
Project Scientist's Report

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“The marvel of *Chandra* exceeding its nominal operational life continues.” With these words, we began last year’s report. We hope to repeat them for many years to come. The Observatory is now in its 13th year of successful operation, and the call for the Cycle 14 proposals has been issued.

The *Chandra* Team has submitted its proposals to the NASA 2012 Senior Review of Operating Missions. The submission included two proposals: one for the *Chandra* mission and the other for Education and Public Outreach. Oral presentations to the Senior Review Committee are scheduled for February 29.

The *Chandra* X-ray Observatory is unique in its capability for sub-arcsecond X-ray imaging, which is essential to the science goals of many key X-ray and multi-wavelength astrophysical investigations. The Observatory continues to operate with only minor incremental changes in performance, due primarily to the gradual accumulation of molecular contamination on the ACIS filters and to slow degradation of the spacecraft’s thermal insulation. The former affects the detection of low-energy x-rays with ACIS. The latter impacts observing scheduling and strategies to ensure continued operation of the Observatory in a safe thermal environment.

In late 2012 January, *Chandra* experienced the strongest solar proton events since the previous solar maximum. The consequence of such radiation storms is that the Observatory must suspend science operations until the high flux of damaging protons has subsided. In preparation for the impending solar maximum, the *Chandra* Team has made some innovations to respond more robustly to solar proton events. These include use of the HRC anti-coincidence shield rate and of the ACIS threshold crossings as onboard radiation monitors, as well as the implementation of a “Science-Only Safing Action” (SOSA). The SOSA splits the (nominally) weekly command loads into vehicle and science-observation commands, which now allows the spacecraft to continue scheduled maneuvers and other vehicle activities even when the science load has stopped—e.g., to protect the instruments from radiation damage.

A major highlight this past year was the introduction of a new proposal category—X-ray Visionary Projects (XVP)—to address key astrophysical questions that require 1–6 Ms of observing time. The last peer review

awarded time for 4 XVPs: “A *Chandra* Legacy Project to Resolve the Accretion Flow of Gas Captured by a Super-massive Black Hole” (1 Ms); “Cosmology and Cluster Evolution from the 80 Most Massive Clusters in 2000 deg² from the South Pole Telescope Survey” (2 Ms); “*Chandra* Exploration of the Cosmic Melting Pot in the Virialization Region of a Rich Galaxy Cluster” (2 Ms); “*Chandra* HETG Ultra-deep Gratings Spectroscopy of Sgr A*” (3 Ms). Overall, the Cycle 13 Peer Review approved 199 of 664 submitted research proposals, which had requested 142 Ms of observing time, a factor-of-5.4 oversubscription of the available 27 Ms. (See Belinda Wilkes’ article for details.)