Chandra Calibration Status

IACHEC Meeting May 12, 2014
Contamination on the ACIS Filters

Abell 1795

Blazars
Mkn 421
PKS 2111-304

E0102-72
Contamination on the ACIS filters

Plots are based on data acquired through 2013.

From LETG/ACIS-S data

Time-dependence

Spatial-dependence

Composition
Contamination on the ACIS filters

Spectral fits with ACIS contamination model V7

ACIS contamination model V7 is a pure C, O and F edge model. No additional absorption features are included.
Contamination on the ACIS filters

April 2014 observations fit with ACIS contamination model V7

A1795

E0102
Contamination on the ACIS Filters
Mkn421 LETG/ACIS-S big dither observations (March 2014)

There are also indications of different spatial gradients for C and O and absorption from N in the gratings data.
ACIS Temperature-Dependent CTI Correction

ACIS-S3

ECS Al-Kα

ACIS-I3

Cold

Warm

ACIS DH heater turned off
ACIS Temperature-Dependent CTI Correction

There are short term gain variations on $I_0$ and $I_2$ that require self-calibration.
Thermal gradients across the HRMA in the top-to-bottom direction will affect the PSF in imaging data and the LSF in gratings data.
ACIS Low energy Gain

Plots are based on a set of LETG/ACIS-S observations taken at different off-sets along the dispersion axis.

Ratio of photon energy derived from detector gain to that derived from the dispersion relation
Chandra Internal Cross-Calibration with G21.5-09

G21.5–0.9 Broadband Flux

Net Flux [10^{-3} photons s^{-1} cm^{-2}]

Date

Mkn 421 Interleaved 0.85-1.5 keV

13-03-10

30-06-13

HEG
+A
MEG
+A
LEG+A
LEG+H
Mkn 421 Interleaved 1.5-4 keV

13-03-10

30-06-13

HEG +A MEG +A LEG+A LEG+H
Present Calibration Activities

- Update ACIS contamination model, including: new time-dependence, elemental ratios, spatial gradients for each element and possibly a N component.

- Release revised gain tables for the BI chips (S1 and S3) to reduce residuals at low energies.

- Release a new OSIP file consistent with the new gain table.

- Adjust 0\textsuperscript{th} order HETG efficiency.

- Adjust the HRC-S QE and LETG 1\textsuperscript{st} order efficiency.
LETG/HRC-S Calibration

Uncorrected

Corrected

Time-dependent tilt in the dispersion axis
LETG/HRC-S Calibration

After correcting for time-dependent tilts and 0\textsuperscript{th} order position. With these corrections the extraction region and background can be reduced by 25%
HETG 0th Order Calibration

SN 1987a
0.5-5keV band

Triangles – fit to 0th order
Empty squares – model independent flux
Filled squares – simultaneous fit to 0th and 1st order.
Chandra Internal Cross-Calibration with Mkn 421

MKN421 ObsID 15477 Flux Lightcurve, 0.8–5.0keV

Mean = 1.020 ± 0.004

MKN421 ObsID 15484 Flux Lightcurve, 0.8–5.0keV

Mean = 1.025 ± 0.005