



November 2013

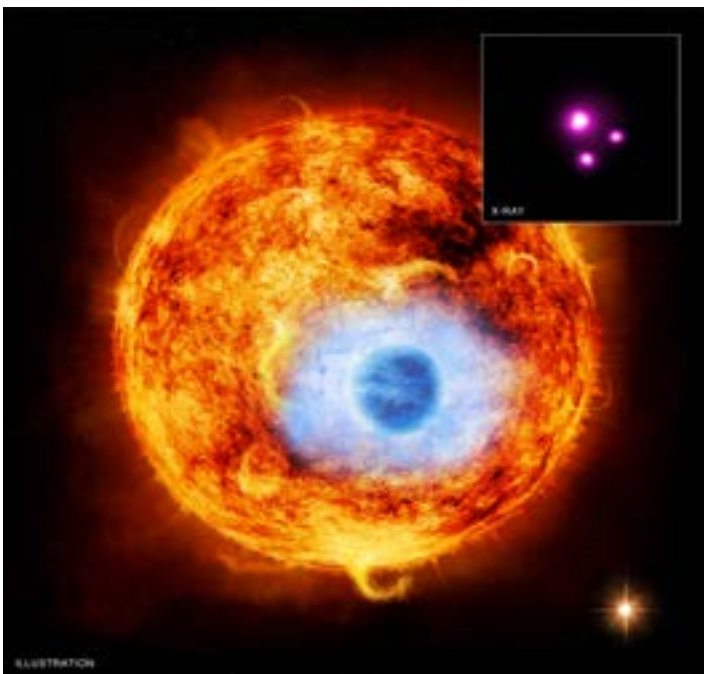
## HEAD Division & Meeting News

Joel Bregman (HEAD Chair)

I and the rest of the HEAD leadership have been working to increase the value of being a HEAD member by following our vision "... to build a dynamic and diverse community of researchers that collaborates productively on an international scale, attracts broad support for its initiatives, and effectively communicates its quests and discoveries to the public." The areas that we continue to improve are the HEAD meetings, the dispersal of information to the community, and advocacy for our activities within government circles.

The HEAD meetings have included new public policy sessions, where US and international leaders have enthusiastically accepted our invitation to speak to and answer questions from attendees. For early career members, such as those in graduate school or recently graduated, we have held a very popular jobs presentation and advice breakfast. In future meetings we will be offering more early career assistance, in addition to the existing travel grants and child care funds. These meeting now provide venues for mission planning activities, and a new outreach feature will be a public evening lecture. The next meeting will be 17-21 August 2014 in Chicago, and this is a perfect time of year to visit

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Chandra and XMM-Newton saw the first X-ray evidence for an exoplanet, HD 189733b, passing in front of its parent star.

## Upcoming Events for HEAD

Randall Smith (HEAD Secretary)

While the times change, some aspects of the HEAD Secretary's job are constant – answering questions, sending out notices, and reminding people that their articles for the Newsletter are due. Putting a government shutdown into the mix was a new one, so thanks to all for contributing nonetheless.

Upcoming events for HEAD include the elections, which will start later this month, the AAS meeting in Washington DC, and then a vote on changing the bylaws. This change would enable HEAD to accept 'affiliate' members from other scientific societies such as the American Physical Society and the American Geophysical Union, allowing people with related interests to be involved in HEAD.

If you have any suggestions or thoughts about how improve our division, please contact me at [headsec@aaas.org](mailto:headsec@aaas.org).

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### HEAD Officers

Chair: Joel Bregman ('12-'13)

Vice Chair: Nicholas White ('12-'13)

Secretary: Randall Smith ('13-'15)

Treasurer: Keith Arnaud ('13-'15)

### Executive Committee

Past Chair: Chryssa Kouvelitou ('12-'13)

Rosanne DiStefano, Stephen Reynolds, Jan Vrtilik ('11-'14)

Joshua Bloom, Paolo Coppi ('12-'15)

Daryl Haggard, Henric Krawczynski ('13-'16)

## HEAD in the News

Megan Watzke, HEAD Press Officer

The HEAD mission made news in recent months covering a wide variety of topics. In several examples, the data from more than one HEAD mission were combined for a discovery, thus underlying the complementary tools each telescope offers. For example, Fermi and Swift teamed up to detect a record-setting blast of gamma rays from GRB 130427A in May. Later that month, scientists announced that Chandra, Swift, RXTE, and XMM-Newton were used to determine that magnetars may be more common than previously thought. Swift, Chandra, Integral as well as radio telescopes were needed to discover that IGR J18245 displays characteristics of both an X-ray binary and a millisecond pulsar – a link that astronomers have long sought. And, Chandra and XMM-Newton saw the first exoplanet transit in X-rays.

All of these discoveries, as well as those made primarily announced by single missions, help to keep the discoveries of HEAD and its missions in the public eye. Through updated websites, widely disseminated press releases, and ever-increasingly important channels of social media, the general public have had a steady diet to appease their appetite for news from the high-energy Universe.

One development in the past six months that may impact the ability of US-based HEAD missions to communicate discoveries is the call in the President's FY14 budget to consolidate science, technology, engineering, and mathematics (STEM) education and public outreach (EPO) activities into three federal agencies: National Science Foundation, Department of Education, and the Smithsonian. More specifically, this would strip EPO out of NASA missions that currently have robust and active programs. While press functions of missions are generally officially separate, most HEAD missions have a great deal of overlap between its press and EPO efforts. For more information on this issue – including statements from the AAS – see <http://aas.org/resources/performance-metrics-nasas-smd-epo-programs>

Below is a sample of stories from HEAD missions that made news in the past 6 months:

- May 3: “NASA’s Fermi, Swift See ‘Shockingly Bright’ Burst” <http://www.nasa.gov/topics/universe/features/shocking-burst.html>
- May 23: “A Hidden Population of Exotic Neutron Stars” [http://www.chandra.si.edu/press/13\\_releases/press\\_052313.html](http://www.chandra.si.edu/press/13_releases/press_052313.html)
- May 29: “NASA’s Swift Reveals New Phenomenon in a Neutron Star” [http://www.nasa.gov/mission\\_pages/swift/bursts/new-phenom.html](http://www.nasa.gov/mission_pages/swift/bursts/new-phenom.html)
- June 10: “Pinwheeling Across the Sky” [www.esa.int/Our\\_Activities/Space\\_Science/Pinwheeling\\_across\\_the\\_sky](http://www.esa.int/Our_Activities/Space_Science/Pinwheeling_across_the_sky)
- June 11: “Black Hole Naps Amidst Stellar Chaos” [www.nasa.gov/mission\\_pages/nustar/news/nustar20130611.html](http://www.nasa.gov/mission_pages/nustar/news/nustar20130611.html)
- June 12: “NASA’s Chandra Turns Up Black Hole Bonanza in Galaxy Next Door”, <http://www.chandra.si.edu/>

[press/13\\_releases/press\\_061213.html](http://www.chandra.si.edu/press/13_releases/press_061213.html)

- July 29: “Eclipsing Planet Caught in X-rays for First Time” [http://www.chandra.si.edu/press/13\\_releases/press\\_072913.html](http://www.chandra.si.edu/press/13_releases/press_072913.html)
- August 14: “Weakling Magnetar Reveals Hidden Strength” <http://sci.esa.int/xmm-newton/52772-weakling-magnetar-reveals-hidden-strength/>
- August 21: “NASA’s Fermi Celebrates Five Years in Space, Enters Extended Mission” <http://www.nasa.gov/content/goddard/nasas-fermi-celebrates-five-years-in-space-enters-extended-mission/>
- August 29: “NASA’s Chandra Catches Our Galaxy’s Giant Black Hole Rejecting Food” [http://www.chandra.si.edu/press/13\\_releases/press\\_082913.html](http://www.chandra.si.edu/press/13_releases/press_082913.html)
- September 5: “Catching Black Holes on the Fly” [http://www.nasa.gov/mission\\_pages/nustar/news/nustar20130905.html](http://www.nasa.gov/mission_pages/nustar/news/nustar20130905.html)
- September 24: “NASA’s Hubble and Chandra Find Evidence for Densest Nearby Galaxy” [http://www.chandra.si.edu/press/13\\_releases/press\\_092413.html](http://www.chandra.si.edu/press/13_releases/press_092413.html)
- September 25: “Astronomers Uncover a ‘Transformer’ Pulsar”, <http://www.nasa.gov/content/goddard/astronomers-uncover-a-transformer-pulsar/>

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## NuSTAR Mission News

Daniel Stern (JPL) & Fiona Harrison (Caltech)

The Nuclear Spectroscopic Telescope Array (NuSTAR) has just passed the one year mark for science operations, which began in August 2012. Now just over half way through the baseline science mission, the NuSTAR instrument and spacecraft continue to operate nominally.

Science observations during the baseline mission are planned by the international science team, and the team is preparing to propose to NASA’s Senior Review for an extended mission that will include a Guest Observer program. To broaden access to the mission 1.5 Msec of NuSTAR time was offered through the Cycle 13 XMM-Newton AO for coordinated programs. This time was in high demand, with over 60 proposals submitted requesting approximately 9 Ms of NuSTAR time, for a factor 6 oversubscription. A similar opportunity will be available to the community for coordinated joint NuSTAR-Chandra programs through the next Chandra AO.

The first NuSTAR public data release occurred in August 2013, and we are currently readying the second data release. Information about data access, software, and calibrations can be found on the HEASARC NuSTAR website.

The NuSTAR mission website includes the full list of the science team, the list of Priority A and Level 1 science targets, links to the as-flown timeline, the list of published NuSTAR papers, as well as information on requesting Target of Opportunity observations (though note that ToO’s are intensive events for the NuSTAR operations team and only a small number are expected to be undertaken per year). This website is: <http://www.nustar.caltech.edu>.

## Chandra X-ray Observatory Report

Roger Brissenden (SAO) & Martin C. Weisskopf (MSFC)

Chandra has carried out more than 14 years of highly successful and productive science operations. The Chandra X-ray Observatory is unique in its capability for producing the sub-arcsecond X-ray images that are essential to accomplish the science goals of many key X-ray and multi-wavelength investigations in current astrophysical research.

The Observatory continues to operate with only minor incremental changes in performance, due primarily to the gradual accumulation of molecular contamination on the UV filter that protects the ACIS detector, and to slow degradation of the spacecraft's thermal insulation. Condensation on the filter reduces somewhat the detection of low-energy x-rays by ACIS (but not by the HRC), while the decline in insulation effectiveness requires extra effort in scheduling observations and the use of special strategies to ensure continued safe operation in the thermal environment. In addition, two systems – the Fine Sun Sensor, and the thrusters of the momentum unloading and propulsion system – have been swapped to their duplicate backup systems to mitigate non-impacting decreases in performance. Science data processing, archiving, and distribution proceeds smoothly, with average time from observation to data delivery to observers remaining at about a day.

Chandra's overall observing efficiency is near the highest level of the mission, due to the evolution of Chandra's orbit, which has reduced the non-observing time spent in Earth's radiation belts. For observing cycles 13–15 this has led to a significant increase in the amount of observing time available. We took advantage of the increased observing time to introduce the X-ray Visionary Program (XVP). XVPs are observing programs of 1-5 Msec intended to address major questions in astrophysics and to produce data sets of lasting value that can only be accomplished with such long observing times. However, as the orbit continues to evolve, the observing efficiency is beginning to decline toward prior levels, and a decision will be made, prior to Cycle 16, as to precisely how to apportion the available observing time among the various categories of observation.

The December 2012 Call for Proposals for Observing Cycle 15 attracted 636 proposals from scientists worldwide, who requested ~5.4 times more observing time than was available. 179 proposals were approved for a total of 20 Ms, including 2 X-ray Visionary Projects proposals for 5 Ms.

The current cycle of Einstein postdoctoral fellowships attracted 189 applications from early-career scientists. Three-year fellowships were awarded to 12 highly talented astrophysicists who will work at institutions throughout the United States. More information is available at <http://cxc.harvard.edu/fellows/>.

Since March, the Chandra program offices at Marshall Space Flight Center and at the Chandra X-ray Center (CXC) have been adapting to new restrictions on trav-

el and conferences that NASA has imposed in response to the recent congressional sequestration of Federal funds. These restrictions have reduced staff travel to conferences, scientific collaborations and operational meetings.

The Chandra Press Office issued 11 image releases and 6 science press releases. A complete listing is available at <http://chandra.harvard.edu/press/>. Information about the Chandra Observatory and the Chandra X-ray Center can be found at <http://cxc.harvard.edu/>.

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## XMM-Newton

Steve Snowden & Lynne Valencic (GSFC)

The 13th Call for Proposals for XMM-Newton closed October 11, 2013; successful submissions will be announced in December. In total, 452 valid proposals were submitted, requesting 77.7 Ms of science time. This Announcement of Opportunity covers a period of one year, with 14.5 Ms of observing time available for distribution. The over-subscription factor is 5.4.

A total of 56 proposals for Large Programmes were received. Triggered/ToO observations were requested in 51 proposals. For the joint programmes, 102 proposals were submitted: 18 requested time for the XMM-HST programme, 15 for the XMM-SWIFT programme, 8 for the XMM-VLT programme, 6 for the XMM-Chandra programme, and 62 for the new XMM-NuSTAR programme. As a result of the last Senior Review, some funds will be available for top-ranked proposals with U.S. PIs. Eligible PIs will be notified in early 2014.

In May, 2013, the XMM-Newton Science Operations Centre (SOC) hosted a meeting on energetic phenomena in isolated neutron stars, pulsar wind nebulae and supernova remnants. The presentations are now available online at [http://xmm.esac.esa.int/external/xmm\\_science/workshops/2013\\_science/](http://xmm.esac.esa.int/external/xmm_science/workshops/2013_science/).

The SOC will organize a symposium June 16-19, 2014 at Trinity College in Dublin, Ireland. It will be the fourth international meeting in the series "The X-ray Universe". A general collection of research in high energy astrophysics will be presented, highlighting recent results, discoveries, and plans for current and future X-ray missions. Registration will open in January, and the abstract submission deadline is at the end of February. More information is available online at [http://xmm.esac.esa.int/external/xmm\\_science/workshops/2014symposium/](http://xmm.esac.esa.int/external/xmm_science/workshops/2014symposium/).

## The Fermi Gamma-Ray Telescope

*Julie McEnery, Chris Shrader, Dave Thompson,  
Liz Hays (GSFC) & Lynn Cominsky (Sonoma State)*

The Fermi Gamma-ray Space Telescope continues to operate nominally. In August, the project celebrated five years of surveying the gamma-ray sky. Based on community input, an alternative observing strategy that could maximize scientific opportunities for the future of the mission will be implemented by the end of the year, subject to successful engineering studies. We strongly encourage people to post comments and suggestions on the proposed change. See: [http://fermi.gsfc.nasa.gov/ssc/proposals/alt\\_obs/obs\\_modes.html](http://fermi.gsfc.nasa.gov/ssc/proposals/alt_obs/obs_modes.html)

**Recent Fermi Highlights:**

- The Fermi instruments combined with other ground and satellite observations have shown that Gamma-ray Burst GRB 130427A was record-breaking in several respects, including detecting the highest-energy photons ever detected from such an event. See <http://www.nasa.gov/topics/universe/features/shocking-burst.html>
- Highlights from the first five years of the planned ten-year Fermi mission include a release of the five-year all-sky map. See <http://www.nasa.gov/content/goddard/nasas-fermi-celebrates-five-years-in-space-enters-extended-mission/>
- Proceedings from the Fourth International Fermi Symposium are available at <http://www.slac.stanford.edu/econf/C121028/>

### Data and Software Releases

A new version of the Fermi Science Tools that includes upgrades and bug fixes along with new functionality to analyze non-sidereal targets in the Fermi LAT data will be released during November 2013. Concurrently, the LAT team is reprocessing all LAT science data, implementing refinements expected to lead to improved energy and spatial resolution. More information is available at <http://fermi.gsfc.nasa.gov/ssc/>.

### Fermi Guest Investigator Program

Cycle 6 Fermi Guest Investigator Proposals stage 1 results are available at <http://fermi.gsfc.nasa.gov/ssc/proposals/cycle6/ApprovedPrograms.pdf>

The nominal due date for Cycle 7 Fermi GI proposals is 16 January, 2014. The Government shut-down could affect this date. Please see the latest news at <http://fermi.gsfc.nasa.gov/ssc/proposals/>

### Fermi E/PO News

NASA released a story about the Fermi orbital maneuver that avoided a potential collision with a defunct Soviet spy satellite ([http://www.nasa.gov/mission\\_pages/GLAST/news/bullet-dodge.html](http://www.nasa.gov/mission_pages/GLAST/news/bullet-dodge.html)). The discovery of a new black widow pulsar system using Fermi data is the cover story in the November issue of Sky and Telescope. The author, Roger Romani, says he discouraged the magazine from using the term “Zombie Stars.” (<http://www.skyandtelescope.com/skytel>).

The Fermi-co-sponsored “Big Ideas in Cosmology” online curriculum is now being tested in classrooms, with both Modules 1 and 2 now completed. The en-

tire three-module course will be available for use by the Spring semester 2014. If interested in being one of our early adopters, please contact [lynnc@universe.sonoma.edu](mailto:lynnc@universe.sonoma.edu)

## Progress Towards the Astro-H Mission

*Richard Kelley, Takashi Okajima,  
Lorella Angelini, Rob Petre (NASA/GSFC)*

The joint JAXA/NASA Astro-H mission, with contributions from ESA and the Canadian Space Agency, is solidly in the middle of flight instrument and spacecraft development. Launch is now planned for the end of 2015. Flight versions of the four instruments (Soft X-Ray Spectrometer, Soft X-Ray Imager, Hard X-Ray Imager, and Soft Gamma Detector) are in development and will begin compatibility testing with the spacecraft systems in late 2013/early 2014.

It was previously reported that micro-vibrations from some of the cryocoolers on the Soft X-Ray Spectrometer (SXS) x-ray calorimeter instrument were degrading the energy resolution to worse than 7 eV by creating excessive thermal fluctuations of the 50 mK detector stage. During the last six months, the project has carried out extensive measurements to characterize the problem and develop requirements for the level of reduction required as a function of frequency to eliminate the heating. Efforts are now underway to develop an isolation/damping scheme between the compressors of the Stirling coolers and the dewar. This work will be carried out over the next six months. In the meantime, other components of the SXS will continue development, and integration of the flight instrument will start in April 2014. The goal is to achieve an end-end energy resolution of 5 eV or better with the coolers running at their nominal power.

Calibration of the SXS flight detector system, including non-x-ray blocking filters, has been completed. About 4 months of continuous data have been collected under a wide variety of operating conditions. Analysis of this data will occupy the coming year. The second of two x-ray mirrors, for the SXS and SXI instruments, has been completed and will be shipped to Japan in November 2013 for detailed calibration, but the basic performance has already been characterized using x-ray beam facilities at the Goddard Space Flight Center. Both mirrors will provide over 200 cm<sup>2</sup> at 6 keV with a half-power diameter of about 70 arc-sec.

Work on the Data Center and GO support activities is continuing for all of the Astro-H instruments. Plans for the software and database system design were presented at the 10th Astro-H project science meeting held at Yale University in July 2013, and at a special project workshop held at the University of Maryland, October 2013 concentrating on high-resolution spectroscopy with the SXS. Extensive efforts are being made to coordinate and collaborate with the various x-ray atomic database and x-ray plasma-modeling experts, and incorporate the accumulated knowledge from analyzing and interpreting high-resolution spectral data from Chandra and XMM-Newton.

## LISA Pathfinder Status Update

Michele Vallisneri (JPL) and Paul McNamara (ESA)

LISA Pathfinder (LPF), the second of the European Space Agency's Small Missions for Advanced Research in Technology (SMART), is progressing towards a launch in mid-2015. The LISA Pathfinder spacecraft exited hibernation in June 2013; in the following weeks, a series of system tests were performed, all of which concluded successfully, demonstrating that spacecraft functionality was maintained through the hibernation period. The spacecraft is now being prepared for the installation of the cold-gas micro-Newton thrusters. All payload flight units have been delivered, and industrial activities are focused on system-level integration and testing of the LISA Technology Package payload. These activities will continue throughout next year, culminating in the delivery of the payload in Q4 2014. Following its integration into the spacecraft, final system-level tests will be performed before the launch composite is shipped to the launch site (Kourou, French Guyana). LPF is scheduled for launch in July 2015 aboard a dedicated VEGA launcher. The first science results are expected approximately two months later.



LISA Pathfinder spacecraft and propulsion module preparing for thermal testing [top] and a close-up of the spacecraft itself [bottom]. [Photos courtesy of ESA.]

## Athena+: Revealing the hot and energetic Universe

Kirpal Nandra (MPE), Xavier Barcons (CSIC-UC) & Didier Barret (IRAP)

The European Space Agency (ESA) is currently in the process of selecting science themes for its next large missions, L2 in 2028 and L3 in 2034. A number of White Papers describing proposed themes were presented at a meeting in Paris on September 3rd and 4th. Following this a subset of the teams were invited for further discussions with the Senior Survey Committee (SSC), tasked with recommending the science themes. This included "The Hot and Energetic Universe", the science theme motivating Athena+, the next generation deep Universe X-ray observatory. It is understood that the SSC has recently completed its deliberations and made a recommendation to the ESA Director of Science and Robotic Exploration, who in turn will propose the choice of themes to the ESA Science Program Committee (SPC). The SPC are expected to make the final decision at their meeting at the end of November. Following this, a call for a mission to address the science theme for L2 will be issued in 2014. The Athena+ team are very optimistic about the prospect of the Hot and Energetic Universe being included in the ESA program, and Athena+ becoming the L2 mission.

More information and updates can be found on the Athena+ website: <http://www.the-athena-x-ray-observatory.eu>

## HEAD Division & Meeting News (cont'd)

Joel Bregman (HEAD Chair)

Chicago. It's one of my favorite cities and we have a really great venue for the meeting. Put it on your calendar!

Getting information to our membership is one of our highest priorities and we do so through our HEAD Bulletins and the HEAD Newsletter. The Newsletter comes out every 6 months and has many interesting and important updates, as you see in this one. Rapidly-breaking news and updates appear in the HEAD Bulletin, which now comes out about twice per month! Look it over, as it highlights the state of missions and their deadlines, helps to announce new meetings, and brings other items to light. For example, the last Bulletin discussed the new AAS Agents program where someone from your department acts as a local liaison and in exchange receives a half-price registration discount for a AAS meeting. If your department is not yet signed up, please consider becoming a AAS Agent. Also, please encourage young scientists to become HEAD members, as we provide a manageable path through a large and sometimes daunting professional community.

The AAS and HEAD continue to advocate for governmental support and sensible policies. The AAS has an excellent public policy person, Joel Parriott, who continually works with Congress and the Executive branch. He arranged for a well-received visit by myself and three other HEAD members to the most relevant congressional committees as well as the President's science people.

## Suzaku NEWS

*Koji Mukai (GSFC / CRESST)*

The deadline for Suzaku AO-9 proposals is just a few days away on November 13, 2013. Readers interested in writing a last minute proposal should consult the NASA, JAXA or ESA pages as appropriate for further details. Note that Key Projects (programs requiring up to 2 Ms of observing time) are once again allowed. Also, if you are a US-based researcher with a PhD and are interested in serving on the US peer-review panel, please e-mail [peer\\_review@athena.gsfc.nasa.gov](mailto:peer_review@athena.gsfc.nasa.gov). Even though we cannot always use volunteers for peer-reviews due, e.g., to institutional conflict of interest issues, it helps to have a wide pool of potential reviewers. The US peer review will likely take place in mid to late January, 2014, in or near Greenbelt, MD.

The electric power supply from the Solar Array Paddle (SAP) of Suzaku, which showed a steep decline from roughly August through December of 2011, appears to have stabilized. Since early 2012, there has been a pronounced seasonal variation superimposed on a slow (approximately 50 W per

year) secular decline. During the summer of 2013, the power output was in the 850-950W range, in comparison to the 800W necessary to maintain the full scientific operation of Suzaku. The project team is therefore cautiously optimistic that normal observations can continue throughout the AO-9 period (2014 April through 2015 March) and perhaps beyond.

The Suzaku GOF is preparing a Senior Review proposal for the continued US participation in the mission. Please e-mail [Koji.Mukai@nasa.gov](mailto:Koji.Mukai@nasa.gov) if you have potentially high profile results based on Suzaku data, especially those that are not yet published. We are also interested in hearing about any Suzaku related press releases, and PhD theses based (at least in part) on Suzaku data analysis.

As has previously been announced, the Suzaku project is co-sponsoring "Expanding the Frontiers of the X-ray Universe" conference (Suzaku-MAXI 2014) in Matsuyama, Japan, February 19-22 (<http://www.xray.ess.sci.osaka-u.ac.jp/SuzakuMAXI2014/>).

Abstracts are due on December 2, 2013, and hotel reservation and the registration deadline is on January 17, 2014.

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## Spektrum Roentgen Gamma NEWS

*A. Merloni, M. Pavlinski, P. Predehl, S. Sazonov*

The Spektrum Roentgen Gamma (SRG) mission preparation proceeds on all fronts. Huge progress has been made in the last six months, but, at the same time, bottlenecks in the various production and testing chains were identified, leading to a revised schedule; according to the latest plan, ART-XC will be delivered in March 2015, eROSITA in June of the same year, for a foreseeable SRG launch towards the end of 2015.

At Lavochkin Association the S/C and its sub-components are being tested, including eROSITA and ART/XC qualification models. The production of the Zenit-2SB launcher is in progress, while the upper stage, fairing, transfer compartment are already produced. A review of the radio-complex system is underway by a team of experts from ESA, DLR, Roskosmos, Russian Academy of Science and Lavochkin Association to assess the options for SRG in light of the failure of the Phobos-GRUNT mission.

In Germany, the eROSITA X-ray telescope array continues taking shape. Currently, all eROSITA X-ray mirror shells have been produced and integrated, and the integration of the X-ray baffles into the mirror modules is also underway. The first five fully integrated flight mirror modules (two of which including baffles) were extensively tested in PANTER. With a mean HEW of 16.3" at 1.5keV and on-axis effective areas larger than 380 cm<sup>2</sup> (per mirror module), they fulfill the specifications. In the meantime, Electron Deflectors, Filter Wheels, E-Box Radiators, Camera Radiators, Heatpipe System Camera, Heatpipe System Electronics are ready or in the final testing phases. All the Electronics for the on-board cameras are in production and testing phases,

and they represent the last, and more time-consuming, missing element for the final assembly of the telescope. On October 14-16 more than 80 scientists met at MPE in Garching for the yearly German eROSITA Consortium meeting to discuss the progress of the activities and the prospects for the scientific exploitation of the eROSITA data.

At IKI in Moscow, the hard X-ray telescope ART-XC is being assembled, too. Autonomous mechanical and thermo-vacuum tests of the STM model have been completed, and mechanical tests as part of the spacecraft have been performed.

A technological unit of ART-XC EM has been produced and delivered to the Lavochkin Association, and electrical tests as part of the spacecraft have begun. As far as the Qualification Module (QM) is concerned, various subsystems are under production, including the on-board computer and seven DSSD CdTe X-ray detectors with electronics. EMC test have been carried out. Technological runs of the control module of the drive of the X-ray calibration source blocks is being under way at normal, high and low temperatures. The control block of the telescope's temperature control system has been assembled. The carbon fiber structure of the telescope has been produced. Two mirror systems for autonomous qualification tests have been produced, and the tests have been successfully performed, including tests at an X-ray beam facility. Two mirror systems of 28 shells each for the QM unit have been assembled. The spiders and shells for assembling another 5 mirror systems have been produced. The harness of the telescope and EGSE has been produced. The star tracker has been produced. Finally, the production of subsystems for the flight units of the FM telescope is going on. Four flight mirror systems have been assembled.

## Swift Mission News

*Eleonora Troja (UMCP/GSFC), Lynn Cominsky (Sonoma State), & Neil Gehrels (GSFC)*

The Swift mission continues to operate flawlessly. The mission did well in the 2012 Senior Review and is slated to continue through 2016, with the last two years reviewed again in 2014. The mission continues to support 2 to 3 Target of Opportunity requests per day in addition to observing gamma-ray bursts (GRBs) and Guest Investigator targets. Below is an update on recent science findings, GI program and news from the EPO program.

### Swift Catches Record Setting Gamma-Ray Bursts

Two bright Gamma-ray Bursts discovered by Swift at a relatively close distance ( $z \sim 0.3$ ) provided fundamental answers to long-standing questions. The exceptionally bright GRB 130427A is a long duration ( $> 2$  s) GRB, arising from a dying massive star. Among the 800 GRBs observed by Swift, GRB 130427A sets the record for the highest fluence ever measured from a GRB. Swift observations traced the burst evolution from the prompt to the afterglow phase, uncovering that a common mechanism originates GRBs both in the early and in the contemporary Universe. GRB 130603B is a short duration ( $< 2$  s) GRB, whose origin is not fully understood. Swift observations discovered and localized the GRB in a nearby galaxy. The close distance allowed astronomers to pinpoint a faint infrared transient spatially coincident with the GRB, providing the first tantalizing evidence that short duration GRBs are produced by the collision of two neutron stars.

### Swift Produces Best UV Maps of the Nearest Galaxies

Swift produced the highest resolution ultraviolet (UV) survey of the Magellanic Clouds, the two major galaxies in our neighborhood. Each galaxy extends far beyond the narrow Swift UVOT's field of view, and more than 2,500 images were collected and assembled in order to cover both galaxies. The stunning Swift mosaic revealed nearly 1 million UV sources in the Large Magellanic Cloud, and



*Swift/UVOT mosaic of the Large Magellanic Cloud co-aligned with the optical image. The LMC is about 14,000 light-years across. The 160-megapixel image was assembled from 2,200 images taken by the UVOT, and required a cumulative exposure of 5.4 days. The image is oriented with north at top.*

about 250,000 in the Small Magellanic Cloud. With an angular resolution of 2.5 arcsec, the new Swift images allow scientists to identify the hottest and youngest stars and to map in great detail the regions of active star-formation.

### A magnetar at the heart of our Galaxy

On May 4th 2013, Swift triggered and localized a flaring X-ray source near the Galactic center. Swift and NuSTAR observations conclusively identified the object as a magnetar, a rapidly rotating neutron star with an intense magnetic field. The proximity of the newly discovered magnetar to the supermassive black hole at the heart of our Galaxy hands astronomers a tool to test Einstein's theory of General Relativity.

### Swift Guest Investigator Program

The deadline for submitting scientific/technical proposals for the Swift Cycle 10 GI program was September 26. NASA received 175 proposals for Swift Cycle 10 (up from last year's Cycle 9), requesting a total observing time of 15.6 Ms and \$5.3M in funds for 1,150 targets. About 26% of all proposals are Target of Opportunity proposals; 31% of all targets are part of a monitoring campaign, requesting two or more observations of the same target.

The Swift Cycle 10 Peer Review will be held in December to evaluate the merits of submitted proposals and choose those that are recommended for funding and observing time. The accepted targets will shape the science program for Swift's next year. Cycle 10 observations will commence on or around April 1, 2014, and will last 12 months. **Swift E/PO News:** The Sonoma State University's robotic telescope caught its third GRB afterglow for GRB 130722A. Improvements to the dome software and hardware have greatly increased our observing efficiency and reliability, tripling the number of GRBs now detected.

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## X-ray Science Interest Group News

*Jay Bookbinder (CfA)*

The X-ray Science Analysis Group has been renamed the X-ray Science Interest Group (XRSIG) in order to better match its intent. The XRSIG reports to the Physics of the Cosmos Program Analysis Group, which in turn reports to NASA's Astrophysics Program Advisory Group and thence to the NASA Astrophysics division. It is, therefore, the primary method for providing community-based input to NASA. Membership is open to any interested US-based X-ray astrophysicist. The XRSIG typically holds sessions during AAS or HEAD meetings.

With an official announcement from the European Space Agency about the L2 and L3 mission decisions expected by the end of November (see article on page 5), a series of telecons starting mid-November will discuss potential US contributions to an X-ray mission such as Athena+. The meeting information will be distributed to the SIG mailing list. If you are interested in being involved in this XRSIG activity, please register for the XRSIG mailing list by November 11th. Registration and more information is available at <http://pcos.gsfc.nasa.gov/sags/xrsag.php>.

## INTEGRAL Mission News

Erik Kuulkers (ESA) & Steven Sturmer (UMBC/GSFC)

During a meeting on 18 & 19 June, the SPC approved the indicative extension of science operations for INTEGRAL until 31 December 2016, subject to a mid-term review in Fall 2014. A number of cost savings options will be implemented in order to safeguard future science operations for INTEGRAL, and a few of those options will directly affect the science return of the mission.

The spacecraft, payload and ground segment are performing nominally. Routine annealing #21 of the SPI Germanium detectors took place between 1 and 19 August; as part of the above mentioned cost-saving measures, no scientific observations were performed during that period. The degradation during the last period has been entirely recovered. The recovery is better than for the previous annealing.

A new set of Cosmic X-ray Background (CXB)/Earth occultation observations were successfully performed in July 2013. The data have been made publicly available. A first report has been released: at hard X-rays (>10 keV) a clear occultation signal is visible, while at soft X-rays (<10 keV) auroral emission dominated. Another set of CXB/Earth observations is foreseen for mid-December 2013.

Further scientific observations of the AO-10 cycle were performed as planned. Target of Opportunity (ToO) follow-up observations were performed on the Seyfert 1 galaxy NGC 5548 and on the blazar Mkn 501. Three Gamma-Ray Bursts (GRBs) were detected in the FOV (GRB 130513A, GRB 130514B and GRB130903A).

The INTEGRAL TAC reviewed the submitted observing proposals on 27-29 May at ESAC, in response to the 11th Announcement of Opportunity (AO-11). The recommended programme was published on 14 June. The TAC selected

45 proposals, including 20 ToO follow-up observations, and 3 GRB observations which do not request observing time. The TAC allocated 22.9 Msec to non-ToO AO-11 observing proposals including 16.1 Msec for proposals with the highest scientific grade A. The TAC also granted total of 150 ksec of XMM-Newton observing time to 7 INTEGRAL proposals. AO-11 observations will begin on 1 January 2014.

On 9 September, AO-11 for data right proposals with INTEGRAL was released (with a deadline of 4 October). This announcement solicited proposals for obtaining data rights to targets within the approved non-ToO, non-public, AO-11 observations. 31 proposals were received. Due to the cost savings, this call for data rights proposals is the last one of its kind. The Fall 2014 INTEGRAL workshop is being tentatively planned for location in Annapolis with local organizers at Goddard and Clemson. In addition to INTEGRAL science, the workshop would highlight synergies with Fermi, NuSTAR and Swift. As of 1 September Erik Kuulkers has been appointed INTEGRAL Project Scientist; Chris Winkler will retire at the end of this year.

### Recent scientific highlights

- Swings between rotation and accretion power in a binary millisecond pulsar (Papitto et al. 2013, Nature 501, 517)
- Discovering a 5.72 Day Period in the Supergiant Fast X-ray Transient AX J1845.0-0433 (M. Goossens et al. 2013, MNRAS 434, 2182)
- The polarized Gamma-Ray Burst GRB 061122 (D. Götz et al. 2013, MNRAS 431, 3550)
- Tidal disruption of a super-Jupiter by a massive black hole (M. Nikolajuk & R. Walter 2013, A&A 552, A75)
- Exploring the capabilities of the Anti-Coincidence Shield of the INTEGRAL spectrometer to study solar flares (Rodríguez-Gasén et al. 2013, Solar Physics, arXiv:1308.3350

### X-ray Astrophysics Probe

Rob Petre (GSFC), Jay Bookbinder (CfA),

Andrew Ptak (GSFC), and Randall Smith (CfA)

In 2011 NASA HQ initiated an X-ray mission concepts study through the NASA Physics of the Cosmos program office; details available at <http://pcos.gsfc.nasa.gov/studies/x-ray-mission.php>). The primary charge to the committee was to evaluate a range of possible missions that could complete all or part of the IXO science case. The final report, issued in August 2012, found “that the extraordinary capability of a large-area X-ray calorimeter mission will address the greatest number of IXO science themes.” On this basis, the NASA Astrophysics Implementation Plan (AIP), released in December 2012, (see <http://science.nasa.gov/media/medialibrary/2012/12/20/Rev1-StrategicImplementationPlan-20Dec2012.pdf>) calls out the possibility of an X-ray Astrophysics Probe for a start in 2017. The AIP also requested that a technology development plan be formulated to mature the key X-ray technologies for a such a probe to be ready for a 2017 start or in support of an X-ray mission submission to the 2020 Decadal Survey. A technolo-

gy development roadmap was produced in response to this request and was released in August 2013 (<http://pcos.gsfc.nasa.gov/docs/TDR-Final-23-Aug-2013PM.pdf>). This roadmap gives a rough timeline and cost (~\$62M) for maturing the X-ray optics, calorimeter, gratings and advanced CCDs for a mission phase B (TRL 6) by the end of the decade.

During the summer of 2013 NASA HQ solicited membership of a Science and Technology Development Team (co-chaired by Jay Bookbinder and Ann Hornschemeier; please see the member list and more information at <http://pcos.gsfc.nasa.gov/studies/x-ray-probe-2013-2014.php>) to determine the science requirements and specifications for an X-ray Astrophysics Probe (XAP) with an X-ray calorimeter as the primary instrument. The STDT was selected and work has commenced to maximize the science return for XAP with the constraint that the total cost should be near or under \$1 Billion. An initial report will be due in early 2014 and the final report will be due in early 2015, which would inform NASA HQ’s decision on whether to request a start for XAP in 2017. The Aerospace corporation will also provide an independent cost estimate and technology readiness assessment.