URL: http://cxc.harvard.edu/ciao3.4/why/qeu.html
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QEU Comparison

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The CALDB 2.28 release included an upgrade to ACIS Quantum Efficiency Uniformity (QEU) file which reduces the QEU uncertainties to 1%-2% from the former 5%. The ACIS Calibration website has technical details on the new QEU.

Here we show how analysis done with the new QEU file (version 2: `acisD2000-01-29qeuN0002.fits`) compares to that done with the previous version (v1: `acisD2000-01-29qeuN0001.fits`) for both imaging and grating observations. We also show how to set up CIAO to use the older version, should users wish to do the comparison for themselves.

Imaging Data

- QEU_expmap_comparison.ps

  We have illustrated the comparison for imaging data with exposure maps created at 1.5 keV on ACIS-S3 (BI), including mirror vignetting. On page 1 of the link above is the ratio of the two exposure maps, and as such indicates as a function of position the variation between the old and new QEU maps. The minimum value is black, the maximum white is max, and the min-to-max amplitude is about 10%. Page 2 gives the histogram of ratio values in from page 1. The amplitude of the variation is as great as 11%, which means that relative fluxes from different positions on the chip may be as discrepant as 11% when switching from the old to the new QEU. The absolute fluxes measured using the new QEU will be within about 5% of those determined from the old one, as the distribution of variations is approximately symmetric about unity.

Grating Data

- QEU_instmap_comparison.ps

  These images were made from instrument maps using the v2 QEU Uniformity data (page 1) and the v1 file (page 2) at 1.5 keV. Only the QEU is shown, no detector QE or mirror vignetting. The maps are shown for each chip (the CCD_ID index is at the right of each plot) with high spatial resolution in the chipx direction (x axis). For chips 4, 8, and 9, there are no new data, so new maps are identical with the old.
- QEU_garf_comparison_ratio.ps

  These plots show the effective areas for the HETG using the v2 QEU (black) and v1 QEU (gray) in upper panels for HEG (top graphic) and MEG (bottom). The lower panel in each plot shows the ratio of new to old. The pattern is the same in MEG and HEG, but the structure appears at different wavelengths for the same CCDs due to the factor of two difference in dispersion. In these plots, chip S0 (CCD_ID=4) is at the left.

Switching QEU Versions

Instrument-specific calibration files are controlled via the AXAF_ACISn_QEU_FILE parameters (n=0..9) in the ARDLIB parameter file:

```
unix% punlearn ardlib
unix% plist ardlib | grep ACIS | grep QEU
AXAF_ACIS0_QEU_FILE = CALDB            Enter ACIS-0 Uniformity file
AXAF_ACIS1_QEU_FILE = CALDB            Enter ACIS-1 Uniformity file
AXAF_ACIS2_QEU_FILE = CALDB            Enter ACIS-2 Uniformity file
AXAF_ACIS3_QEU_FILE = CALDB            Enter ACIS-3 Uniformity file
AXAF_ACIS4_QEU_FILE = CALDB            Enter ACIS-4 Uniformity file
AXAF_ACIS5_QEU_FILE = CALDB            Enter ACIS-5 Uniformity file
AXAF_ACIS6_QEU_FILE = CALDB            Enter ACIS-6 Uniformity file
AXAF_ACIS7_QEU_FILE = CALDB            Enter ACIS-7 Uniformity file
AXAF_ACIS8_QEU_FILE = CALDB            Enter ACIS-8 Uniformity file
AXAF_ACIS9_QEU_FILE = CALDB            Enter ACIS-9 Uniformity file
```

If the value of these parameters is left as the default "CALDB", the newer file (v2) will be used. To select the v1 file, use pset to set the filename (including path and extension) for each chip:

```
unix% set calpath = $CALDB/data/chandra/acis/bcf/qe

unix% foreach d ( 0 1 2 3 4 5 6 7 8 9 )
foreach? @ d1 = $d + 1
foreach? pset ardlib AXAF_ACIS${d}_QEU_FILE="${calpath}/acisD2000-01-29qeuN0001.fits[AXAF_QEU${d1}]"
foreach? end
```

Make sure to "punlearn" or delete your ardlib.par file when you are done working with the v1 QEU file in order to access the newer file again.

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