



May 2014

HEAD Division & Meeting News

Nick White (HEAD Chair)

We are looking forward to the next Divisional meeting in Chicago this coming August. I anticipate a very lively meeting with both new results and important discussions about the future of high energy astrophysics. Since Chicago is a major airline hub and the AAS has negotiated an attractive hotel rate we expect that this will be a very economical and accessible meeting. I am also happy to announce that at this meeting the HEAD Dissertation prize will be presented to Reinout van Weeren for his thesis entitled “Radio emission from merging galaxy clusters: characterizing shocks, magnetic fields and particle acceleration.”

The HEAD has recently passed a new bye-law that allows for affiliate membership (thank you for voting!). This allows members from other other professional Societies to join the HEAD without having to become full

AAS members. This brings the HEAD into line with other AAS Divisions. We anticipate this will increase participation in the HEAD Divisional meetings and other events.

As I write this we are planning a HEAD visit to the Hill by executive committee members, to meet with representatives of the various House and Senate committees. I would remind all HEAD members to keep in contact with their representatives and visit with them when you are in Washington. It is important they know how important the NASA and NSF budgets are for the vitality of our field. If you need help with planning your visit, we will be happy to assist.

I would remind HEAD members to start thinking about nominations for the Rossi Prize. This is the HEAD’s premier award, with the prize talk given at the winter AAS meeting. We are planning to introduce later this year a standardized process that will streamline nominations, and urge everyone to take advantage.

Presidential Award and Other HEAD News

Randall Smith (HEAD Secretary)

Your HEAD secretary is happy to report that Prof. Randall McEntaffer (U. Iowa) was named as one of 102 scientists and engineers named by President Barack Obama as recipients of Presidential Early Career Awards for Scientists and Engineers, the highest honor bestowed by the U.S. government on scientists and engineers in the early stages of their independent research careers.

Dr. McEntaffer was recognized “for development of high resolution and high throughput X-ray gratings for use in the next generation of space-based X-ray spectrometers.”

After receiving the award at the White House in April, he gave a talk at NASA HQ on his work on the development of high spectral resolving power grating spectrometers for astronomical X-ray observations, including the fabrication and testing of novel off-plane reflection gratings.

As noted above, in April HEAD members voted to amend the bye-laws to enable affiliate memberships, allowing members of AGU, APS, and similar societies who

Continued on page 9



Presidential Early-Career Researcher Award Recipient Randall McEntaffer with NASA Chief Scientist Ellen Stofan..

Contents

HEAD Division & Meeting News.....	1
Presidential Award and Other HEAD News	1
HEAD in the News	2
Athena: Revealing the hot and energetic Universe.....	2
Chandra X-ray Observatory Report.....	3
Progress Towards the Astro-H Mission.....	3
The Fermi Gamma-Ray Telescope	4
Suzaku Mission News	4
LISA Pathfinder and eLISA News.....	5
X-ray Science Interest Group	5
XMM-Newton Mission News	6
Spektrum Roentgen Gamma Update.....	6
Swift Mission News	7
INTEGRAL Mission News	7
INTEGRAL Mission News (con’t).....	8
NuSTAR Mission News.....	9
Other HEAD News (con’t)	9
Chandra X-ray Observatory (con’t)	9

HEAD in the News

Megan Watzke, HEAD Press Officer

There are many exciting topics being covered by the missions of high-energy astrophysics, and the media and general public are able to share in these discoveries through press releases, press conferences, social media and other outreach efforts. For example, scientists using Fermi recently announced tantalizing clues to the nature of dark matter. Data from Chandra and XMM-Newton were combined to make a direct measurement of a distant black hole. NuSTAR contributed to area of exploded stars with an exciting result announced in February involving Cas A. Earlier in the year, researchers combined data from multiple HEAD missions to observe a nearby supernova. And, the results of a trio of HEAD missions working together to study one of the brightest gamma-ray bursts ever seen once again showed the complementary nature of these telescopes. Links to all of these stories and more can be found below. For a full list of the press releases, image releases, and other articles on results from HEAD missions in the past six months, visit the websites of each of the missions.

If you think you might have a newsworthy result that you are planning on presenting at the upcoming HEAD meeting in Chicago this August, please contact Megan Watzke (mwatzke@cfa.harvard.edu) directly as soon as possible.

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

- November 20, 2013, “NASA’s Chandra Helps Confirm Evidence of Jet in Milky Way’s Black Hole”, http://www.chandra.si.edu/press/13_releases/press_112013.html
- November 26, 2013, “Do Black Holes Come in Size Medium?” <http://www.nasa.gov/jpl/nustar/black-holes-20131126.html>
- November 27, 2013, “NASA Missions Study ‘Watershed’ Cosmic Explosion in Unparalleled Detail”, <http://www.nasa.gov/press/2013/november/nasa-missions-study-watershed-cosmic-explosion-in-unparalleled-detail>
- December 4, 2013, “Supernova Blast Provides Clues to Age of Binary Star System”, http://www.chandra.si.edu/press/13_releases/press_120413.html
- December 12, 2013, “Rare Magnetar Discovered in the Vicinity of a Supernova Remnant”, https://cosparhq.cnes.fr/sites/default/files/press_release_rare_magnetar.pdf
- January 8, 2014, “NASA’s Swift Catches Action at Milky Way’s Center”, <http://www.nasa.gov/press/2014/january/nasas-swift-catches-x-ray-action-at-milky-ways-center>
- January 27, 2014, “NASA Spacecraft Take Aim at Nearby Supernova”, <http://www.nasa.gov/content/goddard/nasa-spacecraft-take-aim-at-nearby-supernova>
- February 18, 2014, “NASA’s Chandra Sees Runaway Pulsar Firing an Extraordinary Jet”, http://www.chandra.si.edu/press/14_releases/press_021814.html
- February 19, 2014, “NASA’s NuSTAR Untangles Mysteries of How Stars Explode”, <http://www.nasa.gov/jpl/>

[nustar/supernova-explosion-20140219](http://www.nasa.gov/content/goddard/nustar/supernova-explosion-20140219)

- March 5, 2014, “Chandra and XMM-Newton Provide Direct Measurement of Distant Black Hole’s Spin”, http://www.chandra.si.edu/press/14_releases/press_030514.html
- April 3, 2014, “Fermi Data Tantalize With Clues to Dark Matter”, <http://www.nasa.gov/content/goddard/fermi-data-tantalize-with-new-clues-to-dark-matter>
- April 22, 2014, “Unique Pair of Hidden Black Holes Discovered by XMM-Newton”, <http://sci.esa.int/xmm-newton/53980-unique-pair-of-hidden-black-holes-discovered-by-xmm-newton/>

Athena: Revealing the hot and energetic Universe

Kirpal Nandra (MPE), Xavier Barcons (CSIC-UC) & Didier Barret (IRAP) for the Athena Team

We are delighted to report that in November 2013, the Science Programme Committee (SPC) of the European Space Agency (ESA) selected “The Hot and Energetic Universe” as the science theme for its next Large (L-class) mission. The theme calls for answers to key issues in astrophysics, including a determination of the physical processes behind the formation and evolution of hot gas structures in the Universe, and the role of black holes in shaping galaxies and larger scale structures. These questions can be uniquely addressed by the mission concept Athena (the Advanced Telescope for High Energy Astrophysics), and the ESA decision has paved the way for the adoption of Athena into the ESA program for launch in 2028.

Following the selection of the Hot and Energetic Universe theme, ESA issued a call for mission proposals to address the science, with a deadline of 15th April this year. The same team which proposed the Hot and Energetic Universe science theme has responded to this call with a mission proposal for Athena. The mission concept consists of a single X-ray telescope with 12m focal length based on Silicon Pore Optics technology, providing 2m² of effective area at 1 keV with 5” angular resolution. The telescope can feed one of two focal plane instruments. The X-ray Integral Field Unit (X-IFU) uses transition edge sensor technology to provide high resolution (2.5 eV) spectroscopy over a field of view of 5’ diameter. The Wide Field Imager (WFI) is a Silicon DEPFET-based instrument offering spectrally resolved imaging over a large field of view (40’ x 40’), and sub-millisecond timing capabilities for bright X-ray sources.

It is understood that the Athena proposal was the only one submitted in response to the ESA call. The proposal is to be reviewed by ESA, with a decision due at the meeting of the SPC in June this year. If this is positive, Athena will enter a study, definition and technology development phase, with a decision on mission adoption anticipated in late 2018.

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

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.

As its part in NASA's biennial Senior Review of operating missions, the Chandra Program in January submitted a proposal discussing Chandra's scientific productivity, the status of the Chandra spacecraft and instruments, and the CXC's future plans for operating the mission. In March the Senior Review committee visited the CXC's Operations Control Center in Cambridge, Massachusetts for a tour of the facilities and presentations and discussion of the proposal. The committee's report is expected in Spring, 2014.

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 that are used to unload accumulated angular momentum – 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 13–16 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. For Cycle 16, approximately 19.2 Msec will be allo-

Continued on page 9

Progress Towards the Astro-H Mission

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

The joint JAXA/NASA Astro-H project, with contributions from ESA and the Canadian Space Agency, has made significant progress toward the completion of the flight instruments and spacecraft development directed at a launch near 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 the final stages of assembly, and initial spacecraft testing is underway.

The micro-vibration issue from some of the cryocoolers on the Soft X-Ray Spectrometer (SXS) x-ray calorimeter instrument has been addressed and is nearing resolution. Following extensive testing to characterize the sensitivity, JAXA developed non-flight isolators to mitigate the problem. These have been verified, rendering heating and excess broadening to the energy resolution virtually undetectable at nominal cooler drive powers. Using the engineering model of the SXS, an energy resolution of 5 eV has been obtained with all of the coolers operating normally. This work was then used to develop requirements for a commercial, flight isolator system, and this procurement is now under way, with test units expected to arrive in late May 2014. Work remains to be done on the flight qualification of these isolators, and ensuring that the isolators engineered for launch can also fully meet the mechanical isolation requirements.

Meanwhile, the flight x-ray calorimeter detector sys-

tem and 3-stage magnetic refrigerator developed at GSFC have been delivered to JAXA and installed in the flight dewar. The completed SXS dewar system is now about to undergo extensive testing. The components of the aperture system, including blocking filters, and electronics boxes, are nearing completion and will be sent to JAXA over the next few months for final integration.

The second of two X-ray mirrors, for the SXS and SXI instruments, was delivered to JAXA in November 2013. The second mirror is now being characterized in detail at ISAS/JAXA for effective area, vignetting, on/off-axis point spread function, stray light, etc. The effective area for the second mirror is about 2% higher than the first mirror, while the angular resolution is also slightly better (~1.2 arcmin half power diameter vs. 1.3 arcmin below 11 keV). The second mirror has therefore been chosen to be used with the SXS, as it will provide 3-4% higher collecting area compared with the first mirror. The system-level effective area of the SXS (including filter transmission, detector quantum efficiency, etc.) is expected to reach about 300 cm² at 6 keV.

The Astro-H U.S. Data Center established at GSFC continues the activities of implementation of the instrument software, collecting the calibration information, and preparing for the pipeline processing. New members joined the group this year, including Tahir Yaqoob and Hiroya Yamaguchi to support software and calibration work related to the x-ray mirrors and the Soft X-ray Imager instrument, respectively.

Dr. Laura Brenneman has joined the US Astro-H team at GSFC to assist in mission and science planning activities.

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. Based on community input, an alternative all-sky observing strategy with a concentration on the Galactic Center region was started in December. The emphasis is on finding more inner-Galaxy pulsars, observing the G2 cloud interaction with the central black hole, and enhancing searches for dark matter signatures. During the late Spring the observing plan will shift back to more uniform sky coverage in order to allow better observations of the periastron passage in the PSR B1259-63 system.

Along with other operating missions, Fermi presented its plans for continued operation to the NASA Senior Review. Results will be announced later this year.

Recent Fermi Highlights:

- The Fermi Large Area Telescope continues to help astronomers discover new millisecond pulsars, including a number of “black widow” binary system. See <http://www.nasa.gov/content/goddard/with-a-deadly-embrace-spider-pulsars-consume-their-mates>
- Flaring activity from a distant AGN allowed Fermi to detect gravitational lensing of its gamma-ray emission. See <http://www.nasa.gov/press/2014/january/nasas-fermi-makes-first-gamma-ray-study-of-a-gravitational-lens>
- Fermi observations are offering additional tentative hints of dark matter detections. See <http://www.nasa.gov/content/goddard/fermi-data-tantalize-with-new-clues-to-dark-matter>
- The second GBM Catalog of Gamma-Ray Bursts is available in HEASARC Browse. See <http://heasarc.gsfc.nasa.gov/W3Browse/fermi/fermigbrst.html>
- The 2014 Fermi Summer School will be held from May 27- June 6. See <http://fermi.gsfc.nasa.gov/science/mtgs/summerschool/2014/>

Fermi Guest Investigator Program

A total of 224 Guest Investigator proposals were received in response to the Cycle-7 solicitation. Proposals will be peer reviewed in late April, with selections to be announced by NASA Headquarters by early June. For the latest news please refer to <http://fermi.gsfc.nasa.gov/ssc/proposals/>.

Fermi E/PO News

Lynn Cominsky discussed Fermi and played the Fermi Race card game with 20 8th grade students at SSU’s Expanding Your Horizons event on April 5, 2014. Fermi Educator Ambassador Teena Della did a series of six Fermi-related workshops and events with families in Cottage Grove, Oregon during March 2014. These included the ever-popular Tasty Active Galaxy activity, as well as a star party and observing strategies to locate Fermi blazars. Lynn Cominsky gave an invited lecture “Blazars and Gamma rays” to amateurs and undergrads at a special session of the Winter AAS meeting on January 8, 2014. On January 18, 2014 Cominsky did the

Tasty Active Galaxy activity with over 90 middle school students who participate in SSU’s Academic Talent Search, a program that supports under-represented students to get them ready for college. Kevin John wrote an interactive activity that illustrate gravitational lensing to accompany the blazar release at the January 2014 AAS meeting (see link above). Kevin McLin did the X-ray and Gamma-ray Exploration Station for Family Day accompanying the American Geophysical Union meeting in San Francisco in December 2013.

Fermi Multiwavelength Opportunities

The Fermi LAT has a weekly blog that describes activities in the gamma-ray sky: <http://fermisky.blogspot.com>

There is also a multiwavelength mailing list with a gamma-ray emphasis available for reading or posting: <https://lists.nasa.gov/mailman/listinfo/gammamw>

The Fermi Gamma-ray Burst Monitor (GBM) is monitoring a sizeable number of other sources that are visible in its 12 – 300 keV energy range, using both Earth occultation and pulsar timing approaches. If you might be interested in joining a collaborative program for one or more of these sources, please contact Colleen Wilson-Hodge, colleen.wilson@nasa.gov.

Suzaku Mission News

Koji Mukai (GSFC / CRESST)

Suzaku went into a safe hold on 2014 January 16 due to low battery voltage. Investigations by the Suzaku team showed that one of the on-board batteries had degraded after about 50,000 charge/discharge cycles. After an intensive effort by the entire operations team, Suzaku resumed observations initially only using the XIS on January 31, while the high voltage of the HXD was turned on on February 16. Because of the ~2 week hiatus in normal observations, several AO-8 priority A & B observations could not be completed by the nominal end of the AO-8 period, March 31. The majority of the remaining AO-8 targets have been observed during April, 2014, although some had to be deferred till the subsequent visibility window in fall 2014.

The national reviews and the international merging of the AO-9 proposals have been completed, and the target list was published on February 26, 2014. US-based PIs of successful AO-9 proposals with guaranteed targets (priority A or B, and non-TOO) can submit an ADAP proposal (deadline: 2014 May 16) to request financial support for their investigations.

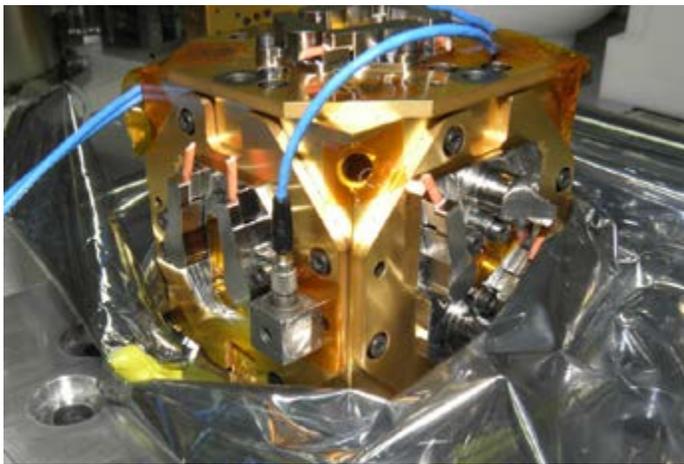
The conference that Suzaku and MAXI jointly sponsored, “Expanding the Frontiers of the X-ray Universe” was a success, with a total of 226 attendees (45 of which were from outside Japan). It is clear that the interest in Suzaku data continues to be strong, and that the community is taking advantage of the unique attributes of Suzaku data to gain interesting new insights in a wide range of topics. The conference organizers are busy editing the contribution for the proceedings, which they hope to publish by the end of 2014.

LISA Pathfinder and eLISA News

Ira Thorpe (NASA/GSFC) and Guido Mueller (U-Florida)

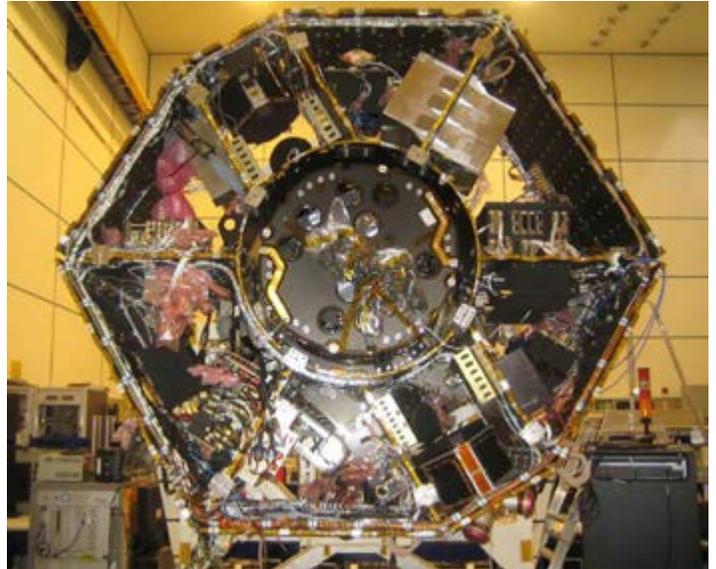
Two important gatherings of the space-based gravitational-wave detector community were held in Zurich, Switzerland this past March. The first was a meeting of the Science Working Team for LISA Pathfinder (LPF), a dedicated technology demonstrator mission for a future LISA-like gravitational wave observatory. LPF is entering an extremely exciting phase with launch less than 15 months away. All flight components for both the European science payload, known as the LISA Technology Package (LTP), and the NASA science payload, known as the Space Technology 7 Disturbance Reduction System (ST7-DRS), have been delivered and are undergoing integration. The final flight component for the spacecraft bus, a cold-gas thruster based on the successful GAIA design, will be delivered later this year. Current focus is on completing integration of the science payload (see Figures below) and preparation for operations and data analysis. After a launch in Summer 2015, LPF will take approximately 90 days to reach its operational orbit around the Earth-Sun Lagrange point (L1), where it will begin science operations. After 90 days of LTP operations followed by 90 days of DRS operations, LPF will have completed its prime mission of paving the way for a space-based observatory of gravitational waves in the milliHertz band.

Immediately following the meeting of the LPF team, the eLISA consortium held its third progress meeting. The consortium (www.elisascience.org) is the organizing body of the European space-based gravitational-wave community, and it was responsible for the “The Gravitational Universe” whitepaper that resulted in the November 2013 election of a gravitational-wave science theme for ESA’s Cosmic Visions L3 opportunity. In preparation for an L3 mission concept call, which is expected later this decade, and for launch in the mid 2030s, the eLISA consortium members are coordinating technology development and mission study activities which



The LPF inertial sensor measures the acceleration of the spacecraft relative to a freely-floating test mass. In LISA, these test masses will be used as reference points to measure distortions in spacetime caused by passing gravitational waves. Image Credit: Airbus Defence and Space

will build on the LPF results. The final mission concept is expected to include some international (non-European) contributions, and NASA has expressed an interest in participating in this ground-breaking mission. The US research community supports such a collaboration, or any other mission scenario that achieves the high-priority science of a space-based gravitational-wave observatory at the earliest possible date.



All flight electronics boxes have been integrated into the LPF sciencecraft and several environmental test have been successfully passed. Following delivery of the integrated payload and the microthruster system later this year, the sciencecraft will be completed and prepared for the launch campaign. Image Credit: Airbus Defence and Space

X-ray Science Interest Group

Jay Bookbinder (CfA) & Mark Bautz (MIT)

The X-ray Science Interest Group (XRSIG) provides metrics and assessments to NASA regarding possible new X-ray missions. Recent XRSIG activities included providing coordinated inputs to NASA HQ on potential areas of US contributions to the ATHENA mission. The XRSIG chair, Jay Bookbinder, attended the ATHENA meeting in Germany; along with official NASA representative (Rob Petre) to maintain the dialog with the ATHENA leadership. The Chair also attended the Savannah APS meeting and presented an outlook on X-ray astrophysics geared towards APS membership.

Upcoming XRSIG activities include a small, informal planning meeting to be held at the Boston AAS (June) as a prelude/planning to the HEAD meeting. There will be a full XRSIG meeting on Sunday, August 17, 2014, immediately before the start of the HEAD meeting in Chicago to review the status of recent technology developments, identify technology gaps, and have an open discussion of strategies for future X-ray missions given the ATHENA selection. In addition, the SIG may be requested to provide HQ with inputs, if requested, in terms of community views of NASA progress in fulfilling the 2010 Decadal objectives as part of the mid-decadal review process. If so requested, the XRSIG will solicit and coordinate these inputs via email and telecons.

XMM-Newton Mission News

Steve Snowden & Lynne Valencic (GSFC)

Successful submissions from the Thirteenth Call for Proposals for XMM-Newton were announced in December 2013, and observations will begin in May. The Fourteenth Call for Proposals will open August 26, and the final date to submit proposals will be October 10.

A new version of the XMM-Newton OM Serendipitous Ultraviolet Source Survey Catalogue (XMM-SUSS2) has been released. It differs from the previous release by including the visible filters as well as the UV filters, and uses stacked images to find fainter sources. Also, the XMM-Newton Slew Survey Source Catalogue has been updated; the update contains data from 390 slew observations and 6500

new sources. These catalogs may be accessed here: <http://xmm.esac.esa.int/xsa>.

The SOC is hosting a symposium June 16-19, 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. More information can be found here: http://xmm.esac.esa.int/external/xmm_science/workshops/2014symposium/

XMM-Newton submitted its proposal to the 2014 Senior Review, of which the Science Section is online at ftp://legacy.gsfc.nasa.gov/xmm/doc/senior_review/xmm_sr_science_2014.pdf

Spektrum Roentgen Gamma Update

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

The Spektrum Roentgen Gamma (SRG) mission will be launched from Baykonour with a Zenit/FregatSB around January 2016. The spacecraft is being integrated at Lavochkin Association in Moscow. A final recommendation from the Review Team for the adoption of a reliable Medium Gain Antenna for the onboard radio-complex has been adopted, which will have a slight impact on the scanning strategy and the final exposure map in the survey scanning mode. **eROSITA**

A major milestone in the preparation of the eROSITA telescope was passed last January. All eight (seven flight-plus one spare-) mirror modules, and the associated X-ray baffles have been assembled. Acceptance tests were performed on all of them in the PANTER test facility in Munich, and all mirrors assembly passed them. The average on-axis spatial resolution (HEW) is 16.2”, and the effective area of the mirrors, after accounting for vignetting and the effect of the baffles meet the original specifications. Also, a first successful test of the camera integrated in the electronic box has been carried out at MPE, revealing excellent performances in terms of background noise, uniformity, stability and spectral resolution (measured to be ~70 eV at ~1 keV and 136 eV at ~6 keV). The overall telescope structure integration proceeds normally. Final delivery to Lavochkin Association in Moscow is scheduled for June 2015. See <http://www.mpe.mpg.de/450698/news> for more info.

ART-XC

Engineering Model:

On March 17, 2014 the first phase of electrical connection tests between the ART-XC EM and spacecraft ser-



Final assembly of ART-XC X-ray detector unit.

vice systems (on-board control system, radio-complex and telemetry system) was completed. The second phase of electrical connection tests is scheduled for May 2014.

Qualification Model: At the present time production of QM subsystems is in progress. We have completed the technological test run of the complete X-ray detector system: 160 hours under normal climatic conditions and 120 hours at high temperature of +50° C. Fine tuning of the detector’s low energy thresholds using bremsstrahlung X-ray tube spectra is ongoing, and the detector’s polarization effects are being studied. After a technological test, we will start qualification tests: mechanical, climatic, thermal-vacuum, EMC and electrical discharge. We have completed qualification tests of the control unit of the calibration X-ray source drives. We have also completed a technological test run of the telescope’s thermal control system: a total of 400 hours, out of which 160 hours under normal conditions, 200 hours at +50° C and 40 hours at -20° C. Six (6) full-size QM mirror systems were assembled, assembly of the seventh QM mirror system is in progress. The telescope’s carbon fiber structure has been sent to outgassing. EGSE production has been completed.

Flight Model: Production of the Flight Model subsystems for the ART-XC is in progress, as shown below.



ART-XC X-Ray detectors system consisting of 7 detectors, 2 electronic boxes and one commutation box.

Swift Mission News

Eleonora Troja (UMCP/GSFC),

Lynn Cominsky (Sonoma State), & Neil Gehrels (GSFC)

The Swift mission continues to operate flawlessly. The mission was presented to the 2014 Senior Review with panel evaluation due by May. The mission continues to support about 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.

Dying supergiant star powers hours-long GRB 130925A

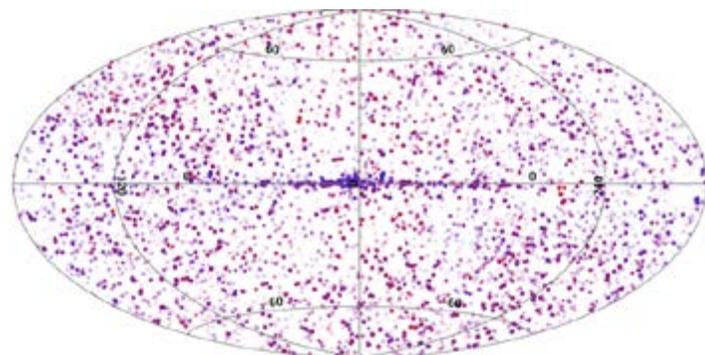
On September 25 2013, Swift triggered and localized a peculiar event, dubbed GRB130925A, characterized by an extremely long duration in the gamma-rays (~2 hours), and dramatic flaring in the X-rays for over 5 hours. By using Swift data, in conjunction with Chandra, XMM-Newton, and Hubble observations, astronomers found evidence of a low-metallicity supergiant star progenitor embedded into a rarefied stellar wind. Located in a nearby galaxy at $z=0.35$, GRB130925A could represent the closest link ever discovered between GRBs and the rare Population III stars.

Swift satellite catches 100,000 new cosmic X-ray sources

The first Swift X-ray Point Source catalogue lists over 150,000 high-energy stars and galaxies, which will be a vital resource for future astronomical studies. Because of Swift's unique capabilities, the Swift X-Ray Telescope has observed a larger fraction of the sky than other X-ray observatories, finding a vast number of extra sources. The catalogue provides positions, X-ray colors, and variability analyses of nearly 100,000 previously unknown sources in order to help in the classification of rare and exotic objects. All of the data, including light curves and spectra are available online: <http://www.swift.ac.uk/1SXPS/>

Swift Guest Investigator Program

The Swift Guest Investigator (GI) program will continue to solicit proposals in GRB and non-GRB research during Cycle 11. NASA's Research Opportunities in Space and Earth Sciences (ROSES) 2014 and the Swift Appendix were released on February 18, 2014. The deadline for submitting Swift Cycle 11 GI Program proposals is September 25 at 4:30PM



New X-ray sources in the Swift X-ray source catalog. Bluer colors show higher energy X-ray sources, redder colors are for lower energy sources.

EST. Cycle 11 will offer for the first time the possibility of joint Swift/NRAO observing programs. Swift observing time can also be requested through the Chandra, XMM-Newton, and INTEGRAL AOs. Please visit the Swift Proposals web site for more details: <http://swift.gsfc.nasa.gov/proposals/>

Swift E/PO News

Lynn Cominsky helped to organize a Swift press conference at the 223rd AAS meeting about Galactic Center surveys, and plans to monitor upcoming G2 event, featuring Nathalie Degenaar. Aurore Simonnet's illustration of GRB 130427A came out on Science magazine's cover for the January 3, 2014 edition: <http://www.sciencemag.org/content/343/6166.cover-expansion>

INTEGRAL Mission News

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

The spacecraft, payload and ground segment are performing nominally. Solar activity affected the operations in January 2014. During this time period one of the Solar flares was due to one of the largest sunspots (AR1944) in years. Routine annealing #22 of the SPI detectors occurred between January 6 and January 24, and was successful with the recovery being slightly better than for the previous annealing. Scientific observations during this period were performed using targets for which the science did not depend on SPI.

The IUG meeting #15 took place on 26 & 27 November 2013 at ESTEC. Among the agenda items were the upcoming fall 2014 ESA mission extension exercise, how to increase the awareness of INTEGRAL in the high-energy community and the public, how to handle the data rights in the AO-12 cycle and beyond, future calibration, and the cross-calibration status. The IUG will meet again on 13 & 14 May 2014 to finalize the science case for the mission extension exercise.

The TAC recommended list of approved data rights proposals and associated data rights targets, in response to the 11th Announcement of Opportunity for data right proposals with INTEGRAL, was approved by ESA D/SRE on 19 November 2013.

The 12th Announcement of Opportunity was released on 24 February 2014 with a deadline of 4 April 2014. Various important changes were implemented for AO-12. ESA will henceforth issue only a single, annual AO for observing proposals with no 2nd call for data rights proposals. Data or science rights for the targets or science in the field of view of the instruments proposed by the PIs in response to AO-12 will be allocated to these PIs with the usual 1-year proprietary period. If the PI is from a country other than the Russian Federation, the rest of the field will be made public. If the PI is from the Russian Federation the rest of the field will be open only to all Russian Federation scientists currently working at Russian Federation scientific institutes. Because of the coded-mask nature of the high-energy instruments, ISOC and ISDC will take measures to ensure that the approved 1-year proprietary na-

Continued on next page

INTEGRAL Mission News (con't)

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

ture is respected. New also for AO-12 is the opportunity for coordinated observations with NASA's Swift satellite, in addition to the already existing program with XMM-Newton.

In response to AO-12, 77 proposals were received (40 normal, asking for data rights on 523 sources, and 37 ToO). The total requested observing time was about 106.5 Msec (for all types of observations; only 10% of the requested total ToO time has been taken into account). Given that up to about 22 Msec of observing time will be available in AO-12, this corresponds to an oversubscription of about 4.8. This is excellent news, since the oversubscription in the previous AO was 2.6. ISOC is now preparing for the TAC meeting on 20-22 May 2014.

During the reporting period, six Gamma-Ray Bursts (GRBs) were detected in the FOV of the high-energy instruments (GRB 131122A, GRB 131218A, GRB 131224A, GRB 140206A, GRB 140320B and GRB 140320C). Scientific observations of the AO-10 cycle in 2013 were performed as planned. Target of Opportunity (ToO) follow-up observations were performed on the Classical Nova V1369 Cen (Nova Cen 2013). A second series of pre-perigee Earth observations took place on 16 & 17 December 2013. These data have also been made publicly available. Preliminary analysis of the IBIS/ISGRI data shows a clear Earth occultation signal. For the first time the Earth has been nicely imaged by the OMC (see Figure).

In the first month of AO-11, a type Ia Supernova (SN), SN2014J, was discovered on 21 January 2014 in M82. At a distance of about 3.5 Mpc, this is the closest type-Ia SN discovered in the past 4 decades. INTEGRAL is the only observatory currently capable of doing high-resolution gamma-ray spectroscopy, which may help to constrain the models of the SN explosion. Therefore, INTEGRAL observed this unique event almost exclusively between the end of January 2014 and the end of April 2014 (see ATel #5835), interspersed with short monitoring observations of regions in the Galactic plane, as well as a Crab calibration observation. A total of 1.2 Msec was planned during the early stage of the SN with a coverage of up to about 4 Msec foreseen for the second stage. During observations performed between 3-19 March 2014, the 847 keV line due to the radio-active decay of ^{56}Co in SN2014J was detected by INTEGRAL (ATel #5992). This is direct evidence of nucleosynthesis in a SN. The optical lightcurve has long been thought to be powered by ^{56}Co decay, but the INTEGRAL detection is the first, direct, evidence of its production.

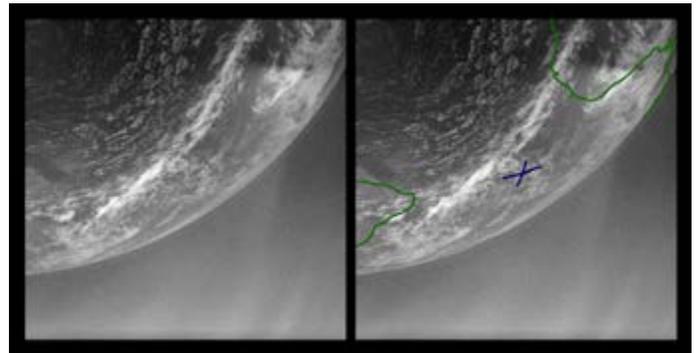
The workshop "INTEGRAL's journey through the high-energy sky" in Rome on 15-18 October 2013 organized by INAF-IAPS exhibited scientific results from INTEGRAL, as well as observations from other high-energy missions and/or observatories in space or on the ground at different wavelengths. The workshop successfully brought together about

60 scientists in order to discuss key science topics and many (new) ideas for future observing strategies with INTEGRAL.

The 10th INTEGRAL workshop "A Synergistic View of the High Energy Sky" will take place from 15 - 19 September 2014 in Annapolis, MD, USA. The latest results in the field of high-energy astrophysics obtained using INTEGRAL will be presented and discussed, which will be placed in the context of other operational space-based missions, such as AGILE, Fermi, NuSTAR, Swift, and Suzaku, as well as ground-based VHE observatories. Correlative studies in lower energy bands, as well as neutrino- and gravitational wave observations are included as relevant for various source classes.

Recent INTEGRAL related scientific highlights include:

- INTEGRAL observations of SS433: system's parameters and nutation of supercritical accretion disc (A.M. Cherepashchuk et al. 2013, MNRAS 436, 2004-2013)
- Kinematics of massive star ejecta in the Milky Way as traced by ^{26}Al (K. Kretschmer et al. 2013, A&A 559, A99)
- The long helical jet of the Lighthouse nebula, IGR J11014-6103 (L. Pavan et al. 2014, A&A 562, A122, 8 pp.)
- IGR J17488-2338: a newly discovered giant radio galaxy (M. Molina et al. 2014, A&A, in press, arXiv:1403.1400)
- Detection of the 847 keV gamma-ray line of radio-active ^{56}Co from the Type Ia Supernova SN2014J in M82 with INTEGRAL (E. Churazov et al. 2014, ATel #5992)



For the first time INTEGRAL imaged the Earth with the Optical Monitor Camera (OMC) instrument on 17 December 2013, just when leaving the Earth disk, between South America and Africa. This was not possible during previous observations because reflections from the highly illuminated daylight side saturated the night side, and the few times these reflections were blocked by the spacecraft the night side was too dark for OMC. This time the full moon illuminating the clouds over the Atlantic, combined with a specific geometry (i.e., no Sun illuminated Earth disk within the OMC field of view, reflections blocked by the spacecraft) conspired to give us this nice, unexpected image. Although the OMC camera was not designed for such observations, even in this image we can distinguish the Earth's atmospheric haze over the disk perimeter. The blue cross at the centre of the image corresponds approximately to an Earth location of 18.5 deg West and 5.5 deg South, i.e., in the South Atlantic Ocean. The coastlines have been plotted in green as reference. Kourou should be somewhere at the left of the image, more or less at the centre on the vertical axis, at the time when GAIA was being prepared for launch. Credits: Albert Domingo Garau (CAB/CSIC-INTA, INTEGRAL/OMC-team).

NuSTAR Mission News

Daniel Stern (JPL) & Fiona Harrison (Caltech)

With a bandpass of 3-79 keV, NuSTAR is the first focusing mission in orbit to work in the hard X-ray band. During the baseline mission, most NuSTAR observations have been planned by the 150-person international NuSTAR science team. In addition, 1.5 Ms of coordinated NuSTAR + XMM-Newton community observations were competitively selected in the Cycle 13 XMM-Newton AO, and 0.5 Ms of coordinated NuSTAR + Chandra observations were made available through the recent Cycle 16 Chandra AO. The first open-access coordinated NuSTAR + XMM-Newton observations have already started. Four NuSTAR public data releases have occurred thus far, with the data released through HEASARC.

NuSTAR has applied for an extended mission through the NASA Astrophysics Senior Review during which the observatory would be opened up to the community through a mixture of NuSTAR Guest Observer (GO) observations, Target of Opportunity (ToO) observations, and a continuation of the large Galactic and extragalactic survey programs. The latter will be planned and executed by the NuSTAR science team based on community input. NuSTAR will have a Special Session at the August 2014 meeting of the High Energy Astrophysics Division (HEAD) of the American Astronomical Society (AAS) in Chicago. By that time, results from the Senior Review will be announced and we anticipate soliciting community input for the large survey programs at the HEAD meeting.

The NuSTAR mission website includes the full list of published papers, links to the as-flown timeline, 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 during the current baseline mission). This website is: <http://www.nustar.caltech.edu>.

Other HEAD News (con't)

Randall Smith (HEAD Secretary)

have interests in high energy astrophysics to join HEAD and attend our meetings at the member rate, receive copies of HEAD bulletins, and vote in elections, but not be required to pay the full AAS membership fee. There will just be a slight additional charge to cover the AAS organizational costs. We plan to have the affiliate program formally available in June. If you have colleagues who might be interested, I urge you to let them know of this opportunity.

If you have other news of import to HEAD members, such as meetings, workshops, funding and observing opportunities, or major awards given to HEAD members, please inform the Secretary at Head.Secretary@aaas.org. We publish the HEAD newsletter twice yearly in May and November, but emailed HEAD bulletins are sent out much more frequently, roughly twice per month.

Chandra X-ray Observatory (con't)

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

cated, compared with 20.0 Msec in Cycle 15, 25.7 Msec in Cycle 13 (the maximum) and an average of 18.3 Msec per cycle for the entire mission. The December 2013 Call for Proposals for Observing Cycle 16 attracted 636 proposals from scientists worldwide, who requested ~5.4 times more observing time than was available. The peer review of proposals will be held during June.

Harvey Tananbaum, Martin C. Weisskopf, Belinda Wilkes, Wallace Tucker, and Peter Edmonds of the CXC have prepared a major review article, "Highlights and Discoveries from the Chandra X-ray Observatory" to appear this year in the journal Reports on Progress in Physics.

The Chandra Press Office has been active in issuing image releases, science press releases and other communications of Chandra research results. 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/>.

As previously announced, on 20 April 2014, Harvey Tananbaum stepped down as director of the CXC and Belinda Wilkes, following her selection and appointment, became the next director.

HEAD Officers

Chair: Nicholas White (2014-15)

Vice Chair: Chris Reynolds (2014-15)

Secretary: Randall Smith (2013-15)

Treasurer: Keith Arnaud (2013-15)

Executive Committee

Past Chair: Joel Bregman (2014-15)

Joshua Bloom, Paolo Coppi (2012-2015)

Daryl Haggard, Henric Krawczynski (2013-2016)

Mark Bautz, Q. Daniel Wang (2014-2017)



HEAD Executive committee members Randall Smith, Daryl Haggard, and Henric Krawczynski at the US Capitol in the midst of a series of meetings with the staffs of Representatives and Senators. With the NASA authorization bill in process, and both plans for new missions and support for old ones on the line, keeping tabs on what is happening on 'The Hill' is always a good idea. While support for science in the abstract is strong, it never hurts to make sure your own Representative and Senators know how much it matters to their constituents.