

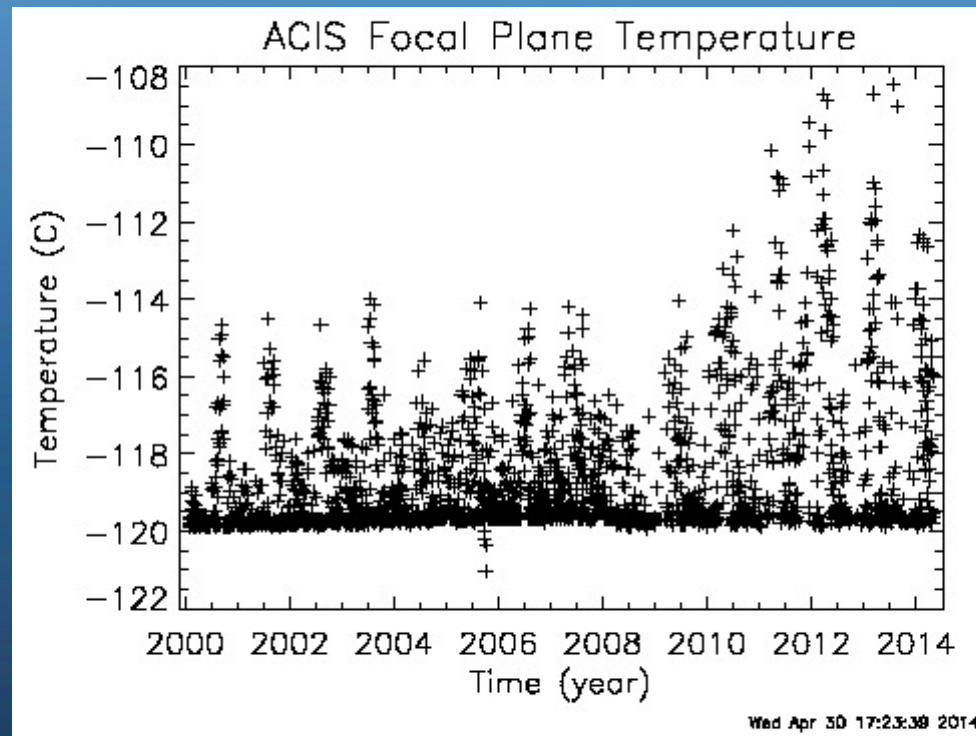
Evaluating the ACIS Temperature-Dependent CTI Correction

Motivation: *Improve spacecraft detector temperature regulation by turning back on detector housing heater.*

Also, slow the ACIS contamination buildup with consistently warmer housing temperature.

But first: *How good is the ACIS temperature-dependent CTI correction at warmer focal plane temperatures?*

Test: *Emission line fits at warm and cold FP_TEMP.*



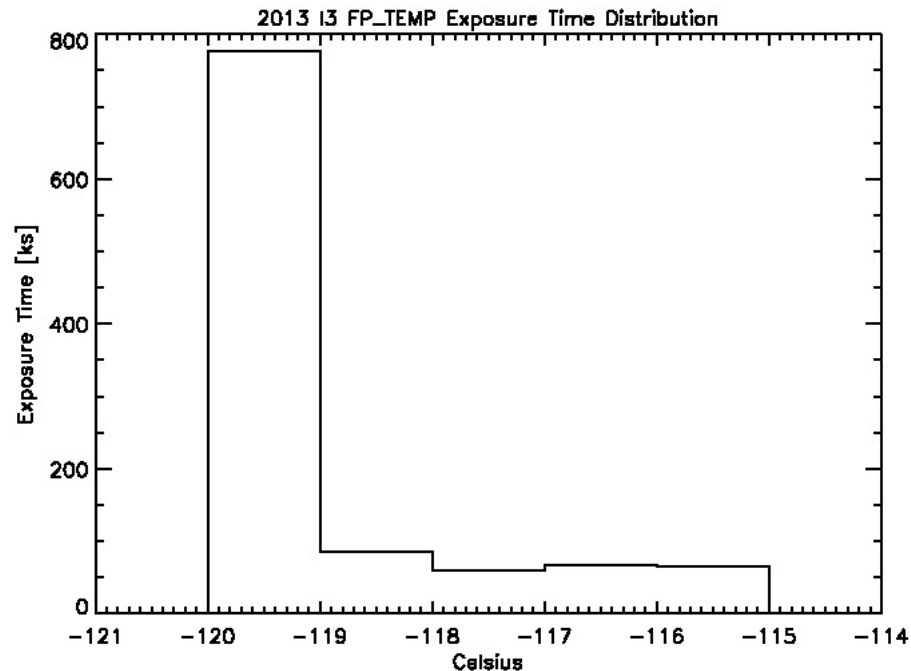
Dataset

Source

Prominent Al $K\alpha$, Mn $K\alpha$ and K β emission lines in ACIS external calibration source (ECS) observations.

Data Preparation

- Reprocess observations, CTI=yes, latest contamination model V7
- Merge 1 year of observations, calendar year 2013
- Filter into focal plane temperature bins:
 - 120 : -119C ~750 ksec
 - 119 : -118C ~85 ksec
 - 118 : -117C ~60 ksec
 - 117 : -116C ~66 ksec
 - 116 : -115C ~65 ksec
- Filter into 64x64 pixel regions for I3 and S3 chips
- Create RMF response for each 64x64 region for each chip



Fitting

XSpec v. 12.8.1

- *Settings: Leven, Cstat, test Pchi, 90% confidence parameter errors*

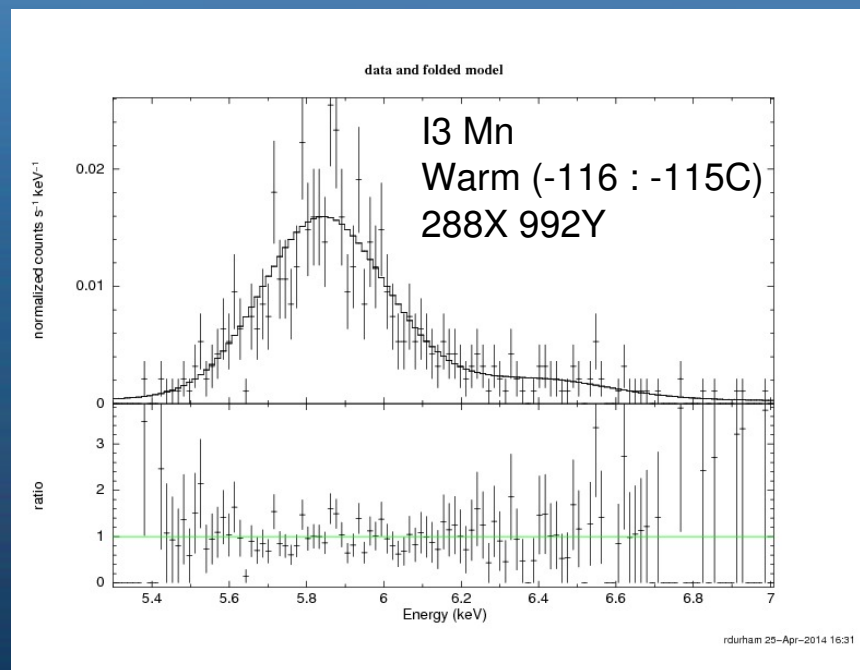
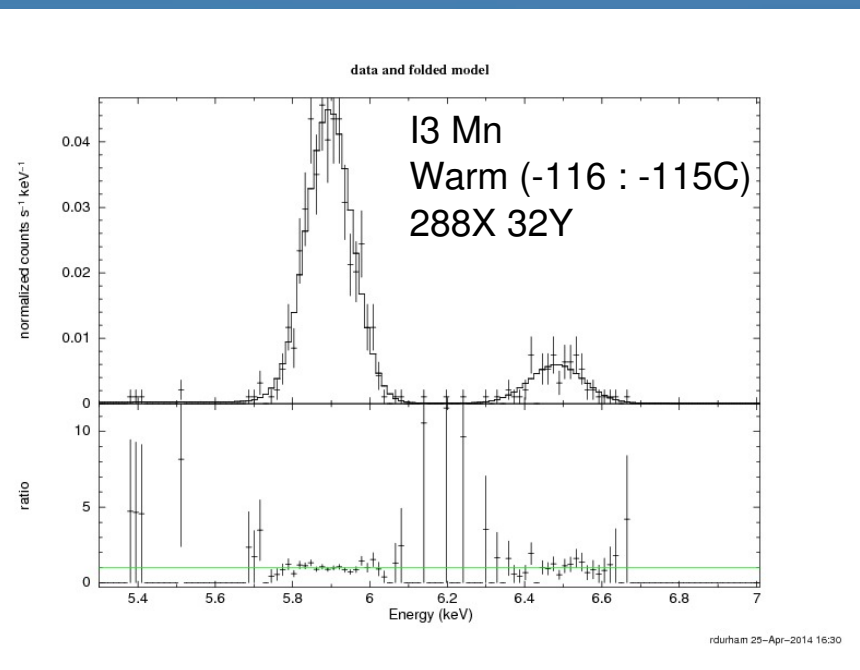
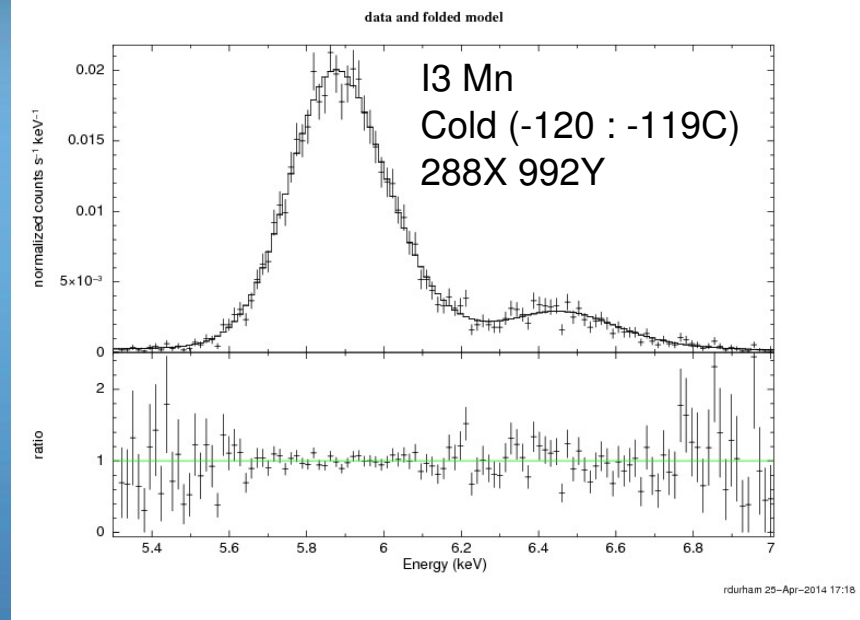
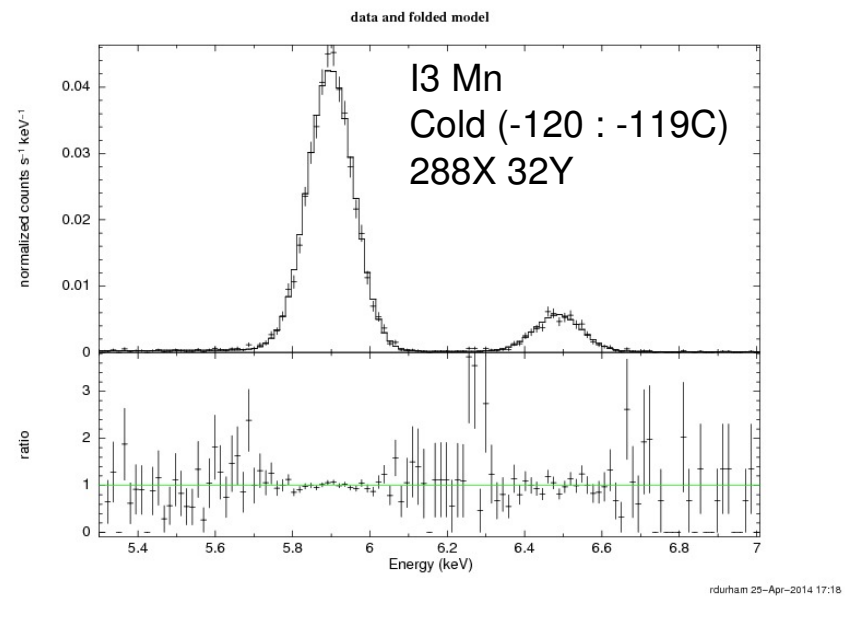
Al line 1.487 keV

- *gaussian+powerlaw model*
- *restricted to 1.1 : 2.0 keV*
- *floating Line Energy, Line Width, Normalization*
- *frozen Photon Index = 0*

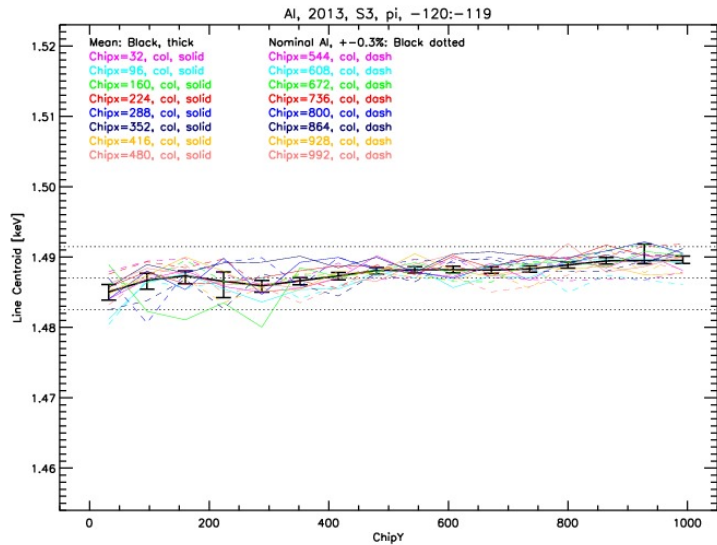
Mn- α line 5.898 keV, Mn- β line 6.486 keV

- *gaussian+gaussian+powerlaw model*
- *restricted to 5.3 : 7.0 keV*
- *floating Mn- α Line Energy, Line Width, Normalization*
- *fixed Mn- β Line Energy fixed to $1.09969 \times \text{Mn-}\alpha$*
- *frozen Photon Index = 0*

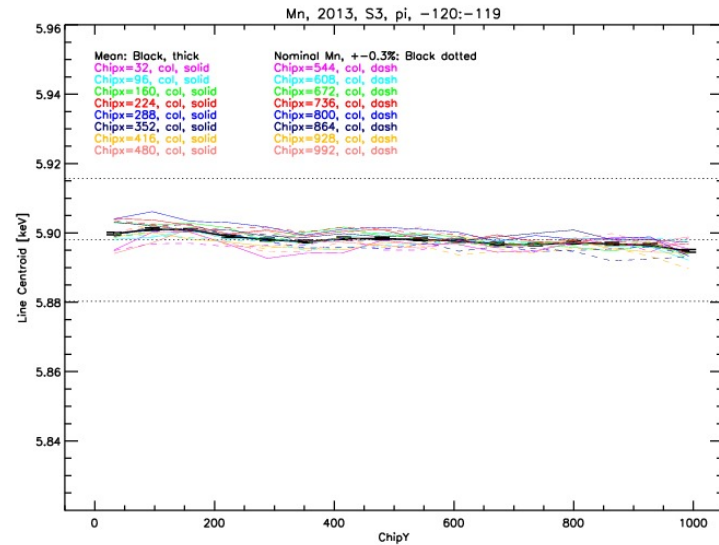
Line Fits



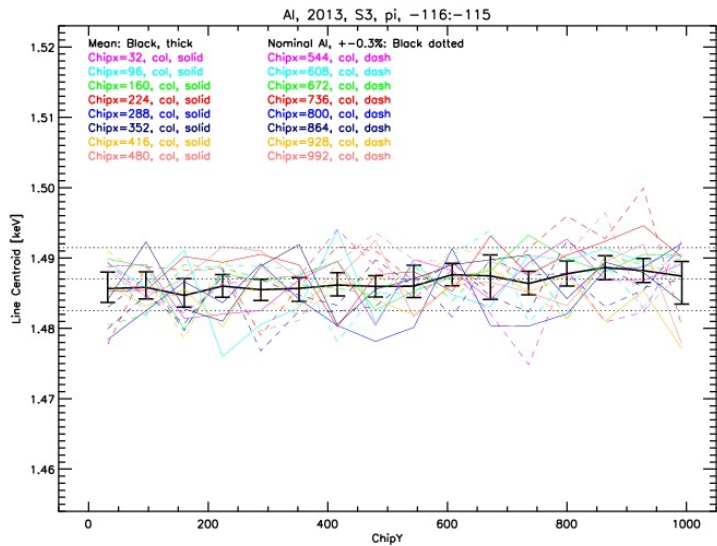
S3 Fitted Line Energy v. ChipY



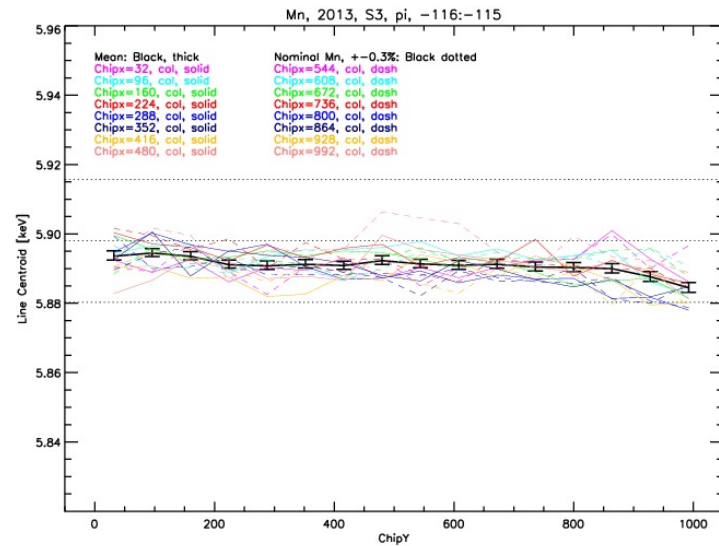
S3 Al Cold (-120 : -119C)



S3 Mn Cold (-120 : -119C)

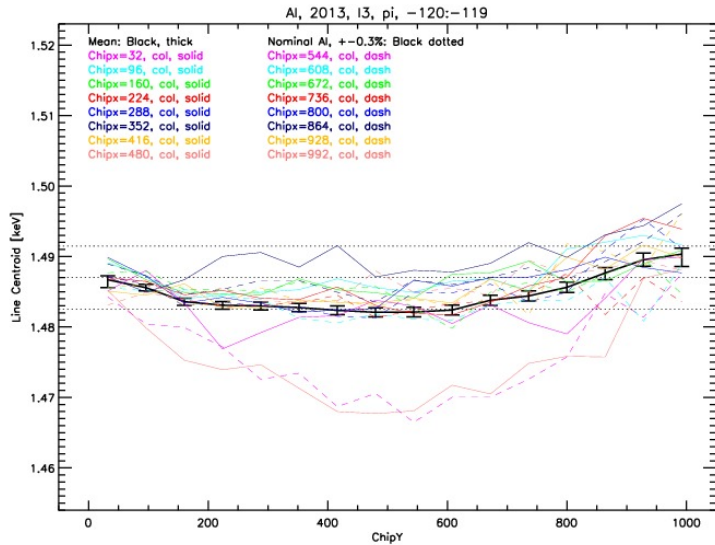


S3 Al Warm (-116 : -115C)

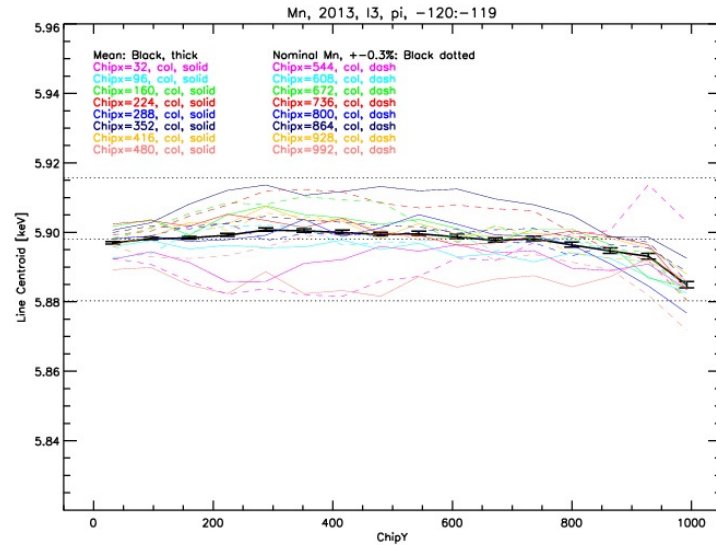


S3 Mn Warm (-116 : -115C)

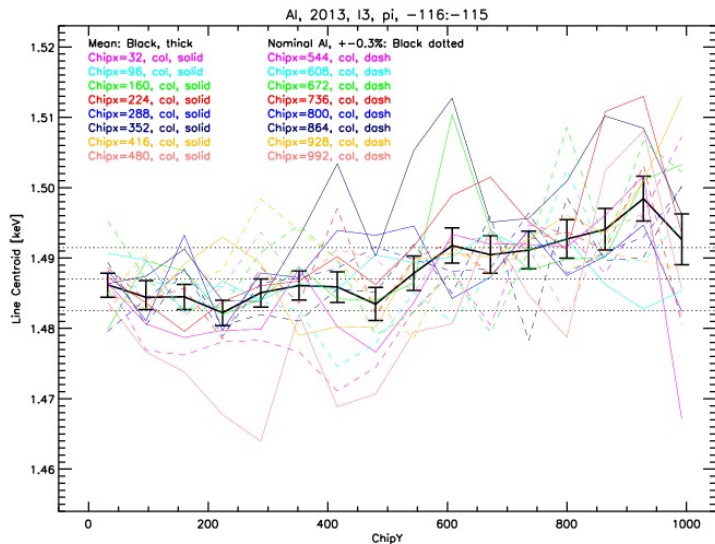
I3 Fitted Line Energy v. ChipY



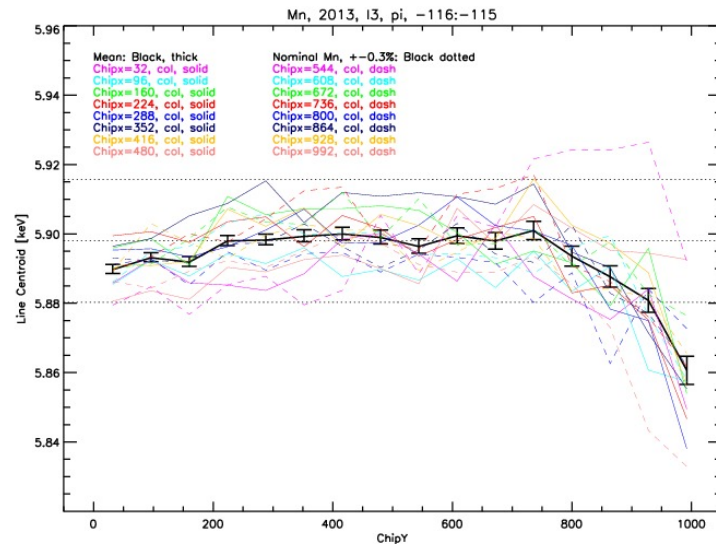
I3 Al Cold (-120 : -119C)



I3 Mn Cold (-120 : -119C)



I3 Al Warm (-116 : -115C)



I3 Mn Warm (-116 : -115C)