

# The eROSITA Bulletin



No.2, November 2012

## 1. Project status and milestones

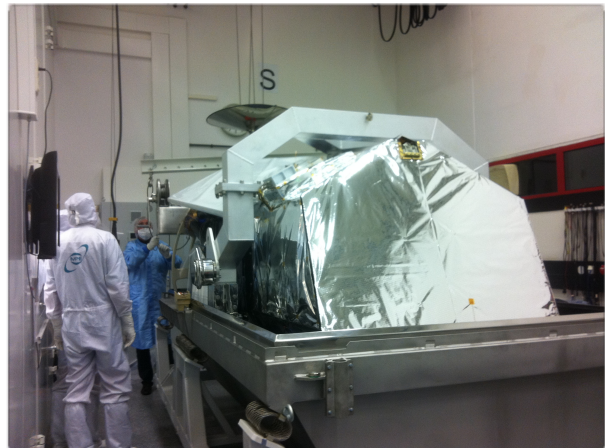
**Qualification tests campaign at IABG:** The eROSITA Telescope structure left MPE on October 25 and arrived safely at the IABG testing facility center in Ottobrunn, south-east of Munich. For the following six weeks the telescope undergoes a series of crucial qualification tests. These include:

- Determination of total mass, center of gravity, moments of inertia (week of October 29);
- Acoustic noise tests (week of November 5);
- Vibration tests (week of November 12);
- Space simulation (i.e. thermal vacuum tests, etc.; starting in December).



*eROSITA at the space testing facility IABG during mass measurement.*

At the time of writing (November 8), the measurements of the telescope mass properties were completed, and eROSITA passed safely the subsequent acoustic noise tests.



*Getting ready to lift eROSITA into its clean container at MPE (left). Eventually, eROSITA is laid into its protective enclosure (right), ready to leave MPE and be shipped to IABG for the tests campaign.*

**Mission timeline:** The latest detailed schedule for the SRG mission was presented by Lavochkin last September, and foresees a launch window in Q3 2014. eROSITA is well on track to meet such a goal. The next official SRG status meeting (including representatives of MPE, IKI, LA, Roskosmos and DLR) will be held on December 10-14 at MPE.

## 2. Hardware development

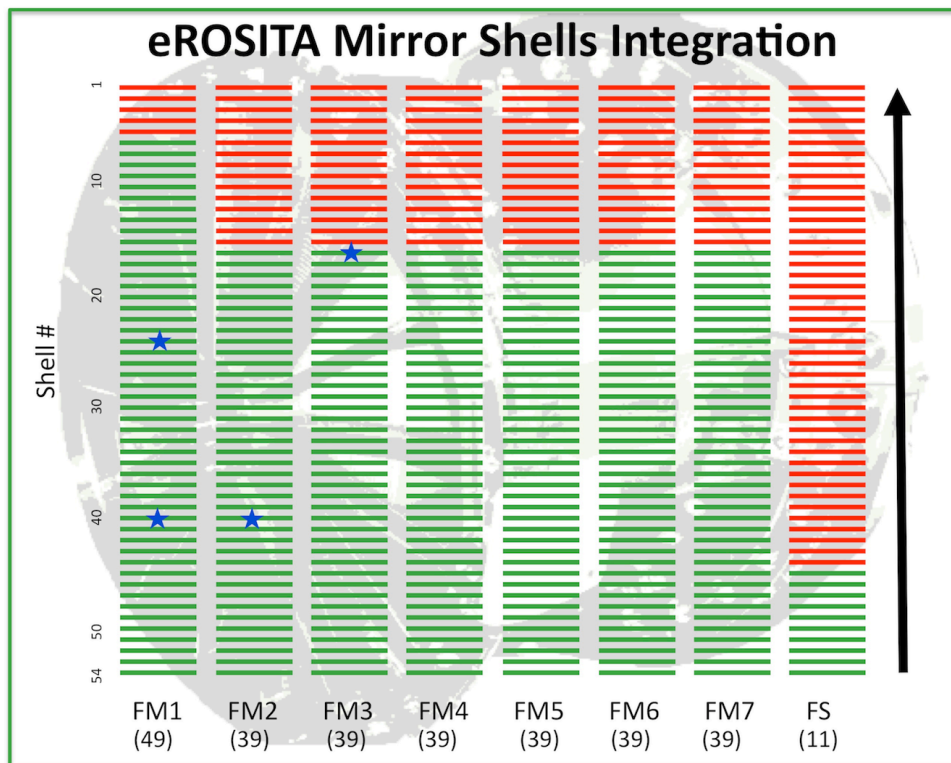
**Mirrors and Mirror Modules tests:** Mirror modules integration proceeds fast at Media-Lario (Italy). At the time of writing, about 68% of all mirror shells have been integrated (see graphics on the next page). In October, tests at PANTER of the the largest mirror shell (shell number 1) have shown performances slightly worse than expected, with HEW of  $\sim 17''$ . Further tests and investigations are underway in order to improve on this figure. Starting from mid-December, the first fully integrated Mirror Module (FM1) will be extensively tested at PANTER, both without and with the X-ray Baffle integrated.

**First FM X-ray Baffle produced:** Each of the seven eROSITA Mirror Modules will be equipped with a X-ray Baffle, to drastically reduce stray light contamination, i.e. single reflections off the hyperboloid part of the mirror shells. The design and performance of the eROSITA X-ray baffle has been studied at MPE by means of ray-tracing simulations (see [wiki.mpe.mpg.de/eRosita/EroBkg/StrayLight](http://wiki.mpe.mpg.de/eRosita/EroBkg/StrayLight)). On October 2012, the first Flight Module X-ray baffle has been finally produced (see picture on the right).



*The first Flight Module X-ray Baffle in the MPE workshop at the end of October 2012.*





*Schematic view of Mirror Modules integration progress, as of November 2012. Green tick marks represent integrated shells, their totals being reported at the bottom. Blue stars mark the tested modules. All tests of partially integrated mirrors so far are within specification (on-axis HEW<15").*

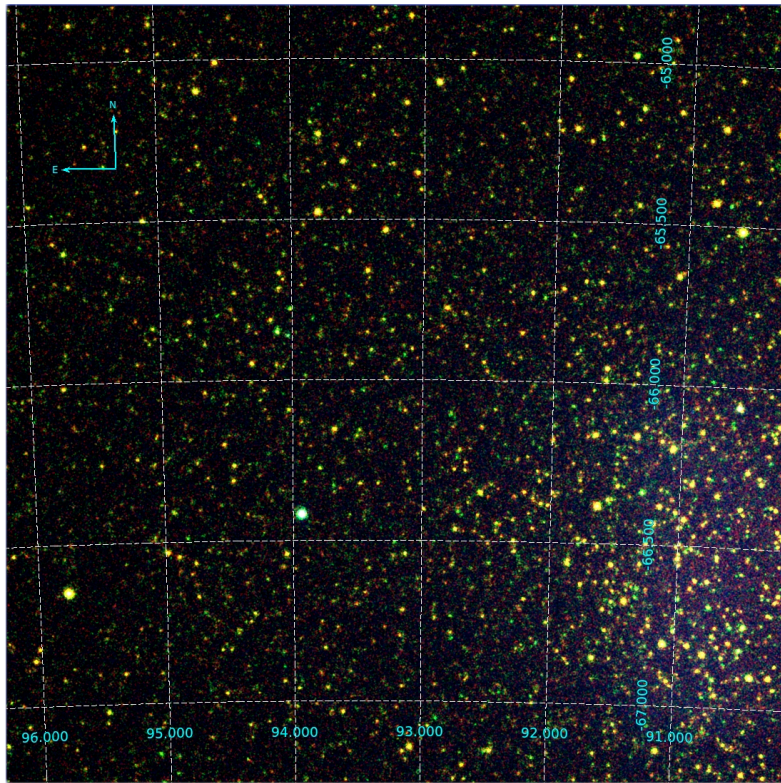
### 3. Science preparation activities

**Polar field simulation:** As a first step towards assessing the optimal shift of the detector with respect to the focal plane for the benefit of the all-sky survey, simulations have been produced of a large field near the south ecliptic pole with modified PSF. The composite false colors X-ray image (red: 0.5-1 keV; green: 1-2 keV; blue: 2-10 keV) of the field as observed after 4 years of eROSITA all-sky survey is shown in the next page. The SEP is in the lower right corner. The simulation contains AGN only, and a realistic background.

**eROSITA in-orbit calibration:** The transfer phase to L2 shall be used for commissioning and initial in-orbit calibration. Possible celestial targets are currently being compiled (available as a HTML table, with links to ROSAT, DSS, Wise, 2MASS surveys), depending on calibration subject and visibility. The list contains also target candidates for a performance verification phase. These targets will be accompanied by measurements with the internal Fe-55 calibration source and closed filter observations. A document describing the whole in-orbit calibration strategy and plan is available in PDF format (see [www.mpe.mpg.de/~mjf/CalPV/](http://www.mpe.mpg.de/~mjf/CalPV/)).

### 4. Multi-wavelength surveys and follow-up preparation

**Multi-band Imaging:** Discussions are underway between the management of the German eROSITA Consortium and the Australian CAASTRO (ARC Centre of Excellence for All-sky Astrophysics) to set up a broad collaboration scheme with a number of wide-area multi-wavelength surveys currently planned and executed in the southern hemisphere. Contacts have also been established with members of the DES and PanSTARRS optical surveys.



*Simulated false-colors X-ray image of the polar field in eRASS:8.*

**4MOST:** Phase A2 study activities are underway in the 4MOST collaboration. Full 5-years survey simulations have been produced and analyzed in detail to identify margins of improvement for the various Design Reference Surveys (which include a systematic follow-up of extended and point-like eROSITA sources). A 4MOST meeting “Science with Large Area Spectroscopic Surveys” to discuss the specific needs for spectroscopic survey facilities in the next decade will be held in Potsdam on November 13-15 (<http://workshop.4most.eu/>).

**AS3/SPIDERS:** The AS3 (After-Sloan 3) program crossed an important threshold on October 16: the Sloan Foundation has awarded \$10M of core funding. This success puts AS3 on a firm footing for building the

collaboration and future fund-raising. In the meantime, preparation of the survey plans is underway. The eBOSS team has defined their baseline targeting and observing plan, and the SPIDERS and TDSS subprograms have begun test observations to refine their targeting strategies this season as BOSS ancillary programs. An eBOSS meeting is planned for December 13 at Carnegie Mellon, Pittsburgh, USA. In the meantime, the data management team has been planning for the SDSS-III/AS3 transition and have begun designing enhancements to the existing data systems. They have submitted two NSF proposals this summer to partly fund the data management effort. Finally, the Apache Point operations team has been evaluating the hardware and software changes necessary for the new observing modes post-2014.

## 5. Recent bibliography

### 5.1 SPIE Technical papers 2012:

- **Predehl:** *eROSITA*. Proc. SPIE 8443, Space Telescopes and Instrumentation 2012: Ultraviolet to Gamma Ray, 84431R
- **Friedrich et al.:** *Development and testing of the eROSITA mirror modules*. Proc. SPIE 8443, Space Telescopes and Instrumentation 2012: Ultraviolet to Gamma Ray, 84431S
- **Dennerl et al.:** *Determination of the eROSITA mirror HEW with subpixel resolution*. Proc. SPIE 8443, Space Telescopes and Instrumentation 2012: Ultraviolet to Gamma Ray, 844350
- **Freyberg, et al.:** *Calibration of the eROSITA calibration source*. Proc. SPIE 8443, Space Telescopes and Instrumentation 2012: Ultraviolet to Gamma Ray, 844351
- **Fürmetz, et al.:** *The thermal control system of the x-ray telescope eROSITA on Spektrum-Roentgen-Gamma*. Proc. SPIE 8443, Space Telescopes and Instrumentation 2012: Ultraviolet to Gamma Ray, 844352



- **Perinati et al.**, *Accelerator experiments with soft protons and hyper-velocity dust particles: application to ongoing projects of future x-ray missions*. Proc. SPIE 8443, Space Telescopes and Instrumentation 2012: Ultraviolet to Gamma Ray, 84430O
- **Perinati et al.**, *Nuclear spallation by solar proton events and cosmic rays in the eROSITA and ATHENA focal plane configurations*. Proc. SPIE 8443, Space Telescopes and Instrumentation 2012: Ultraviolet to Gamma Ray, 84432J
- **Pavlinisky et al.**: *The ART-XC instrument on board the SRG Mission*. Proc. SPIE 8443, Space Telescopes and Instrumentation 2012: Ultraviolet to Gamma Ray, 84431T
- **Freyberg & Dennerl**: *eROSITA in-orbit calibration strategy and plan: from the ground to the science*. Proc. SPIE 8448, Observatory Operations: Strategies, Processes, and Systems IV, 84480Y
- **Boller & Dwelly**: *The 4MOST facility simulator: instrument and science optimisation*. Proc. SPIE 8448, Observatory Operations: Strategies, Processes, and Systems IV, 84480X
- **Meidinger et al.**: *Design and performance of the eROSITA focal plane instrumentation*. Proc. SPIE 8453, High Energy, Optical, and Infrared Detectors for Astronomy V, 84530P

**5.2 Scientific papers** appeared since the last bulletin containing the word “eROSITA” in their abstract in the period July-October 2012 (from ADS):

- **Schwobe**, *CV surveys with eROSITA*. Proc. 'The Golden Age of CVs', Mem.S.A.It., in press; arXiv:1208.1625
- **Merloni et al.**, *eROSITA Science Book: Mapping the Structure of the Energetic Universe*. arXiv:1209.3114
- **Serjeant et al.**, *A new HST/Herschel deep field at the North Ecliptic Pole: preparing the way for JWST, SPICA and Euclid*. White paper submitted to the HST/Herschel Deep Fields working group; arXiv:1209.3790
- **Béky & Kocsis**, *Stellar transits in active galactic nuclei*. ApJ, submitted; arXiv:1210.4159
- **Chon & Boehringer**, *Cluster science from ROSAT to eROSITA*. Proceedings of the XMM-Newton Science Workshop: "Galaxy Clusters as Giant Cosmic Laboratories" at ESAC, Madrid, Spain, 21-23 May 2012. Astronomische Nachrichten, in press; arXiv:1210.5132
- **Khedekar & Majumdar**, *Cosmology with the largest galaxy cluster surveys: Going beyond Fisher matrix forecasts*. JCAP, submitted; arXiv:1210.5586

## 6. Past and upcoming meetings and events

**Second SRG/eROSITA conference held in Kazan, Russia:** On September 3-7 more than 100 scientists from all over the world gathered in Kazan, the capital city of the Republic of Tatarstan, Russia, to discuss ‘Science with eROSITA and ART-XC aboard Spectrum-RG’. Most presentations are available online at <http://hea.iki.rssi.ru/kazan2012/>

**Meetings of General Interest (December 2012 - June 2013; from CADC):**

- **Macquarie University, Sydney, Australia**, December 10-12, 2013: *The TAIPAN Survey: Toward the Next Generation of Spectroscopic All-Sky Surveys*
- **Sao Paulo, Brazil**, December 16-20, 2012: *26th Texas Symposium on Relativistic Astrophysics*
- **Sao Paulo, Brazil**, February 4-7, 2013: *Cosmology, Large Scale Structure and First Objects*
- **Madonna di Campiglio (Trento), Italy**, March 17-22, 2013: *Galaxy cluster masses from the core to the outskirts: the need for a multi-wavelength approach*
- **Snowbird Ski Resort, Utah, USA**, March 17-23, 2013: *SnowPAC 2013 -- Black Hole Fingerprints: Dynamics, Disruptions & Demographics*

- [Snowbird Ski Resort, Utah, USA](#), March 24-29, 2013: *SnowCluster 2013: Physics of Galaxy Clusters*
- [ESA/ESTEC, Noordwijk, The Netherlands](#), April 2-5, 2013: *ESLAB 2013: The Universe as seen by Planck*
- [Monterey, California, USA](#), April 7-11, 2013: *High Energy Astrophysics Division of the AAS Meeting*
- [Cambridge, Massachusetts, USA](#), April 22-24, 2013: *9th Chandra/CIAO Workshop*
- [Kathmandu, Nepal](#), April 29- May 3, 2013: *Black holes, jets and outflows*
- [Varadero, Cuba](#), May 4-10, 2013: *SMFNS2013 - 3rd International Symposium on Strong Electromagnetic Fields and Neutron Stars*
- [Amsterdam, The Netherlands](#), May 6-10, 2013, *Latest results from the neutron-star laboratory: probing gravitational waves, ultra-dense matter, and gargantuan magnetic fields*
- [Villafranca del Castillo, near Madrid, Spain](#), May 22-24, 2013: *The Fast and the Furious: Energetic Phenomena in Isolated Neutron Stars, Pulsar Wind Nebulae and Supernova Remnants (XMM-Newton Science Workshop 2013)*
- [Moscow, Russia](#), June 3-7, 2013: *Putting A Stars into Context: Evolution, Environment, and Related Stars*
- [Garching, Germany](#), June 24-28, 2013: *The Physical Link between Galaxies and their Halos*
- [Hamilton Island, Australia](#), June 24-28, 2013: *Feeding, Feedback, and Fireworks: Celebrating Our Cosmic Landscape*

## IMPRINT

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