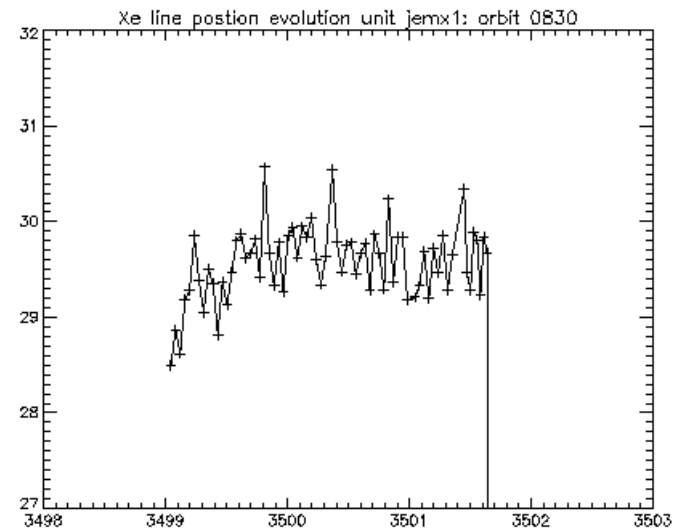 Rev. 861: Gain 24-25 chans/keV   Rev. 846: Gain 22-23 chans/keV
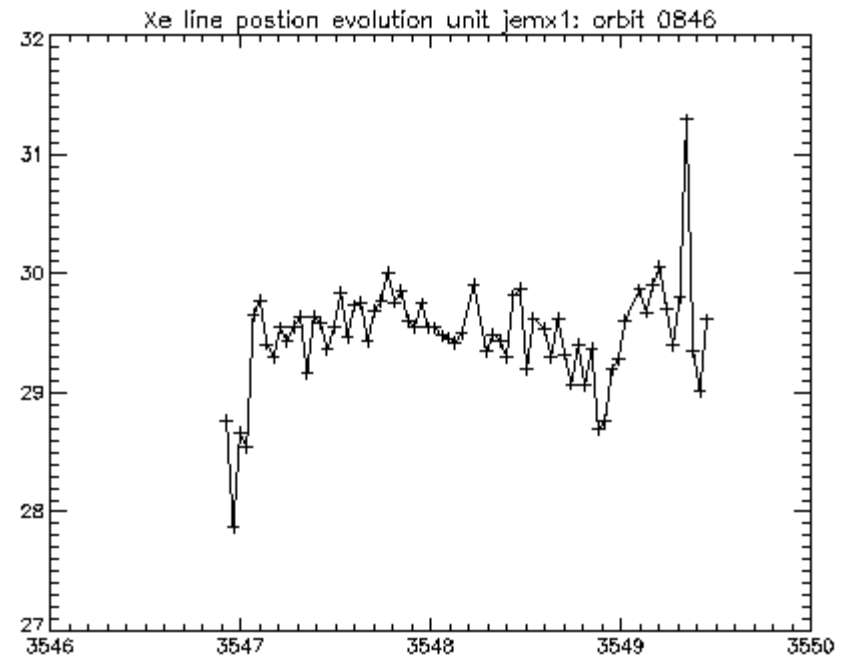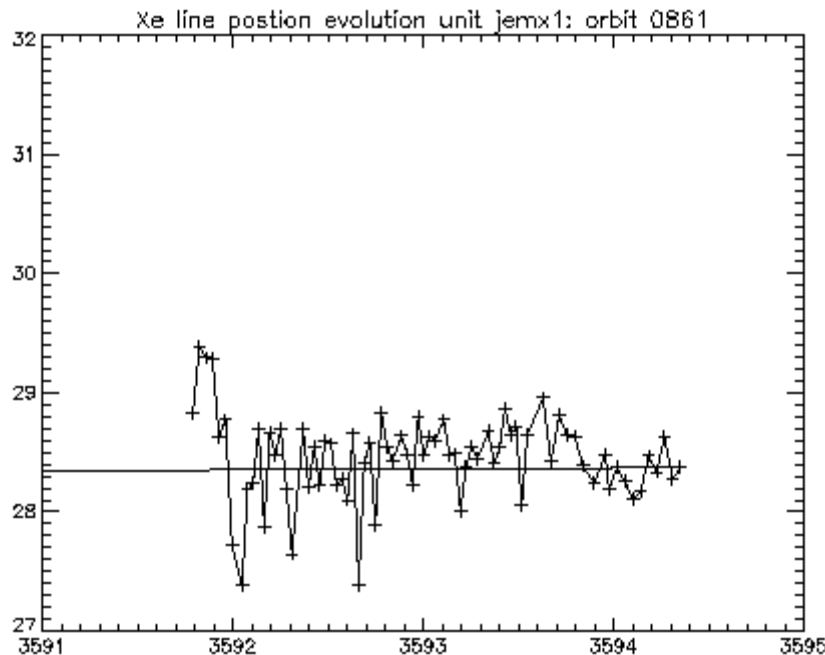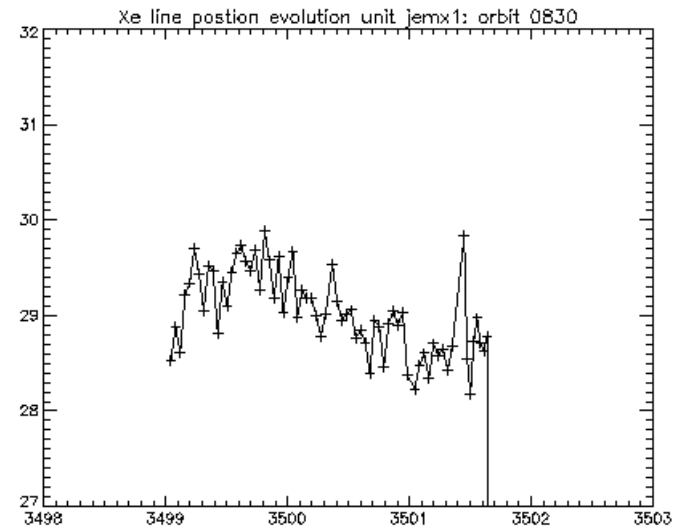
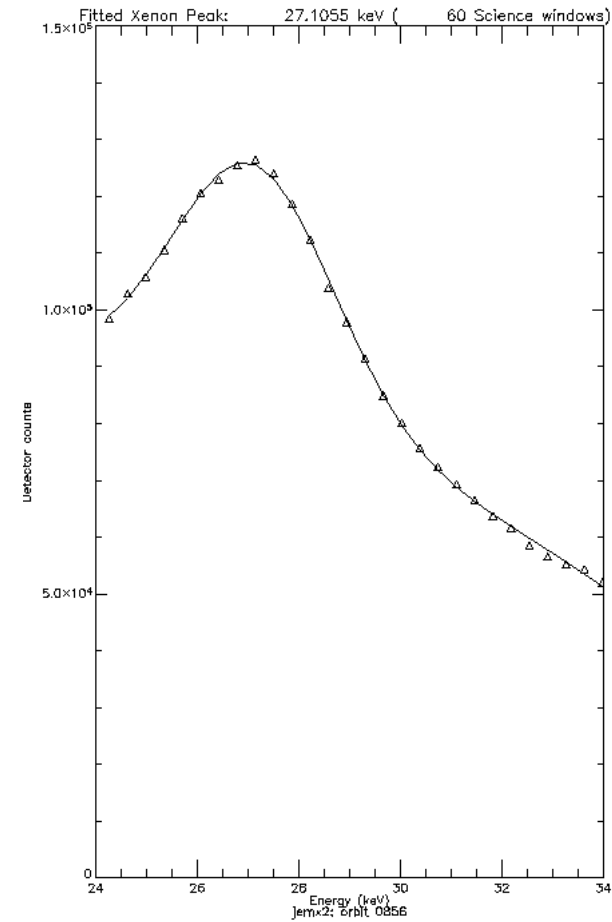# Non-linear Non-linearities

- Rev. 801: Gain 25-27 chans/keV

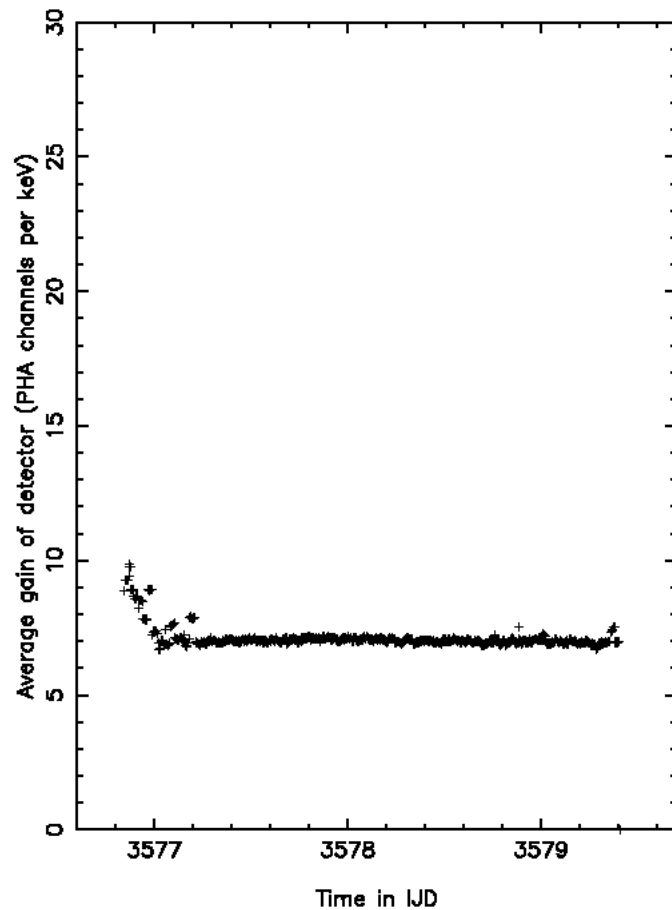

Xe line position evolution unit jemx1: orbit 0801

IC Gain history tables to correct Nonlinearities

- Rev. 830: increasing gain
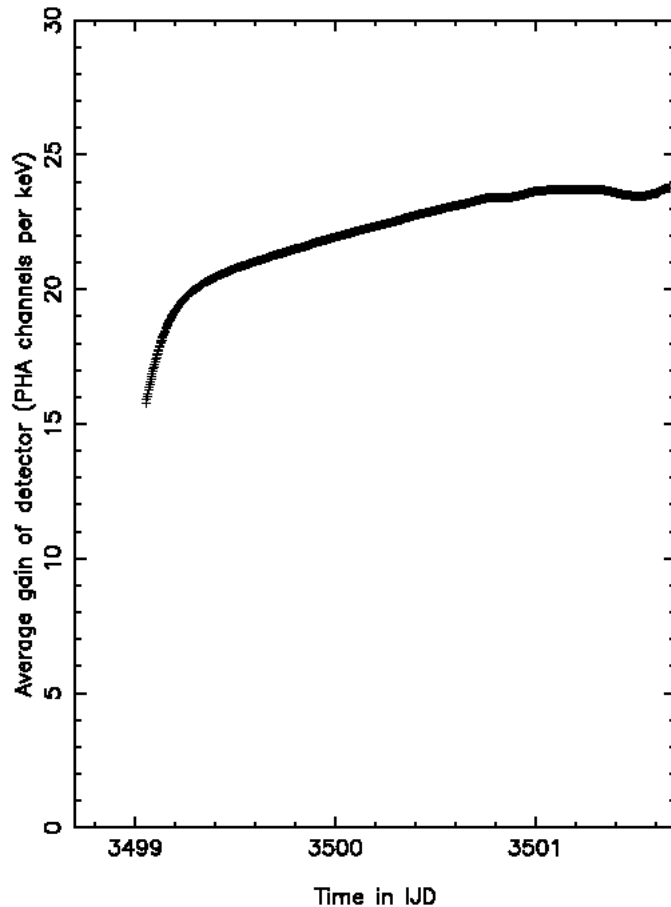
JEM-X2: Switch on with wrong binning table Rev. 856

JEM-X2: New Reference Channels?

- Rev.s 857 to 865

  - General tendency for Xe line to be a little low

  - May be seeing first signs of temperature non-linearities

  - Adjust reference channels so that cold revs are just above 29.6 keV and warm ones just below

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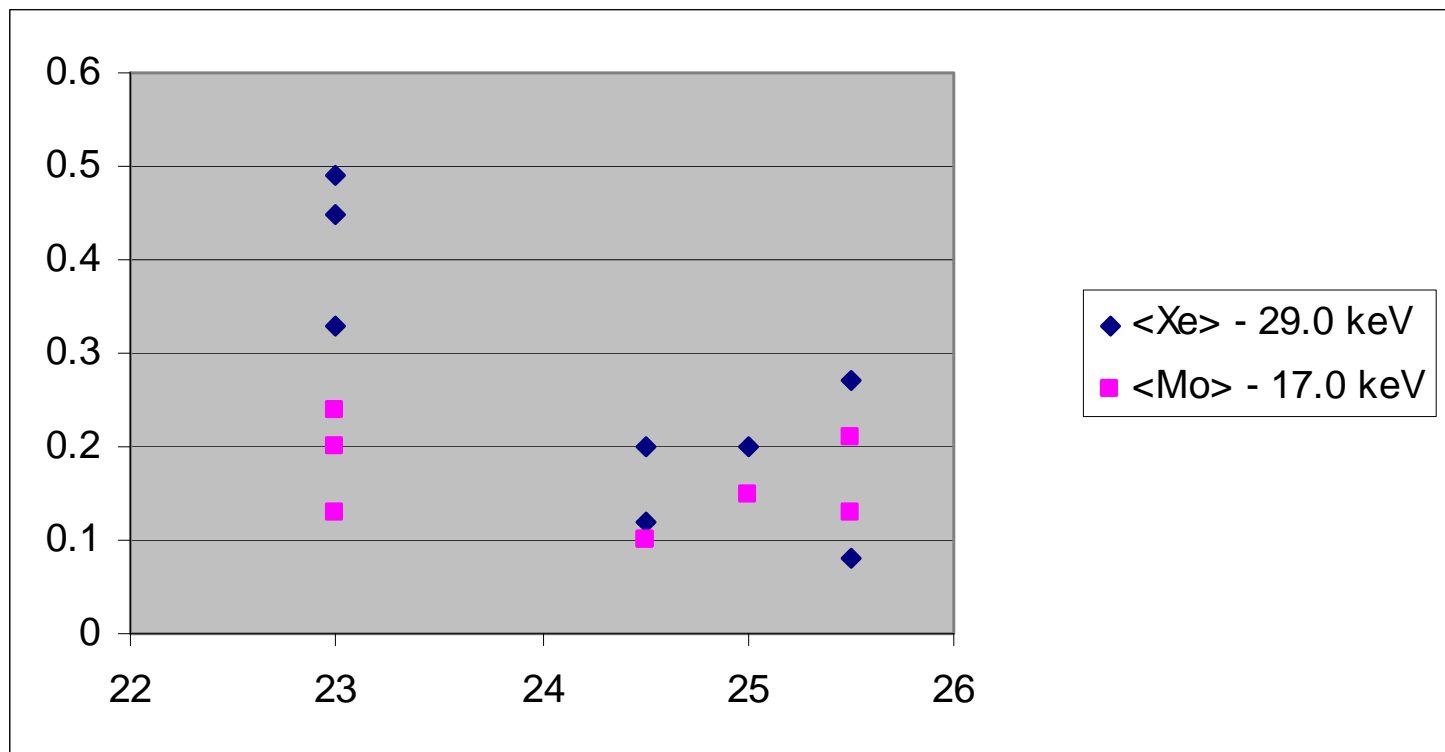
To Do List

- Make IC gain history tables for last JEM-X1 revolutions (849-861)
  - To correct for temperature/gain non-linearities
- Make IC gain history table for JEM-X2 revolution 856
  - To correct for switch on with old binning table
- Find improved reference channels for JEM-X2
  - To bring Xe level closer to 29.6keV for all revolutions
- Continue to make IC gain history tables for JEM-X1 revolutions < 800
  - To correct for temperature/gain non-linearities

- Long Term:
  - Keep an eye on tendency for high gain to produce low Xe position
  - Make complete new set of JEM-X1 reference channels to be used with the new SPAG tables.