

# **XMM-Newton Science Support, Working together in support of the scientific community**

Maria Santos-Lleo

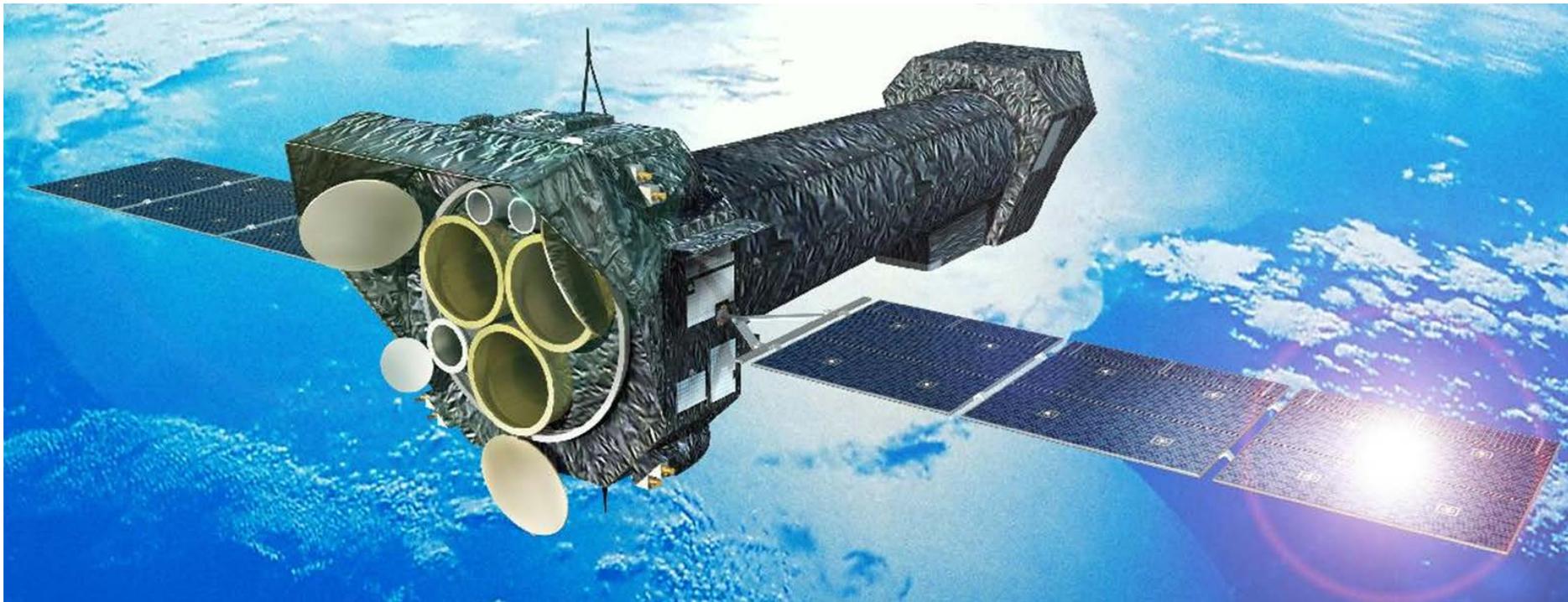
With acknowledgement to the whole XMM-Newton  
Science Operations Centre at ESAC

- Introduction to XMM-Newton
- A personal view of the evolution and achievements of the Scientific Support since launch in Dec 1999

# XMM-Newton: An X-ray OBSERVATORY



**Unveiling the hot and extreme conditions at the Universe**

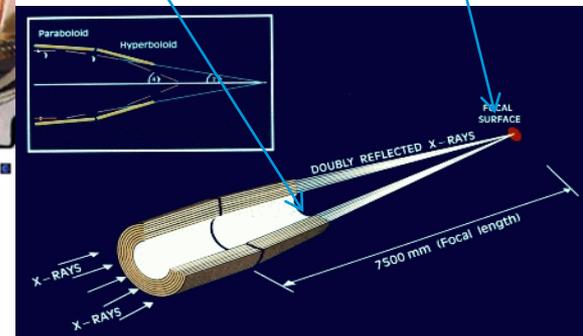
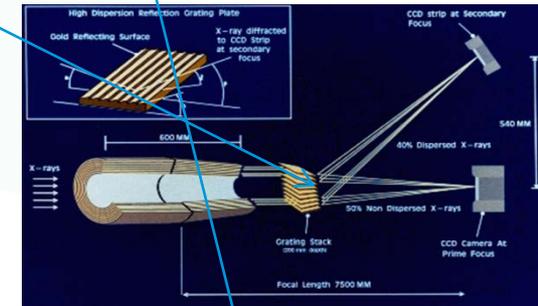
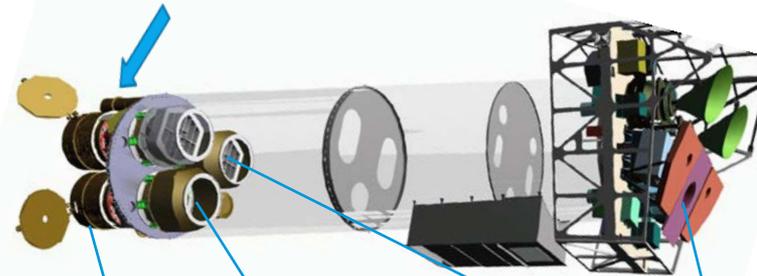


# The Observatory: telescopes and instruments in space

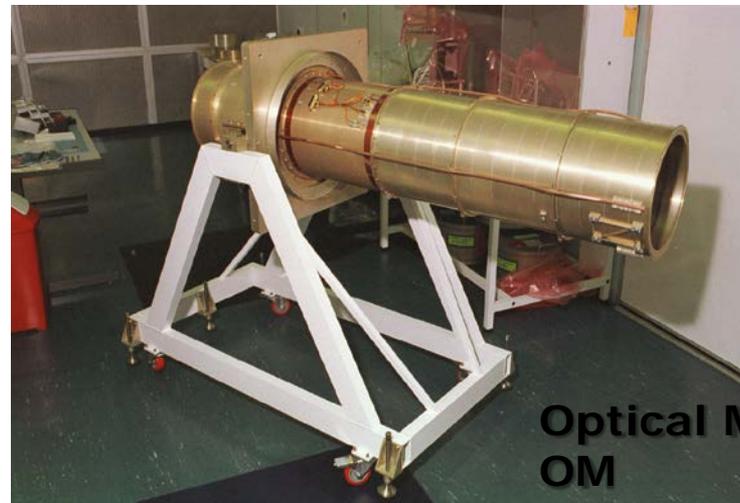
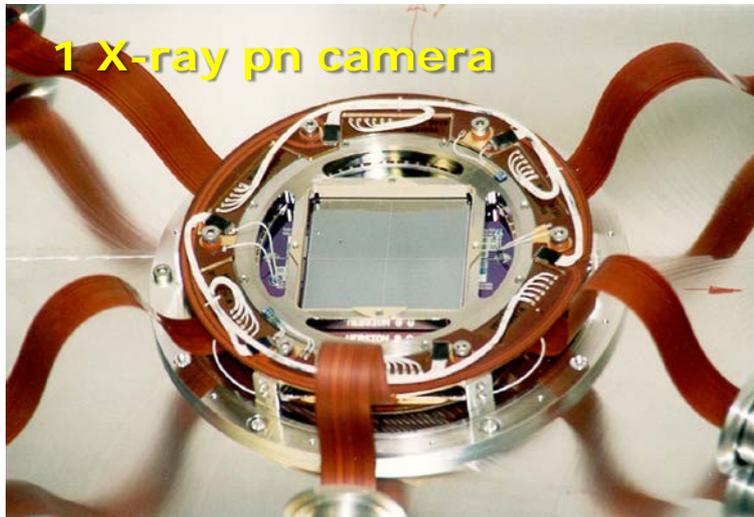


Spacecraft (the dome) & Payload (telescopes and instruments)

- Launched: Dec 1999
- Orbit: 48 h period



# The instruments





## Observatory-type mission: support astronomers from proposal preparation to scientific publication

- Run the annual call for proposals, provide relation with scientific community
- Provide scientific planning: long & short term plan, ToO
- Monitor Instruments
- Deliver instrument calibration
- Deliver tools for data analysis
- Deliver raw and processed data
- Provide a scientific archive
- Provide generic community support: documents, web, helpdesk, workshops

Observatory-type mission: support astronomers from proposal preparation to scientific publication

➤ **Working together:**

- Run the annual call for proposals, provide relation: **with scientific community & Time Allocation panels**
- Provide scientific planning: long & short term plan, ToO
- Monitor Instruments: **with Instrument PI teams**
- Deliver instrument calibration: **with Instrument PI teams**
- Deliver tools for data analysis: **with Science Survey Centre (SSC)**
- Deliver raw and processed data: **with SSC (discontinued in 2012)**
- Provide a scientific archive: **with ESA Science Archives Team**
- Provides generic community support: documents, web, helpdesk, workshops

Observatory-type mission: support astronomers from proposal preparation to scientific publication

➤ **Working together:**

- Run the annual call for proposals, provide relation: **with scientific community** & Time Allocation panels
- Provide scientific planning: long & short term plan, ToO
- Monitor Instruments: with Instrument PI teams
- Deliver instrument calibration: with Instrument PI teams
- Deliver tools for data analysis: with Science Survey Centre (SSC)
- Deliver raw and processed data: with SSC (discontinued in 2012)
- Provide a scientific archive: with ESA Science Archives Team
- Provides generic community support: documents, web, helpdesk, workshops

Observatory-type mission: support astronomers from proposal preparation to scientific publication

➤ **Working together:**

- Run the annual call for proposals, provide relation: **with scientific community to get the best science out of XMM-Newton**
- Provide scientific planning: long & short term plan, ToO
- Monitor Instruments: with Instrument PI teams
- Deliver instrument calibration: with Instrument PI teams
- Deliver tools for data analysis: with Science Survey Centre (SSC)
- Deliver raw and processed data: with SSC (discontinued in 2012)
- Provide a scientific archive: with ESA Science Archives Team
- Provides generic community support: documents, web, helpdesk, workshops

Observatory-type mission: support astronomers from proposal preparation to scientific publication

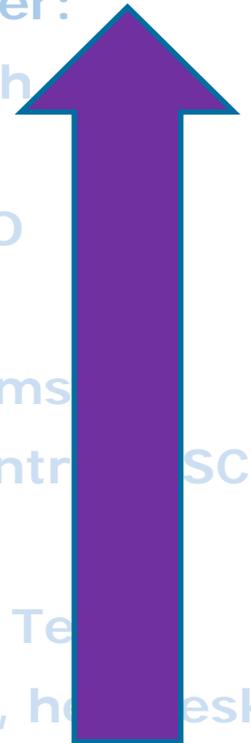
➤ Working together:

- Run the annual call for proposals, provide relation: **with scientific community: nearly constant in number, new people**
- Provide scientific planning: long & short term plan, ToO
- Monitor Instruments: **with Instrument PI teams** ↓
- Deliver instrument calibration: **with Instrument PI teams** ↓
- Deliver tools for data analysis: **with Science Survey Centre (SSC)** ↓
- Deliver raw and processed data: ~~with SSC~~ (**discontinued in 2012**)
- Provide a scientific archive: **with ESA Science Archives Team** ↓
- Provides generic community support: documents, web, helpdesk, workshops: **Science Ops Centre** ↓

Observatory-type mission: support astronomers from proposal preparation to scientific publication

➤ Working together:

- Run the annual call for proposals, provide relation: with scientific community & Time Allocation panels
- Provide scientific planning: long & short term plan, ToO
- Monitor Instruments: with Instrument PI teams
- Deliver instrument calibration: with Instrument PI teams
- Deliver tools for data analysis: with Science Survey Centre (SSC)
- Deliver raw and processed data:
- Provide a scientific archive: with ESA Science Archives Team
- Provides generic community support: documents, web, help desk, workshops



- Proposal cycle:
  - New proposal types
  - New astronomers, Ph D
  - New tools
  - More sophisticated ideas
- Mission planning:
  - increase efficiency
  - fixed-time/coord observations
- Instruments
  - New modes
  - Improve on calibration
  - Contingencies, time evolution, cros-cal with other missions
- Data analysis software
  - New tasks
  - New H/W platforms
- Pipeline data processing
  - Optimized algorithms
  - New science products
- Archive
  - Need to adapt to new technologies: e.g. full re-engineering
- Fixed tasks
  - Check & optimize proposals
  - Mission planning
  - Conferences ...

# How to manage?



- Budget pressure (with time) but constant load
- Key
  - Team
    - core team with great expertise from previous missions and/or high scientific background (mainly in X-ray astronomy, but not only)
    - new people with a lot of enthusiasm and new ideas
    - Different internal teams co-located and interacting
  - Tools developed in the team or adapted from previous missions
  - Keep inst. modes simple, while adapt to evolution and scientific community needs
  - Smooth interaction with inst. experts, coordinated by ESA cal. scientist
  - Smooth interaction with external S/W developers and taking over of their tasks as they leave, if internal resources allow it
  - **Keep interaction with community** as highest priority: keep high level of support



- Cross-calibration with X-ray instruments of other missions
- Software analysis system (SAS): new releases per year, with changing platforms
- Data processing pipeline, transferred and running
- New archive: requirements prepared as per community needs

## XMM-Newton Science Archive

HOME SEARCH AIO SYSTEM CATALOGUES AND TOOLS DOCUMENTATION USER GUIDE CONTACT

Back to Search

Results #1

OBSERVATIONS (47)

Add to Basket

Columns

Save table as

Send table to

<input type="checkbox"/>			Obs.ID	EPIC	RGS	Target	RA	Dec	PA	Rev	Distance	Start Date
<input type="checkbox"/>			0109270101			M31Core	00h 42m 42.99s	+41d 15' 46.00"	75.9	285	26	2001-06-29 06:15:17
<input type="checkbox"/>			0109270501	N/A		M31Core	00h 42m 42.99s	+41d 15' 46.00"	75.9	285	26	2001-06-29 03:16:05
<input type="checkbox"/>			0112570101			M31 Core	00h 42m 42.99s	+41d 15' 46.00"	249.6	381	26	2002-01-06 18:00:56
<input type="checkbox"/>			0112570401			M31 Core	00h 42m 42.99s	+41d 15' 46.00"	78	100	26	2000-06-25 08:12:41

- Helpdesk
- Check every proposal & contact PI for science optimization
- Documentation, manuals, reports
- Web
- Image Gallery
- SAS (data analysis) workshops

The poster features a central image of a galaxy with a bright yellow core and blue filaments. To the left, four smaller images show the same galaxy in different wavelengths: Optical, Optical and Infrared, Infrared, and X rays. The ESA logo is in the top right corner. At the bottom, it reads: "→ 11th ESAC XMM-NEWTON SAS WORKSHOP", "The Science Analysis System (SAS) Workshop aims at providing XMM-Newton users with an introduction to the procedures and techniques to successfully reduce and analyse XMM-Newton data", "European Space Astronomy Centre, Madrid, Spain, 06 - 10 June 2011", and the URL "http://xmm.esac.esa.int/external/xmm\_data\_analysis/sas\_workshops/current/". It also lists "LOC Members" and the "European Space Agency" logo.

This poster shows the XMM-Newton satellite in space. The ESA logo is in the top right. Below the satellite, it reads: "XMM-NEWTON SAS", "11-15 June 2012", "European Space Astronomy Centre, Madrid, Spain", and "Workshop aims at providing XMM-Newton users and techniques to successfully reduce and analyse XMM-Newton data". It also lists "LOC Members" and the "European Space Agency" logo.

# Community Support



Science  
Conferences  
& workshops,  
The X-ray Universe 2014  
16-19 June, Dublin

Get input via Project  
Scientist and Users  
Group

→ Keep contact with  
community

**esa** Deutsches Zentrum für Luft- und Raumfahrt

**Topics**

- Stars, Star-forming Regions, Planetary and Cometary Studies
- Interacting Binary Systems, Galactic Black Holes & Microquasars
- Cataclysmic Variables and Novae
- Magnetars, Isolated Neutron Stars and Pulsars
- Planetary Nebulae, SN, SNR, PWN, Gamma-ray Bursts and Afterglows
- Galaxies, Galaxy Surveys, Population Studies, ISM and Diffuse Galactic Emission
- Active Galactic Nuclei
- Clusters of Galaxies
- Extragalactic Surveys and Population Studies, the Cosmic X-ray Background, WHEIM and Cosmology
- X-ray Astronomy, Missions, Optics, Instrumentation, Data Analysis and Archiving

→ **THE X-RAY UNIVERSE 2014**  
Showcase discoveries and expectations from current and future X-ray missions  
Berlin, Germany, 27-30 June

**Scientific Committee**

G. Matt (Chair), Università degli Studi Roma Tre, I	S. Komossa, MPE, Garching, D
N. Scharfel (co-Chair), XMM-Newton SOC, Madrid, ESA	C. Kouveliotou, NASA/MSFC, Huntsville, USA
M. Ali Alpar, Sabanci University, Istanbul, TR	M. Makishima, University of Tokyo, J
D. Barret, CEA, Toulouse, F	S. Marlowe, University of Amsterdam, NL
E. Bahar, Technion, Haifa, IL	B. McBreen, University College Dublin, IRL
H. Böhringer, MPE, Garching, D	B. McNamara, University Waterloo, CAN
G. Branduardi-Raymont, UCL-MSSL, Dorking, UK	G. Micella, INAF, Palermo, I
F. J. Carrera, IAC, Sanstader, E	G. Miniati, CSIC/INTA, Madrid, E
F. E. Christensen, DTU, Copenhagen, DK	Y. Naze, University of Liège, B
A. Decourchelle, ESA, Saclay, F	T. Ohashi, Tokyo Metropolitan University, J
J.-W. den Hartog, SRON, Utrecht, NL	F. Ozel, University of Arizona, Tucson, USA
P. González-Wiesner, XMM-Newton SOC, Madrid, E	A. Zezas, University of Crete, GR
G. Hellier, Keele University, UK	

**Local Committee**

M. Ehle (co-Chair)	J.-U. Ness (co-Chair)
M. Arzouan	C. Gabriel
A. Labiano	G. Laner
N. Leseau	

European Space Agency <http://xrayuniverse.esa.int>

**esa**

→ **GALAXY CLUSTERS AS GIANT COSMIC LABORATORIES**  
XMM-Newton Workshop 2012  
21st - 23rd May 2012  
European Space Astronomy Centre, Madrid, Spain

**Scientific Organising Committee**

H. Böhringer (Chair), MPE, Garching, Germany	K. Pedersen, Niels Bohr Institute/Copenhagen University, Denmark
X. Barcons, Inst de Fisica de Cantabria (CSIC-UC), Spain	M. Pilonis, National Observatory Athens, Greece
S. Borgani, Università di Trieste, Italy	T. Porman, University of Birmingham, UK
M. Brueggen, Jacobs Universität, Bremen, Germany	C. Pratt, CEA Saclay, France
A. Fabian, University of Cambridge, UK	C. Sarazin, University Virginia, Charlottesville, VA, USA
W. Forman, Harvard University, Cambridge, MA, USA	N. Scharfel, (co-chair) XMM-Newton SOC, Madrid, Spain
J. Kaastra, SRON, Utrecht, The Netherlands	
S. Molendi, INAF IASF, Milano, Italy	
T. Ohashi, Tokyo Metropolitan University, Japan	

**Local Organising Committee**

J.U. Ness (Chair), M. Arzouan, M. Ehle, A.L. Longinotti, M. Stuhlinger

[http://xmm.esa.int/external/xmm\\_science/workshops/2012\\_science/](http://xmm.esa.int/external/xmm_science/workshops/2012_science/)

www.esa.int European Space Agency



- + 13 years of operations: XMM-Newton remains one of the ESA **flagship missions, ranked very high by advisory committees, keeps interest by scientific community and high productivity indicators:**
  - **Oversubscription** factor in AO12 (October 2012) was 5.9 in time
  - **Number of scientific papers** in refereed journals making direct use of XMM-Newton data remains constant at rate of ~300/yr
  - **Number of astronomers:** proposal PI+CoI, S/W and archive users remains at about 1500, with new people coming in (and going out). Conference attendance over 300 people.