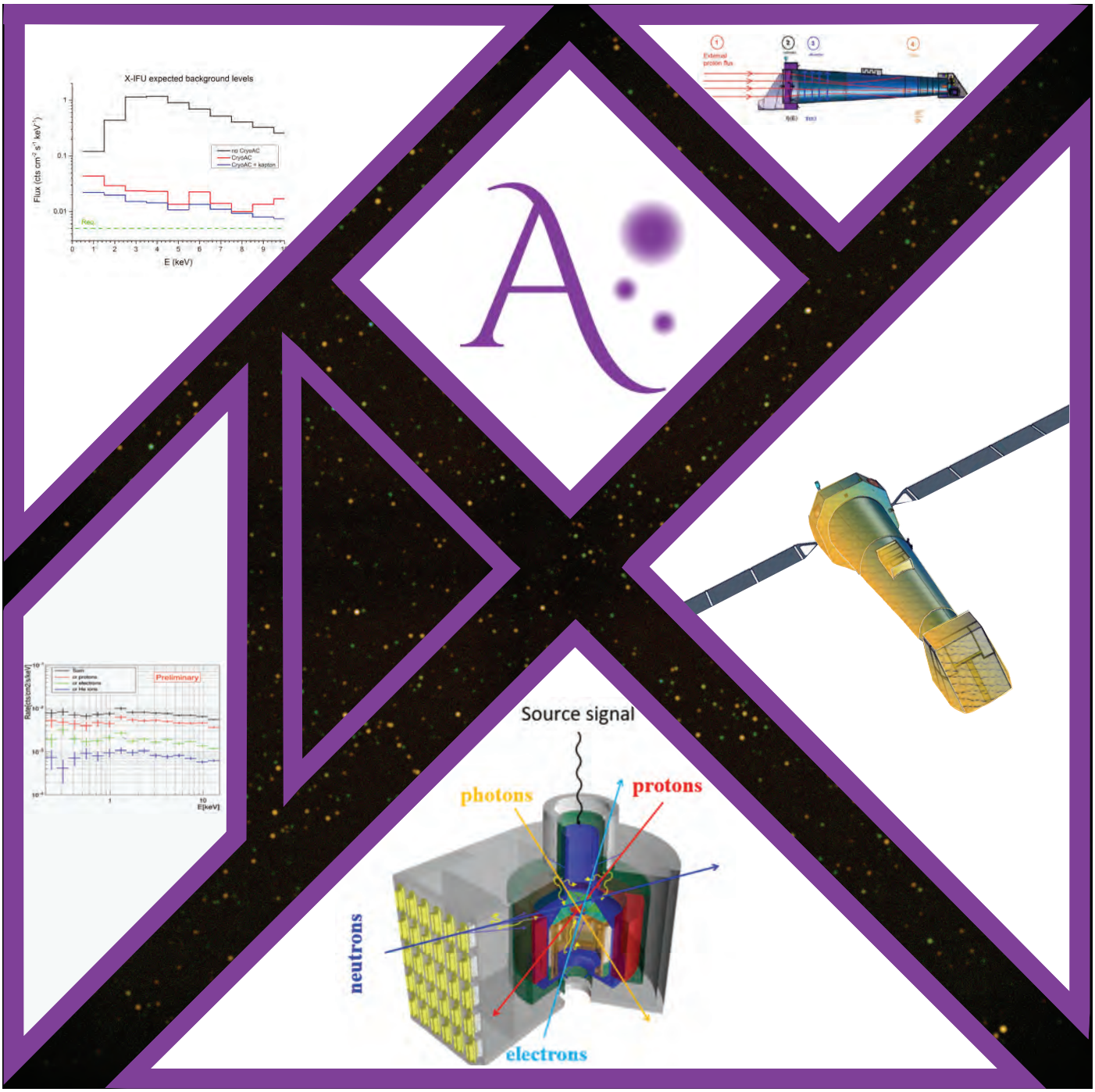

ATHENA COMMUNITY NEWSLETTER #3

June 2017

ATHENA

Contents

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*Front Cover image credits: Background image: WFI/SIXTE simulation of 700ks of a blank field (Credit: G. Lanzuisi). Preliminary spectra of the background in the X-IFU instrument (Credit: S. Lotti and S. Molendi; top left). Schematics of the steps followed by the soft protons through the telescope (Credit: S. Lotti et al., Exp Astron (2017); top right). Preliminary spectra of the background in the WFI instrument (Credit: A. von Kienlin and the WFI team; bottom left). Schematic view of particle background in X-IFU FPA (Credit: SRON; bottom centre). Composition: ACO.

Welcome

K. Nandra (ASST Lead Scientist) on behalf of the Athena Science Study Team (ASST)

Welcome to the third installment of the Athena Community Newsletter.

This issue comes at an exciting but challenging phase for the project. The mission is progressing through an intensive Phase A study, with a detailed examination and consideration of all the technical issues and programmatic constraints. The coming six months should see a consolidation of this process, resulting in a sound mission baseline that can be taken forward through Phase A and beyond. You will find a more detailed report on this in the newsletter, as well as progress reports from the two Athena instruments.

Our last newsletter included the most recent solicitation for new members of the Athena working groups. This has now been completed, and it is a pleasure to be able to welcome 38 new members to our team. The energy and support of our community is one of Athena's greatest strengths.

Another great strength of Athena is as an observatory, working together with other facilities across the wavebands to provide new insights into the Universe. In this respect we are excited to report on the recent publication of the report of the ESO-Athena Synergy Team (EAST), co-ordinated by its infectiously enthusiastic chair Paolo Padovani. As the EAST report shows, the prospect of Europe's great space- and ground-based observatories working together in the late 2020s is truly mouthwatering.

Our scientific and technical nuggets this time concentrate respectively on black hole winds, and the Athena background, the latter also being the subject of a dedicated article on the AREMBES activity.

We are delighted to be able to share with you the profiles of three key Athena scientists, Anne Decourchelle, Luigi Piro and Thomas Reiprich.

Last, but certainly not least, in this issue we bid farewell to Xavier Barcons, who is leaving the Athena team after two decades of service in defining and motivating the next generation European X-ray Observatory. He is already sorely missed, but we wish Xavier all the best in his new role as ESO Director-General.

We hope you enjoy this newsletter and as ever are grateful to the Athena Community Office for their efforts in putting it together.

Athena Team Membership News

F.J. Carrera (ACO Lead, IFCA CSIC-UC)

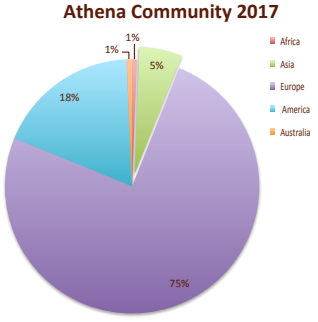
Our colleague Xavier Barcons is soon (beginning of September 2017) to start as Director General of ESO. He is consequently stepping down from his various Athena roles, in which he will be sorely missed. In particular, he will no longer be a member of the ASST or a co-chair of the Science Working Group 2. Francisco J. Carrera will take over as lead of the Athena Community Office (ACO) and the coordination of the SKA-Athena Synergy Exercise.

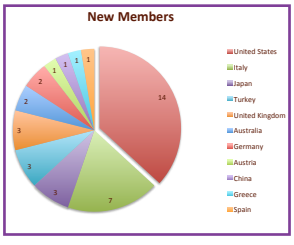
Luigi Piro will lead the Gamma-ray/multi-messenger-Athena Synergy Exercise and Kirpal Nandra will conduct the Synergy Exercise with the Wide-area Optical/IR surveyors, in both cases with ACO support.

In mid-April the annual call for membership of the Athena Science Working Groups resulted in 38 new members from 11 different countries. We have reached 860 members spread all over the world.

We wish our community a very successful and rewarding time in supporting the Athena X-ray observatory, which will enable the exploration of the Universe through revolutionary eyes.

Thanks to all for joining in this exciting adventure.





Athena Phase A Progress

The Athena mission continues to progress through Phase A, with the delta-Mission Consolidation Review (dMCR) having concluded in April 2017.

K. Nandra (MPE) and D. Barret (IRAP), for the Athena Science Study Team

The system-level studies of the spacecraft and conceptual design work for the instruments continue, with particular emphasis on the consolidation of the design of the Science Instrument Module (SIM). The dMCR concluded that the SIM design has progressed very significantly since the preceding MCR. A major item under scrutiny during the dMCR was the estimated system mass relative to the assumed Ariane 64 launch capability. Early Athena mass estimates were close to the launcher limit, and non-compliant when the margin philosophy advocated by the dMCR panel was adopted. This led to a major exercise to identify mass-saving options and to optimize the designs to fit the launcher capability.

One of the key inputs to this effort was the ASST-led 'Science Impact of Mass-Saving Options' (SIMO) exercise, which evaluated the science implications of a range of different mass-saving changes to the Athena design. All of the Athena Science Working Groups participated in this effort, culminating in a meeting of the ASST and Topical Panel chairs at SRON (Utrecht) on February 22-23rd 2017. These results were considered by the ASST at a later meeting with the ESA project team, resulting in a recommendation to maintain the current design as baseline. Due to uncertainties in both the current mass estimates and the eventual launcher capabilities, however, the ASST also made a recommendation that if a mass issue persists at a later stage, e,g. at the time of the Ariane 6 Critical Design Review, a decision to remove the outermost (20th) mirror row can be taken. This measure was considered by ESA to be sufficient to consider the mass-risk issue identified at the dMCR to be fully mitigated.

The other substantial issue identified at the dMCR was the estimates of the mission cost to ESA. This exceeds the cap of €1.05bn specified by the ESA Science Program committee (SPC) at the time Athena was selected. A major design-to-cost exercise has therefore been initiated along with parallel efforts to identify cost-mitigation options and efficiency savings. The philosophy behind this is to define a mission with the best possible science performance while meeting the imposed programmatic constraints. The science community will be fully involved in this via an activity entitled CORE (the Athena Cost-driven Observation Reprogramming Exercise), which is currently being defined within the science working groups. The process is expected to result in a stable baseline for the Athena mission to be carried through Phase A and beyond. This should be completed by approximately the end of September.

More information from ESA about the Athena mission and timeline is available at the ESA* website.

* http://sci.esa.int/cosmic-vision/54517-athena/

Athena's Science Study Team and Topical Panel chairs meet at SRON, February 2017.

News from the Instruments

News from the WFI

A. Rau (WFI Project Scientist) and K. Nandra (WFI Principal Investigator)

In the current project phase, work within the WFI proto-consortium focuses on the development of the instrument's conceptual design and on technology developments. To review the status of all activities, in January 2017 more than 70 representatives of the partner institutes and nations met in Palermo, Italy, for the 5th WFI proto-consortium meeting. During two days of lively discussion, excellent progress for all relevant instrument subsystems was demonstrated.

In the context of ESA's design-to-mass request for the instruments and the overall simplification of the science instrument module a tradeoff of accommodation options is being performed by the WFI team. This includes work on a redesign of the instrument with focus on the filter wheel and primary structure as well as an optimization of the radiator design. A revised instrument design will be delivered to ESA within the coming weeks.

WFI proto-consortium meeting at Palermo, Italy, January 2017.

Following the completion of the fabrication of the first WFI-specific prototype DEFPET sensors at the Semiconductor Laboratory of the Max Planck Society, a wide range of devices are being tested at MPE. A variety of 64x64 pixel devices have been fabricated and will be used to inform the choice of optimum transistor design and other technology options for the production of the pre-flight devices, which is planned to start in the second half of 2017. The first results indicate very good performance in terms of spectral resolution and readout speed. Initial tests of larger devices (e.g. 256x256 DEPFETs) have also started.

The conceptual design of the Detector Electronics is ongoing, including the selection of the key components for the analog-to-digital conversion and FPGA-based frame processing. The main criterion for the selection is the overall performance, e.g., energy resolution, noise, and processing speed, with the verification of the real-time processing requirements expected by the end of 2017.

Further information is available at WFI* website.

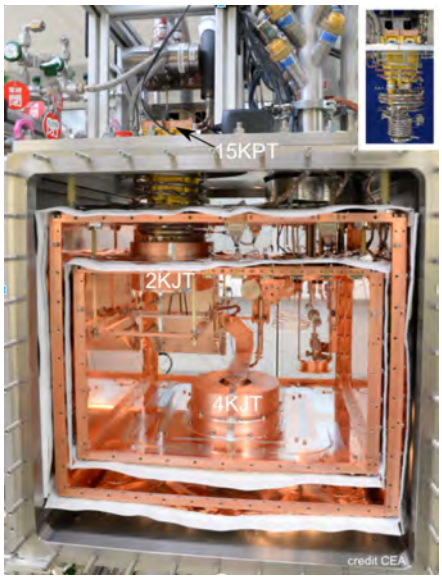
* http://www.mpe.mpg.de/ATHENA-WFI/

News from X-IFU

D. Barret IRAP, X-IFU Principal Investigator and T. Lam Trong, CNES, X-IFU Project Manager

The X-IFU team supported the delta-Mission Consolidation Review (MCR), concluded early January. The review panel concluded that the overall technical definition of the X-IFU and the Science Instrument Module (SIM) was commensurate with the state expected in mid Phase A, and that the X-IFU (and SIM) designs have progressed very significantly since the preceding MCR. The activities of the X-IFU team keep focusing on bringing the overall mass of the instrument to its current allocation (773 kg with margin). Much effort is also being spent on consolidating the thermal budget margin philosophy as applied to the cryogenic chain, in close collaboration with ESA. Several optimizations of the Dewar assembly (use of thermal disconnects, thermal switches…) and more generally of the instrument (EMC shielding, redundancy philosophy…) are being considered to improve its overall performance. Writing of the technical specifications of the main sub-systems of the X-IFU as well as defining their interfaces is also progressing, as part of the X-IFU instrument team activities (focal plane assembly, aperture cylinder, door…). The system team continues to consolidate the system requirements and the performance budgets of the X-IFU (e.g. spectral resolution), with the support of the X-IFU Science Advisory Team and from the end-to-end simulation team, on topics like the bright source capabilities. In parallel, the X-IFU team is actively investigating all the possibilities to optimize the SIM related activities, in particular the downstream X-IFU integration, validation and test activities on the SIM itself. More generally, the X-IFU will also support the on-going cost saving exercise, with the ultimate objective of maximizing the science capabilities of Athena.

The activities related to the development of a demonstrator of a sub-mK cooling chain are also ramping up. The JAXA 2K Joule Thomson cooler is being coupled right now with the 15 Pulse Tube developed by Air Liquide Advanced Technology. The activity is carried out jointly by a team of JAXA and CEA-SBT engineers. First tests performed with He4, followed by tests with He3 will continue throughout the summer, before the final integration with the last stage ADR. Large format Transition Edge Sensors array developed by Goddard Space Flight Center are being shipped to SRON for the demonstration of the Frequency Domain Multiplexing. Several critical technologies are also developed and tested, e.g. components of the cold and warm electronics and the large size thermal/optical blocking filter.



The assembly of the 4K, 2K JAXA Joule-Thomson coolers and the ALAT 15 K Pulse Tube in a laboratory cryostat at CEA-SBT (Grenoble). Courtesy of Thomas Prouvé (CEA/SBT). Credit: CEA/JAXA.

The fifth X-IFU consortium meeting took place at IRAP Toulouse in March and was the opportunity to say goodbye, thanks and wish the best of luck to Xavier Barcons IFCA (CSIC-UC Santander), called to take over the ESO Director General position later this year. Xavier Barcons, whose contribution to the building of the X-IFU consortium has been outstanding, is replaced by Massimo Cappi (IASF Bologna), as Chair of the X-IFU Science Advisory Team, and as a member of the X-IFU Consortium Management Team. The 6th consortium meeting will be held in Madrid in September, hosted by CSIC. Miguel Mas-Hesse (Centro de Astrobiología, CSIC/INTA) leads the organization.

Further information is available at X-IFU* website.

5th X-IFU consortium meeting at IRAP Toulouse, March 2017.

* http://x-ifu.irap.omp.eu/

AREMBES and the Athena background

C. Macculi, L. Piro (IAPS/INAF, Rome)

Particles depositing energy in the energy bands of the Athena detectors produce a background that decreases the instrument sensitivity. To assess and then identify measures to reduce this component it is necessary:

1. To know the particle environment in the satellite orbit: GCR (Galactic cosmic Rays), and "Soft Protons" (SP) up to 100's keV

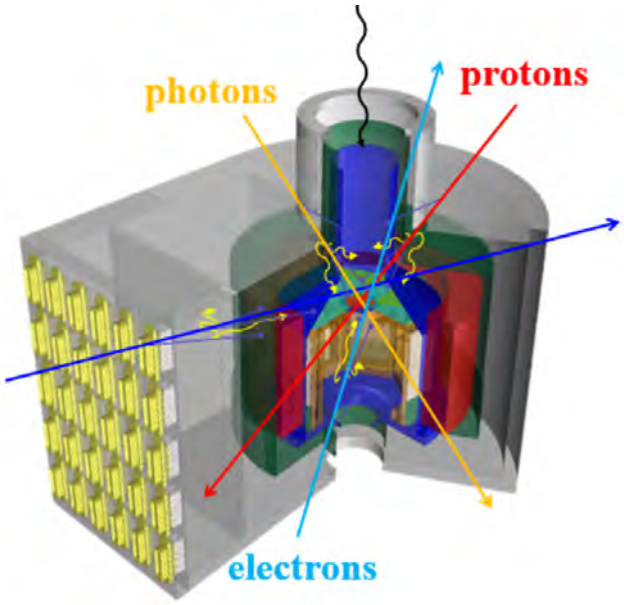
2. To propagate the high energy primaries and the secondary particles resulting from interactions with the spacecraft and detector structures towards the sensors, and to evaluate how SP are collimated by the optics towards the detectors. Both are tasks that can be performed using the Geant4 toolkit.

No X-ray mission has ever flown in an L2 orbit,thus, it is crucial to assess the particle environment in this region. Furthermore, most of the physical processes and the associated models employed in Geant4 and that are relevant to the production of the background in the energy bandwidth of the Athena instruments require a more in depth validation. To cope with these demands, it is ne-cessary to gather expertize from plasma physicists and Geant4 developers.

The AREMBES (Athena Radiation Environment Models and X-ray Background Effects Simulators) project, as part of the ESA science CTP, caters for all the necessary expertise to tackle the above issues, is also tasked to provide a user-friendly simulator based on Geant4. The 30-month project has three phases: 1. Evaluation of the L2 particle environment and lessons learned from previous X-ray missions; improvement and validation of the main physics processes useful for Athena to model optics collimation; 2. Development of the user-friendly Geant4 simulator; 3. Maintenance and upgrades of the s/w. The project is lead by INAF and involves 10 partners both research institutions and individual subject matter experts: IRAP (FR), NOA (G), SWHARD (I), RadMod Research (UK), INTA (E), CEA (FR), SRON (NL), MPE (G), Kallisto Consultancy (UK). The main conclusions of the 1st phase are:

- L2 Environment:
  - » Investigated Soft Protons, Ions, High energy Protons/SEP, by ACE, WIND, Geotail, Herschel/Planck and XMM data. Strong anisotropy observed in L2; detailed information only on some solar cycle phases; no data coverage on solar maximum; in general, sparse coverage and few data in L2. The XMM/EPIC analysis revealed that the background low intensity component is not produced by SP. Study is underway for Athena aims.
- Geant4 physics:
  - » Identified and validated the main processes for Athena as electron backscattering, fluorescences, proton scattering; created a reference "Space Physics list" for the Athena instruments, and a link with the ESA Study Team to provide info on the magnetic diverter design.
  - » In addition to the above tasks, following a request by the Athena science team ESA and the AREMBES team have agreed to include an assessment of the L1 (vs L2) environment in study, and results are expected by end this year.

Stay tuned!



Particle background in a detector. The source photons focused by the optics hit the detector, as the particles (primaries and secondaries) produced by the interaction of the CGR with the satellite. The picture shows the X-IFU FPA (Credit: SRON), but processes are the same for the WFI.

The ESO-Athena Synergy Exercise ends with the publication of the ESO-Athena Synergy White Paper

Paolo Padovani (ESO)

ESA has established the Athena Science Study Team (ASST) to provide guidance on all scientific aspects during the Assessment Phase for the Athena mission. One of the ASST's tasks is to identify and elaborate synergies with various astronomical facilities, which will be available in the late 2020s.

The ESO-Athena Synergy Team (EAST) was tasked by the ASST and ESO to single out the potential scientific synergies between Athena and optical/near-infrared (NIR) and sub/mm ground based facilities, in particular those of ESO (i.e., the Very Large Telescope [VLT] and the Extremely Large Telescope [ELT], the Atacama Large Millimeter/submillimeter Array [ALMA] and the Atacama Pathfinder Experiment [APEX]). The EAST included: Paolo Padovani (ESO; chair), Françoise Combes (Observatoire de Paris, France), Maria Díaz Trigo (ESO), Stefano Ettori (INAF-OABO, Italy), Evanthia Hatziminaoglou (ESO), Peter Jonker (SRON, The Netherlands), Mara Salvato (MPE, Germany), and Serena Viti (UCL, UK).

ESO-Athena Synergy White Paper image

The EAST's main task was to produce a White Paper to identify and develop the: 1. needs to access ESO ground-based facilities to achieve the formulated Athena science objectives; 2. needs to access Athena to achieve the formulated science objectives of ESO facilities contemporary to Athena; 3. science areas where the synergistic use of Athena and ESO facilities in the late 2020s will result in scientific added value.

Community input to the process happened primarily via a dedicated ESO-ELT Athena Synergy Workshop (by EAST invitation only) that took place on Sept. 14 – 16, 2016 at ESO, Garching (more information at the workshop website*).

The White Paper presents the results of the EAST's work, sorted by synergy area, and deals with the following topics:

- The Hot Universe: Early groups and clusters and their evolution, Physics of the Intra-cluster medium, Missing baryons in cosmic filaments;
- The Energetic Universe: Supermassive black hole (SMBH) history, SMBH accretion disks, Active Galactic Nuclei feedback – Molecular outflows, Ultra-fast outflows, Accretion Physics, Transient Science;
- Observatory Science: Star Formation, Stars.

The White Paper then discusses the view from ESO's side by providing details on VLT/MOONS, the ELT instruments, in particular the MOS, VISTA/4MOST, the ESO and ALMA archives, future ALMA and ESO developments, and finally the (likely) ESO – Athena astronomical scene in the 2020s.

The main conclusion is that the ESO facilities, which are most needed to exploit the synergies with Athena include, in approximate ranking order, Integral Field Units (i.e., VLT/MUSE and ELT/HARMONI), ALMA, multi-object spectrographs (i.e., VISTA/4MOST, VLT/MOONS, and ELT/MOS), NIR imagers (mostly ELT/MICADO), and high-resolution spectrographs (i.e., VLT/UVES and ELT/HIRES). Moreover, the ESO archives will be filled with observations relevant to the interpretation of Athena data well before its launch.

The EAST White Paper is available at arXiv** website.

* https://indico.ifca.es/indico/event/247/
** https://arxiv.org/abs/1705.06064

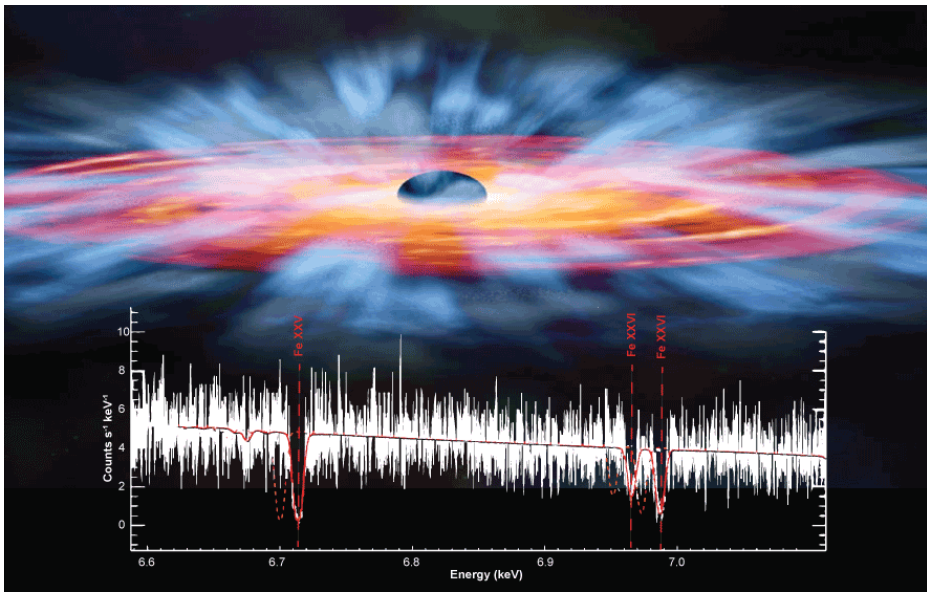
How are winds generated around stellar-mass black holes and neutron stars?

María Díaz-Trigo (ESO)

The brightest X-ray sources in our galaxy are X-ray binaries. In these systems, a normal star and a collapsed star, such as a stellar-mass black hole or a neutron star, orbit around each other. Their extreme luminosity in X-rays is generated by matter falling from the normal star (the so-called "donor") into the compact black hole or neutron star (also called "accretor"). The extreme density of the black hole or neutron star generates a powerful gravitational field that rips gas from the donor, which spirals around the compact object before being sucked down by the black hole or crushed onto the surface of the neutron star, a process known as "accretion".

It has been long suspected that at least a fraction of the mass that is being channelled towards the black hole or neutron star could be expelled in the form of winds before it reaches the compact object. In recent years, X-ray observations with high resolution spectrometers have revealed the existence of such winds mainly via the detection of highly-ionised absorption lines with significant blue-shifts. The amount of matter expelled, and the conditions required to launch such winds crucially depends on their power source, which may be magnetic fields, thermal pressure or radiative pressure. The power source also determines the amount of energy that is deposited in the environment of the X-ray binary.

The Athena satellite will characterize these winds using the high spectroscopic resolution and throughput provided by the X-IFU instrument. The precise measurement of outflow velocities, column densities and ionization states of the winds will allow researchers to disentangle different wind components and to compare the measured wind parameters with those expected from theoretical models to understand the mechanism that powers them, a breakthrough in the study of accretion disk winds. Observations at infrared and millimetre wavelengths with the ESO E-ELT and ALMA telescopes will provide complementary information. Coordinated X-ray and infrared observations will allow to establish a link, if existent, between winds observed at different temperatures, as is the case for X-ray and molecular winds from supermassive black holes. In addition, coordinated X-ray and millimetre observations will allow to study the interplay between the X-ray wind and the relativistic jet, which is bright at millimetre wavelengths.



Artist's impression of an equatorial accretion disc wind as observed in X-ray binaries. X-IFU on-board Athena will allow the detection of weak lines and an unprecedented precision in the measurement of the width, position and depth of all the detected lines (see inset). This information will be used to disentangle the different components of the winds and to infer their characteristics to ultimately determine what powers them. Credit: image (Chandra/NASA). Inset: Fig. 2, Motch et al 2013.

Athena instrument background

Simone Lotti (INAF/IAPS, Rome), Silvano Molendi (INAF/IASF, Milan)

Observations of faint X-ray sources are traditionally limited by instrumental background. The largest contributions to the background arise from Cosmic Rays (CRs) that possess enough energy to penetrate the spacecraft and reach the instruments from any direction and from Soft Protons (SPs) concentrated by the optics. Here we focus on the CR-induced component (see the AREMBES section for a discussion on SPs). CRs create showers of secondaries, such as electrons and protons, along their path, which in turn induce further background on the detectors.

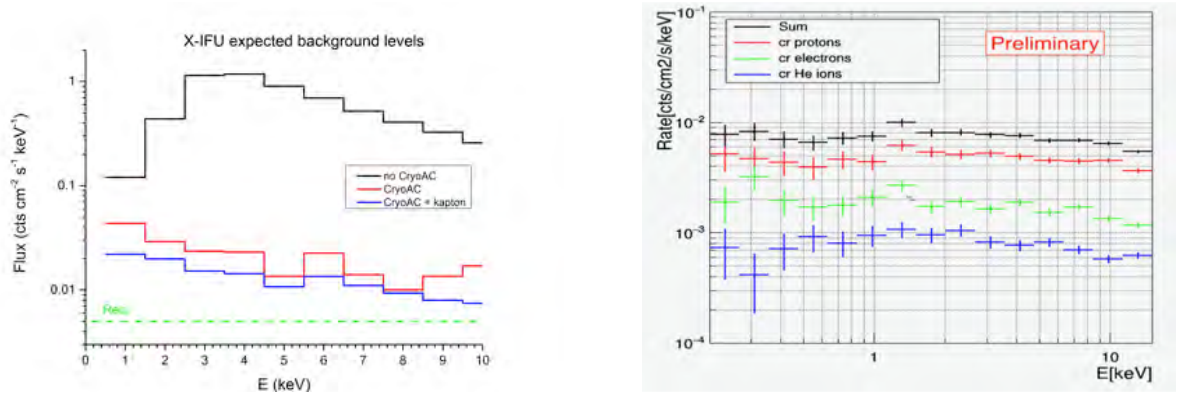
The standard approach is to exploit Monte Carlo simulations to predict and analyze the background components. This requires the construction of a representative mass model of the instruments and an adequate understanding of the radiative environment. In turn, these simulations allow to characterize not only the background level, but also its spectrum, origin and composition. All this information can be used to plan for solutions aimed to reduce specific background components, and/or suppress the generation of secondaries from specific elements of the mass model.

In the case of the X-IFU Geant4 simulations indicated that the CR-induced background on the instrument without any precaution would be >100 times above the level set by the scientific requirement and it was induced mostly by MIP (Minimum Ionizing Particles). To reduce this component, X-IFU instrument will include a cryogenic anticoincidence detector (CryoAC) capable of intercepting ~ 98% of the MIP.

Once MIPs are removed the residual background is still a factor >3 above the requirement. This time the culprits are low energy secondaries that deposit all of their energy inside the detector or scatter on its surface, not reaching the CryoAC. To reduce their flux a low-Z passive shielding (kapton) has been inserted in the FPA, reducing a background closer to the requirement. Possibilities under study to further reduce the background involve optimization of the passive shielding and possibly the use of a lateral CryoAC surrounding the detector on its sides, although their feasibility is yet to be studied by the instrument team.

The WFI background is mitigated in different ways. Due to the thickness of the detector, MIPS deposit a large amount of energy and can be discarded during event processing. Secondary particles (i.e. electrons or fluorescence photons) will also contribute strongly. Secondary electrons can be reduced through optimization of the detector coating, while to reduce the impact of fluorescence photons a graded-Z shield, i.e. a multi-layer coating with decreasing atomic number from outside inwards, will be implemented.

Further reductions in background can be achieved by a form of self-anticoincidence where the data from an entire quadrant of the WFI Large Detector Array hit by a particle can be rejected. These and other issues are being addressed within the WFI team to ensure compliance with the background requirements.



Preliminary spectra of the background in the Athena Instruments. Left - X-IFU background for different configurations of the FPA. Right - WFI background showing contributions from different particle populations (plot courtesy of A. von Kienlin and the WFI team). Optimizations are ongoing for both instruments.

Athena Community People

Anne Decourchelle

I am an astrophysicist working at CEA Saclay. I am currently head of the Astrophysics department and the AIM research laboratory.

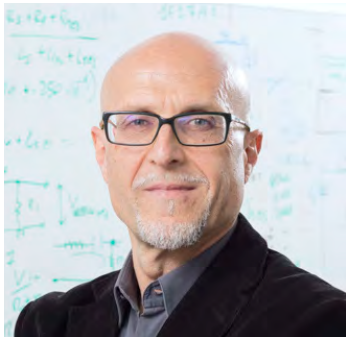
My research activity is based both on observations, more specifically X-rays, and modelling of supernova remnants, including 3D numerical simulations.

I am particularly interested in the young supernova remnant phase, from the explosion of the star to its evolution. X-ray observations of these objects are crucial to diagnose and characterise the nucleosynthesis products in the hot ejected supernova material, the dynamics and evolution of the remnant and the acceleration of particle at their strong shocks.

I am a member of the ASST, co-chair of the Athena Science Working Group on Observatory science, and a member of the X-IFU science team.

Thanks to its breakthrough capability, Athena will provide us new eyes to observe the Universe.

anne.decourchelle@cea.fr



Luigi Piro

I am director of research at IAPS, INAF in Rome, member of the ASST, and a XIFU Co-PI.

After my graduation at University of Rome, I moved to IASF, Bologna as research staff, working on EXOSAT data of AGNs and the development of BeppoSAX instrumentation. I then moved to Japan as visiting scientist in RIKEN, co-leading the discovery paper on the disk reflection features in AGN with GINGA. Back in Rome, as ASI project scientist of BeppoSAX I directed the scientific activities of the mission, in particular those on GRBs, for which I was awarded the Rossi and the Descartes Prize.

I currently lead the development of TES for X-ray Astrophysics and the Athena Consortium in Italy and I am the coordinator of the AHEAD H2020 EU infrastructure project for High Energy Astrophysics. My present main science topics are Gamma-Ray Burst as probes of the high redshift Universe and its large scale structures.

luigi.piro@iaps.inaf.it

Thomas Reiprich

I have been a professor for astrophysics at the Argelander Institute for Astronomy, Bonn University since 2010. I currently serve as the institute's deputy director. I really enjoy teaching and recently received a teaching award from the faculty. I am a member of the Astrophysics Working Group of the European Space Agency.

I am particularly interested in the astrophysics of galaxy groups and clusters as well as in cosmology. I am co-chair of the Cluster and Cosmology Working Group of the eROSITA_DE consortium and look forward to the launch of the SRG/eROSITA mission in 2018; eROSITA's X-ray survey will help us understand how the large scale structure in the Universe is being shaped by the nature of dark energy.

Within the Athena community, I co-chair the Hot Universe Working Group and I am a member of the WFI Science Team. I am fascinated by the prospect of Athena discovering and characterizing the very first galaxy groups in the Universe.

On a personal note, I enjoy ballroom dancing and recently started playing electric guitar.

reiprich@astro.uni-bonn.de

AHEAD Announcement of Opportunity Cycle 4

The AHEAD (Integrated Activities for High Energy Astrophysics) 4th AO is open, with a deadline on June 30, 2017. This program offers access free-of-cost to some of the best European test and calibration facilities, training/mentoring on X-ray data analysis and visits of scientists/ engineers.

For further information visit the AHEAD website.

Conferences

Athena in Conferences (mid-July - December 2017)

- Whereabouts and Physics of the Roaming Baryons in the Universe. Sexten (Italy), 10th-17th July 2017.
- SPIE Optics + Photonics 20. San Diego (USA), 6th-10th August 2017.
- 16th HEAD Divisional Meeting. Sun Valley (USA), 20th-24th August 2017.
- The power of X-ray spectroscopy. Warsaw (Poland), 6th-8th September 2017.

Coming conferences of interest

- From Black Hole to Environment: galaxy evolution across multiple wavelengths. Canberra (Australia). 20th-24th August 2017.
- From Chandra to Lynx: Taking the Sharpest X-ray Vision Fainter and Farther. Cambridge (US). 8th-10th August 2017.
- Annual Meeting of the Astronomische Gesellschaft 2017: The many Scales of the Universe: Galaxies, their Suns, and their Planets. Göttingen (Germany).18th-22nd September 2017.
- SDW 2017. Baltimore (US). 24th-29th September, 2017.
- 15 years INTEGRAL Symposium: Energetic Time Domain Astrophysics. Venice (Italy). 15th-20th October 2017.
- 7th International Fermi Symposium. Garmisch-Partenkirchen (Germany). 15th-20th October 2017.
- 51st ESLAB Symposium, 'Extreme Habitable Worlds'. European Space Research and Technology Centre (ESTEC), The Netherlands. 4th-8th December 2017.
- Deciphering the Violent Universe. Playa del Carmen (Mexico). 11th-15th December 2017.