# ACIS Update

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The ACIS instrument continued to perform well over the past year while conducting the vast majority of GO observations with *Chandra*. There were only minor anomalies that affected the quality of the science data for a few observations. The charge-transfer inefficiency (CTI) of the FI and BI CCDs is increasing at the expected rate. The contamination layer continues to accumulate on the ACIS optical-blocking filter (see article herein by Larry David). A new calibration file to model the absorption due to the contamination layer was released by the CXC calibration group in the 4.5.9 release of the *Chandra* Calibration Database (CALDB) on 19 November 2013. This calibration file significantly improves the accuracy of the model for data acquired after mid-2012. If GOs are analyzing data acquired from mid-2012 or later and the response at low energies is important for their analysis, they should be using the contamination model in CALDB 4.5.9 or later.

The ACIS flight software team developed a patch in 2011 that allows ACIS to recognize sharply increasing count rates on all active CCDs as a signature of the onset of a radiation storm. This patch was developed in response to the continued degradation in sensitivity of the EPHIN instrument to high radiation as the operating temperature of EPHIN increases. ACIS now produces a high radiation signal to the *Chandra* onboard computer (OBC) and the OBC acts upon this trigger (as of May 2012) by sending the necessary commands to protect the science instruments (SIs). The HRC anti-coincidence signal is also used by the OBC as a radiation monitor. Since the ACIS radiation monitor patch has been implemented, there have been two occurrences (both in 2013) in which the high radiation signal was produced by ACIS and the SIs were safed by the OBC without any false triggers. The probability of a false trigger from EPHIN has been increasing as the temperature continues to increase. After observing successful SI safing based on both the ACIS and HRC radiation triggers, the *Chandra* Flight Operations Team has removed the EPHIN radiation signal from the OBC safing logic.

Control of the ACIS focal plane (FP) temperature continues to be a major focus of the ACIS Operations Team. As the *Chandra* thermal environment continues to evolve over the mission, some of the components in the Science Instrument Module (SIM) close to ACIS have been reaching higher temperatures, making it more difficult to maintain the desired operating temperature of -119.7 °C at the focal plane. GOs can increase the probability that the FP temperature will be cold and stable for their observation by reducing the number of operational CCDs, which reduces the power dissipation in the FP, thereby resulting in a lower FP temperature. GOs can select CCDs as "required" or "optional" for their observation. Starting in Cycle 16, GOs will be encouraged to select a maximum of 4 required CCDs for their observations to keep the FP and the electronics cooler, if their science objectives can be met with 4 or fewer CCDs. GOs are still allowed to select 5 CCDs as required when they submit their proposals. Starting in Cycle 14, GOs were not allowed to select "Y" for 6 CCDs in the RPS forms when they submit their proposal. If a GO requires 6 CCDs for their observation, they are to select 5 CCDs as "Y" and one CCD as "OFF1" at the time of proposal submission. If the proposal is selected, the GO may work with their User Uplink Support Scientist and change the "OFF1" to a "Y" if the sixth CCD is required. However, GOs should be aware that requesting 6 CCDs increases the likelihood of a warm FP temperature and/or may increase the complexity of scheduling the observation. GOs should review the updated material on selecting CCDs for their observations in the Proposers' Guide and on this web page: http://cxc.harvard.edu/acis/optional_CCDs/optional_CCDs.html.

The control of the ACIS electronics temperatures continues to be a concern for the ACIS Operations Team. ACIS has three main electronics boxes, the Power Supply and Mechanisms Controller (PSMC), the Digital Processing Assembly (DPA), and the Detector Electronics Assembly (DEA). The PSMC reaches its highest temperatures when the satellite is in a "forward Sun" configuration—pitch angles between 45-60 degrees (*Chandra* cannot point within 45 degrees of the Sun), and the DPA and DEA reach their highest temperatures when the satellite is in a "tail-Sun" orientation—pitch angles between 130-160 degrees. The *Chandra* FOT uses the optional CCDs information provided by GOs to turn off optional CCDs if thermal conditions require. The recommendation in the previous paragraph to select only 4 required CCDs if the science objectives can be met with 4 CCDs, will also reduce the temperature of the PSMC, DEA, and

DPA in addition to the temperature of the FP. Given the benefit to the ACIS FP temperature and electronics temperatures, the CXC encourages GOs to select 4 or fewer required CCDs and select any additional CCDs as optional.