DOCUMENT

Announcement of Opportunity for European Participating Scientist Membership of the Science Team for the X-ray Astronomy Recovery Mission (XARM)

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1 INTRODUCTION

The X-ray Astronomy Recovery Mission (XARM) is a JAXA mission with NASA and ESA participation, aiming at restoring the spectroscopic capabilities lost with the end of the *Hitomi* mission in March 2016. The key scientific objective of XARM is "Pioneering a new horizon of the Universe with unprecedented high-resolution X-ray spectroscopy". This objective is addressed in the following four aspects:

- Structure formation in the Universe and evolution of clusters of galaxies;
- Creation and circulation history of baryonic matter in the Universe;
- Transport and circulation of energy and matter in regions of strong gravity, electromagnetic fields, and/or shock waves;
- New science with unprecedented high-resolution X-ray spectroscopy.

XARM will have two instruments, based on the heritage of the *Hitomi* payload: *Resolve* is a high-resolution imaging X-ray spectrometer with a 0.3-12.0 keV energy range and a spectral resolution of 5-7 eV. It has a 3x3 arcmin field of view. The second instrument is *Xtend*, a CCD-based detector. It has a wide field of view (38x38 arc minutes) and a spectral resolution of <200 eV at 6 keV. The two detectors are located at the focus of nearly identical, co-aligned, X-ray telescopes. These provide an angular resolution of ~1.7 arcmin (half power diameter).

XARM is expected to launch in Japanese Fiscal Year 2020, which ends in March 2021, on a JAXA H-IIA rocket. After initial activation and calibration phases, the first six to nine months of observations will comprise the Performance Verification (PV) phase. A XARM Science Team will select and plan the PV phase observations and will have exclusive use of all data taken during the PV phase for approximately one year after being calibrated, after which they will be released into a public archive. After the PV phase, most observations will be selected competitively through an international General Observer (GO) programme. All data will reside in a public archive after expiration of any exclusive use period.

Following approval by the Science Programme Committee (SPC) at their 154th meeting held in June 2017 of a Mission of Opportunity participation by the Science Programme in the XARM mission, the European Space Agency (ESA) solicits, through this Announcement of Opportunity (AO), proposals for membership of the XARM Science Team as Participating Scientists. This AO is open to scientists affiliated with institutes within the ESA Member States.

2 XARM SCIENCE TEAM STRUCTURE AND OBJECTIVES

2.1 XARM Science Team

In order to optimise the scientific utilisation of the mission, NASA, JAXA, and ESA will appoint a XARM Science Team. This team primarily consists of scientists involved in the development of XARM together with a small number of external Participating Scientists. The total membership of the Science Team is expected to be around 100.

The XARM Science Management Office (SMO), chaired by Mission PI and Co-PI, is responsible for the scientific oversight of XARM, the optimisation of the mission's science output, and the management of the Science Team. The XARM SMO makes recommendations to the JAXA Project Manager on mission issues affecting science.

The XARM Science Team will optimise the XARM science programme by:

- Proposing PV phase and in-flight calibration targets, and concurring with the final target list;
- Planning the selected PV phase science observations;
- Analysing data from the PV targets and publishing results in refereed journals in a timely fashion;
- Making recommendations regarding scientific aspects of the mission, as needed, to the SMO, which will in turn present them to the JAXA Project Manager;
- Advising on plans for key projects selection and execution during the post-PV phase;
- Specifying, developing, and beta testing XARM simulations, data analysis, and user tools.

XARM Participating Scientists will be members of the Science Team and will represent the broader astronomy community. They will provide scientific expertise complementary to that of the scientists involved with XARM mission development.

Through the present Announcement of Opportunity (AO) ESA will select two Participating Scientists; they will become Science Team members upon concurrence by JAXA. The ESA selected Participating Scientists will serve for a renewable term of three years, and possibly for the duration of the XARM Science Team activities.

The XARM Science Team will meet regularly to discuss mission status, relevant science topics, and to plan mission science related activities. It is anticipated that the Science Team will meet once a year at a minimum, and more frequently as launch approaches.

Science Team members have full access to all data taken during the PV phase. It is expected that all Science Team members will participate in the analysis and publication of PV phase

data. Science Team members are allowed to participate in observing proposals as PIs and Co-Is, and will have access to data for accepted GO programmes in which they are participants.

2.2 XARM Science Team Discipline Groups

The activities of the XARM Science Team will be organized in multiple *Science Discipline Groups*. The role of these Discipline Groups includes:

- Elucidating XARM science topics;
- Providing advice on mission topical areas such as, *e.g.,* atomic and plasma physics, scientific instrument calibration, data analysis methods and software, processing pipeline and simulation tools
- Recommending a PV phase science programme in each research topic area;
- Coordinating the PV observations in each research topic area, and the activities of the associated target teams;
- Analysing the resulting data;
- Reporting regularly to the Science Team about Science Discipline Group activities.

Presently, the following Discipline Groups are envisaged to be coupled to key research topics using XARM:

- Physics of the largest objects in the Universe;
- Chemical evolution of the Universe;
- Physics in the most extreme environments in the Universe;
- Unexpected discoveries, enabled by unprecedented high X-ray spectral resolution.

The SMO and the Science Team may modify this list.

2.2.1 XARM Science Team Discipline Group Membership

The Discipline Groups will be drawn from the Science Team. Science Team members will be asked to volunteer to participate in one or more teams. The XARM SMO will concur with the membership of the various teams. Membership in these teams entails a commitment on the part of a Science Team member to contribute to the objective of the team.

Each team will have a chair and a vice-chair. The chair is responsible for overseeing the activity of the committee, with assistance as needed from the vice-chair. The chair serves as the category representative in the XARM SMO.

The chairs and vice-chairs will be selected from XARM Science Team members including Participating Scientists by the SMO membership.

3 APPOINTMENT REQUIREMENTS AND CONDITIONS

This call is open to scientists affiliated with institutes located within the ESA Member States and is for the category of "Participating Scientist" in the XARM Science Team.

Proposals should demonstrate the candidate's expertise in one or more of the XARM core science fields and the expected contribution to the mission science in general. The proposals should also include an explicit mention of the time commitment to the XARM Science Team activities and the endorsement and support from the head of the applicant's institution to their application.

Following evaluation of the proposals by ESA, the Director of Science will appoint, in concurrence with JAXA, any successful European candidates to the XARM Science Team as a Participating Scientist. The appointments will be *ad personam*.

Selected candidates are expected to attend the meetings of the XARM Science Team. ESA will cover the cost of travel and subsistence in connection with these meetings; the participation will be subject to ESA approval.

The international division of responsibilities for PV targets (target team leadership and membership) will be aligned with the agreements between the agencies.

Each ESA-appointed XARM Science Team member would be required to submit an annual report of his or her XARM Science Team-related activities to ESA. At the end of the three-year interval, the Director of Science will decide, in concurrence with JAXA, whether or not to recommend the extension of the appointment for a further term. The Director of Science may decide to discontinue the appointment at any time, based on the evolution of the XARM mission.

4 PROPOSAL CONTENTS

Proposals submitted in response to the AO are limited in length to 8 A4 pages (minimum font size 11 pt), and must contain the following information:

- A cover letter stating the proposer's name, affiliation, title, position, institute, address, telephone number and e-mail address (max. 1 page);
- A description of the proposer's scientific expertise and experience that is relevant to the XARM science objectives and of the experience in leading and coordinating scientific collaborations (max. 2 pages);
- A description of the proposed contributions to the XARM activities and a statement concerning the time availability of the proposer (max. 4 pages);
- A Letter of Endorsement of the application signed by the proposer's Head of Institute. If the proposal needs specific resources to accomplish its activities which are to be provided by the proposer's institute then the endorsement should include these too (max. 1 page).

Proposals must be submitted electronically in PDF format by the deadline indicated in Table 1. For details, see Section 6.

5 EVALUATION CRITERIA

The following criteria will be used (in no particular order) in assessing and evaluating individual proposals:

- The proposer's competence and experience in the XARM science objectives;
- The importance and relevance of the proposed contributions to the XARM science objectives;
- The proposer's ability to lead and coordinate the activities of a Science Category Team;
- Adequacy of the time that the proposer intends to devote to activities related to the XARM Science Team role, and;
- Adequacy of any resources required by the proposer to carry out activities related to the XARM Science Team role.

6 PROPOSALS SUBMISSION

Proposals must be submitted electronically in PDF format (file size cannot exceed 5 MB) according to the instructions on the following webpage:

http://cosmos.esa.int/web/xarm-2018

and according to the deadlines listed in Table 1.

Proposers will receive confirmation upon successful receipt of their Proposals.

Table 1: AO schedule and deadlines

Date	Event
6 March 2018	Release of this AO
6 April 2018, 12:00 (noon) CEST	Proposals due
20 April 2018	Appointment of European Science Team members

Further queries should be addressed to:

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ACRONYMS

AO	Announcement of Opportunity
CCD	Charge-Coupled Device
CEST	Central European Summer Time
Co-I	Co-Investigator
Co-PI	Co-Principal Investigator
D/SCI	Director of the Science Programme of ESA
ESA	European Space Agency
GO	General Observer
JAXA	Japan Aerospace Exploration Agency
NASA	National Aeronautics and Space Administration
PDF	Portable Document Format
PI	Principal Investigator
PV	Performance Verification
SMO	Science Management Office
SPC	Science Programme Committee of ESA
TBC	To Be Confirmed
XARM	X-ray Astronomy Recovery Mission