Chandra Calibration Overview

Calibration Updates Since Last CCW

ACIS

1. A full set of calibration products for S0, S4 and S5 at T=-120 C, including trap maps, time-dependent gain corrections and response files was released in CALDB 3.1.0. All chips are now calibrated in a similar fashion.

2. Testing is complete on the “REPRO III” suite of calibration products for all 10 chips at T=-120 C. The new responses for the FI chips are calibrated in 32 by 32 pixel regions and provide a better treatment for the time-dependent response. This suite also includes updated CTI-uncorrected products for the BI chips based on a new ACIS model which provides a better treatment of the low energy response. These products will be released in CALDB 3.2.0.

HRC

1. The HRC IPI team derived a new HRC-I gain corrections map based on ground-based data. The CXC calibration team then made adjustments to this gain corrections map using the in-flight ArLac raster scans. The HRC-I gain corrections map will be used to derived hardness ratio images. This product will be released in released in CALDB 3.2.0

2. An updated HRC-S degap corrections coefficients table using empirical corrections from LETG/HRC-S observations of emission line sources is scheduled for release in CALDB 3.2.0

LETG

1. An updated HRC-S QE and QEU was released in CALDB 3.0.1. This follows previous updates to the LETG 1st and higher order efficiencies.

HRMA

1. An updated HRMA effective area file with new optical constants and a 22A layer of hydrocarbon contaminate to correct problems near the Ir-M edge. This will be released in CALDB 3.2.0

HETG

1. While the new HRMA effective area file was being validated with gratings observations, updated HEG and MEG efficiencies were derived to be consistent with the new HRMA effective area file. The new HEG and MEG efficiencies will be release in CALDB 3.2.0

Present Status

Effective Areas

Goals met

1. ACIS effective area – present uncertainties are 5%
2. HRC effective area – present uncertainties are 7%
3. HETG/ACIS-S 1st order – present uncertainties are 7%

Goals not met

1. LETG/HRC-S 1st order effective area – uncertainties are 15% - goal is 10%
2. LETG/HRC-S higher order effective area – uncertainties are 20% - goal is 15%
3. HETG/ACIS-S higher order effective area – uncertainties are 20% - goal is 15%

Absolute Energies

Goals met

1. ACIS goals are 0.3% rms deviations within each node with a maximum deviation of 0.5%. These criteria are not quite met in the middle of a few nodes at Al-K.
2. LETG/HRC-S - present uncertainties are 0.006A on central plate and 0.01A on outer plates
3. HETG/ACIS-S – present uncertainties are < 0.003 A

Energy Resolution

Goals Not Met

1. ACIS goal was goal is 8% of FWHM. present uncertainties are 20-30 eV. FWHM vary from 100-350 eV
2. LETG/HRC-S uncertainties are 20% in FWHM - goal is 10%
3. HEG/ACIS-S – uncertainties are 4% in FWHM - goal is 3%
4. MEG/ACIS-S – uncertainties are 5% FWHM - goal is 3%

Astrometry

Goals met

1. HRC/ACIS absolute positions – uncertainties are 0.6 arcsec
2. ACIS relative astrometry – uncertainties are 0.1 arcsec

Goals not met

1. HRC-I relative astrometry – uncertainties are 0.3 arcsec – goal is 0.1 arcsec

Timing

Goals met

1. HRC absolute time – uncertainties are 42 mus
2. HRC relative time – uncertainties are 16 mus

Calibration Plans

ACIS

1. CTI-corrected calibration products for the BI chips at T= -120C
2. ACIS QE adjustment near the Si-K edge
3. CTI-corrected for all 10 chips at T= -110C
4. Update OSIP files
5. Improve CC mode calibration
6. Investigate gain drop in the middle of nodes
7. Investigate bad columns

HRC

1. Update the HRC-S degap correction coefficients table to include emiprical corrections from both line and continuum sources observed by the LETG/HRC-S
2. Update the HRC-I degap correction coefficients table using the AO7 raster scan of Capella

HRMA

1. Public release of SAOsac raytrace code
2. Post a report on the use of the released ECFs with ACIS data
3. Release the ECFs derived from elliptical rather than circular apertures
4. An updated analysis of the ACIS PSF using stacked faint sources
5. Post a report on the optical axis determination
6. Continue study on the effects of ACIS pile-up on the PSF
7. Investigate effects of pixel randomization

LETG

1. Update the HRC-S QE file using the new HRMA effective area file
2. Incorporate the spatial non-linearities in the LETG/HRC-S dispersion relation in the LRFs.
3. Generate a time-dependent HRC-S gain map for better PHA filtering
4. Search for any time-dependence in the non-linearities of the LETG/HRC-S dispersion relation

HETG

1. Further reductions of systematic errors in the HETG/ACIS-S effective area
2. Improve HETG higher order efficiencies
3. Improve HETG absolute energy scale
4. Examine effects of pile-up in grating spectra
5. XMM-Newton / Chandra cross calibration