

Announcement of opportunity for XRISM Guest Scientists (XGS)

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1. INTRODUCTION

This Announcement of Opportunity (AO) solicits the participation of the scientific community of European Space Agency (ESA) Member States in the role of Guest Scientists for the XRISM mission (XGSs). Through the appointment of the XGSs, ESA aims at involving a scientific community as wide and diverse as possible in the exploitation of the data of the Performance Verification Phase (PVP) of the XRISM mission.

1.1. The X-Ray Imaging and Spectroscopy Mission (XRISM)

The Japan Aerospace Exploration Agency (JAXA) is developing the X-Ray Imaging and Spectroscopic Mission (XRISM) with contribution by the National Aeronautics and Space Administration (NASA) and ESA. With its unprecedented capabilities, XRISM will pioneer diverse fields in astrophysical research. The major scientific goal of the XRISM mission is to reveal the formation history of the large-scale structure in the universe and galaxy clusters, the history of baryonic circulation, and mechanisms of energy transportation and circulation in the Universe. In addition, XRISM will open the new observational window of non-dispersive, high-resolution X-ray spectroscopy. To achieve these goals, XRISM carries an innovative payload combination including:

- a micro-calorimeter (*Resolve*) with an energy resolution ≤ 7 eV in the 0.3-12 keV energy range over a $3' \times 3'$ field-of-view covered by an array of 35 pixels;
- an array of CCD detectors (*Xtend*) with a large field-of-view (larger than $30' \times 30'$), and an energy resolution ≤ 200 eV at 6 keV at the beginning of the operational life;
- a large-area, light weight soft X-ray telescope with a $\leq 1.7'$ Half Energy Width or better, and an area comparable to that of the soft X-ray telescopes on-board *Hitomi*.

1.2. The XRISM Guest Scientist (XGS) program

XRISM will verify the instrumental performances and proper functioning of the satellite bus system during the PVP, which is envisaged to be carried out for 6 months immediately following the commissioning phase. The PVP observations will also be used for instrumental calibration, for establishing data analysis procedures, and for highlighting the scientific capabilities of the mission. The prioritized list of the PVP observation targets, which have been selected based on internal discussions within the XRISM Science Team (XST), is available from the ESA XRISM web pages¹. For each of the PVP targets, a Target Team has been formed to lead the observation planning, data analysis, and publication of science results. The same web page provides access to the “Science Objectives of the XRISM Performance”, a document² describing the science plan for each target in the PVP. **Scientists interested in applying to**

¹<https://www.cosmos.esa.int/web/xrism/performance-verification-target-list>

²<https://www.cosmos.esa.int/documents/4262114/0/PV+Target+Team+Plans.pdf/d26715ed-aed6-d3a5-f038-ba3fcc4ff8c6?t=1648462877228>

the XGS program are warmly encouraged to read this document before they start preparing their proposal.

The XGS program offers an opportunity to participate in the scientific activities related to the PVP observations to scientists who are not members of the XST. Proposals for the XGS are solicited by JAXA and its international partners NASA and ESA simultaneously. **ESA will select 5 XGSs** (20 XGSs are allocated to each of the partner Agencies) as a result of this open call.

It is expected for XGSs to enhance the scientific return of the XRISM PV observations by bringing unique expertise that includes, but is not limited to: complementary data on the target from other X-ray observatories or other wavebands, substantial theoretical insight, or specialized data analysis techniques. For more details, please refer to the Appendix A.

The schedule for this AO cycle is given in Table 1.

Table 1: AO schedule and deadlines

Date	Event
4 April 2022	Release of this AO
4 May 2022, 12:00 hrs (noon) CEST	Mandatory Letters of Intent due
4 July 2022, 12:00 hrs (noon) CEST	Proposals due
3 rd Quarter 2022	Appointment of XGSs

2. APPOINTMENT REQUIREMENTS AND CONDITIONS

This call is open to scientists based in ESA Member States. Current members of the XST are not eligible.

The following guidelines govern the XGS program:

1. An XGS participant is granted access only to the data from the PVP target for which she/he has been selected.
2. XGS members do not become XST members.
3. XGS members must sign a Code of Conduct and agree to adhere to the same rules and guidelines as the XST regarding data analysis and publication. The Code of Conduct is available in Appendix B, and a signed version must be included by proposers in their proposal.
4. PVP targets have been selected by the XST exclusively. XGS members are added to existing target teams.
5. While the target selection and duration of the observation will be fixed, XGS participants may suggest a modification of the observing strategy and/or a re-organization of the individual pointings to optimize the scientific return. Such discussions would be internal to the target team, including the XGS participant.
6. Approximately one XGS scientist will be selected per target. It is envisaged that some teams may have more than one XGS member, while others may have none.

7. Each XGS participant will be assigned to a single target team.
8. During the proprietary period for the PVP data, XGS participants are restricted to accessing and analysing the data exclusively of the target to which they have been assigned. XST members from another target team may not share PVP data with XGS participants outside of that target team.
9. Any analysis performed by an XGS participant prior to the end of the PV phase proprietary period is viewed as part of the target team effort. XGSs may not perform an independent analysis and submit it for publication separate from the target team activity, unless the analysis commences after the data have entered the public archive.
10. XGS are welcome to join any publication by the target team they belong to, provided they can demonstrate a substantial contribution to the publication (as per general rules applicable to any XST member). XGSs may be lead authors of publications.
11. Each XGS participant may share the PVP data with a graduate student or a postdoc working directly under their supervision. In the case of significant graduate student (or postdoc) participation in the analysis or interpretation of the data, the graduate student (or postdoc) may be included as a co-author (or, under exceptional circumstances, a lead author) of any resulting publication. Graduate students and postdocs affiliated with XGS participants do not become XGSs.
12. There are no restrictions on XGSs submitting Guest Observer proposals that do not duplicate their work as an XGS.

The successful candidates will be appointed by the ESA Director of Science. The XGS appointment is *ad personam*. Application from groups or teams will not be considered in the selection process.

Successful candidates are not eligible for any financial support by ESA to discharge the tasks and responsibilities associated with their role as XGS.

The appointment of the XGSs terminates once all the data of the XRISM PVP are in the public domain of the XRISM data archives.

3. LETTER OF INTENT

Prospective proposers must submit a mandatory Letter of Intent (LoI) by the deadline indicated in Table 1. Proposals not preceded by a corresponding LoI will not be considered. LoIs are limited in length to 2 A4 pages (minimum font size 11 pt), and their purpose is to allow ESA to perform an initial assessment of the expected range of proposals, and to prepare for the evaluation process.

Letters of intent must be structured to contain the following information:

- Name and contact information of proposer;
- Short description of the proposer's expertise and its relevance to XRISM.

4. CONTENTS OF THE PROPOSAL

Proposals submitted in response to the AO are limited in length to 9 A4 pages (minimum font size 11 pt), and must contain the following information:

- A cover letter stating the proposer's name and affiliation and explicitly mentioning the proposer's title, position, institute, address, telephone number and e-mail address (max. 1 page);
- A brief curriculum vitae also including the 10 most relevant publications (max. 2 pages);
- A description of the scientific expertise relevant to the XRISM science objectives;
- A description of the PVP target for which the application is submitted, and of the prospective contribution to the scientific exploitation of the corresponding XRISM data;
- A signed copy (under the statement “read and agreed”) of the XRISM Code of Conduct;
- A Letter of Endorsement, signed by the proposer's Head of Institute, with the endorsement to the proposer's application and the explicit support with respect to the proposed activities and the availability of facilities and infrastructure, as needed by the proposer for the accomplishment of the XGS tasks (max. 1 page).

5. EVALUATION CRITERIA

The following criteria will be used in assessing and evaluating individual proposals:

- Candidate's competence and experience relative to the XRISM science objectives;
- The level to which the proposal identifies specific competences and addresses the contribution to the scientific exploitation of the XRISM PVP data, as specified in Sect.2.

6. LETTERS OF INTENT AND PROPOSAL SUBMISSION

Letters of Intent and Proposals shall be submitted electronically in PDF format (file size cannot exceed 10 MB) according to the instructions on the following webpage:

<https://cosmos.esa.int/web/xrism-xgs-2022>

and according to the deadlines listed in Table 1.

Proposers will receive confirmation upon successful receipt of their Letters of Intent and of their Proposals.

Further queries should be addressed to:

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7. ACRONYMS

AO	Announcement of Opportunity
CEST	Central European Summer Time
ESA	European Space Agency
JAXA	Japan Aerospace Exploration Agency
LoI	Letter of Intent
NASA	National Aeronautics and Space Administration
PVP	Performance Verification Phase
XGS	XRISM Guest Scientist
XRISM	X-Ray Imaging and Spectroscopy Mission

8. APPENDIX A: PROSPECTIVE XGS EXPERTISE

In this Section, we present examples of possible expertise which, according to the current evaluation by the XST, could enhance the scientific exploitation of XRISM PVP data. This list is not intended to be exhaustive, and does not preclude scientists with different expertise from being selected as XGS. *Any scientists willing to contribute to the scientific exploitation of the XRISM PVP data are warmly encouraged to apply for the XGS program.*

8.1. Data analysis techniques

The *Resolve* instrument enables, for the first time, high-resolution X-ray non-dispersive spectroscopy with an unprecedented energy-resolution and signal-to-noise ratio, in particular in the 2-10 keV energy band. Data analysis will most likely present new challenges. Moreover, the moderate angular resolution of the XRISM telescope implies that the analysis of the *Resolve* data of extended sources will be particularly complex. Therefore, the XST welcomes expertise from scientists who have knowledge or experience of, for instance:

- Machine learning approach for line detection, transient search, Point Spread Function deconvolution etc.;
- Data cube modelling and analysis;
- Modelling line broadening due to complex spatial and velocity structures (in, *e.g.*, galaxy clusters, Supernova Remnants (SNRs));
- Transfer function modelling for time lag analysis (in Active Galactic Nuclei (AGN));
- Doppler tomography (in compact binary objects);
- Cross-calibration with other X-ray operational missions

8.2. Spectral diagnostics and atomic physics

The unprecedented spectral resolution of the *Resolve* will also allow us to detect spectral features that are unexpected or uncertain in currently available spectral codes due to the paucity of experimental data or limitations in theoretical calculations. Therefore, experts on theoretical or experimental atomic physics related to the following topics are welcome:

- Charge exchange;
- Dust X-Ray Absorption/Scattering Fine Structure (XAFS/XSFS);
- Multiple ionization process by ion-ion interaction;
- Extremely low ionization non-equilibrium plasma;
- Non-Maxwellian plasma;
- Photoionization

8.3. Theoretical insight and/or numerical simulations

The *Resolve* spectroscopic data will push the boundaries of our knowledge of astrophysics in several areas. The XRISM Science Team expects that the XRISM results will fundamentally challenge existing paradigms, and welcome experts on theoretical models and simulations to support the interpretation

of the data, and – in return - contribute to an advancement of the theoretical understanding in our field. The required expertise includes, but is not limited to, the following aspects:

For extragalactic diffuse PVP targets (galaxies, clusters):

- Numerical simulations of feedback from AGN in cool cores;
- Numerical hydrodynamic modelling of the intracluster medium (*e.g.* turbulence/stripping/sloshing/cold front);
- Numerical hydrodynamic modelling of starburst winds
- Supernova nucleosynthesis modelling

For Galactic diffuse PVP targets (SNRs, Interstellar Medium):

- Supernova (SN) nucleosynthesis modelling
- Dust creation and destruction in SNe and SNR shocks;
- Numerical hydrodynamic modelling of SNR evolution;
- Theoretical expertise in shock heating, including cosmic-ray acceleration;

For extragalactic compact PVP targets (AGN, Gamma-Ray Bursts):

- Accretion disk theory;
- Formation and structure of Broad and Narrow Line Regions and the “torus” in AGN;
- AGN/star formation connection;
- AGN outflows/jets and their interaction with the nuclear environment and the Interstellar Medium.

For Galactic compact PVP targets (stellar objects):

- Winds launching mechanisms, including line driven winds and magneto-hydrodynamic simulations in binary systems;
- Disk reflection modelling;
- Relativistic jets in galactic objects;
- Simulations of colliding winds in binaries and binary systems evolution;
- State-of-art mass-radius relations models in white dwarfs.

8.4. Multiwavelength observations of specific PVP targets

Applications are welcome from scientists who have access to, and expertise in the analysis of multiwavelength data that can facilitate the interpretation of the XRISM data of a specific PVP target.

9. APPENDIX B: XRISM CODE OF CONDUCT

1. Preamble

This document is part of a larger document known as the XRISM Science Implementation Plan (SIP). Many of the sections below are summaries of longer policy documents contained in other chapters of the SIP. Where relevant, those chapters should be consulted for a more complete view.

The XRISM Science Team (XST) is a multi-national collaboration of over 100 scientists from Japanese, North American, and European institutions. The purpose of the XST is to plan and execute the science program for the Performance Verification (PV) phase to optimize the scientific utilization of XRISM. The Terms of Reference (ToR) chapter of the SIP spells out in detail the Roles and Responsibilities of the XST, including standard policies for adding or removing an XST member, the data rights of the XST, and the term of duration of the XST.

All members of the XST must strive for an inclusive and respectful environment for all collaboration members. The purpose of this Code of Conduct is to establish a baseline set of principles that all XST members are expected to abide by.

2. Respectful Treatment

XST members should always remain collegial. More broadly, XST members must treat each other equally and with respect, regardless of gender, gender identity, sexual orientation, race, ethnicity, national origin, physical disability, religion, age, or any other attribute.

The nature of advancing science requires active collaboration, discussion, and debate. It is inevitable that disagreements will arise, and when conducted in a constructive and healthy fashion, these can be an important part of the scientific process. All members of the XST should feel free to respectfully express their scientific and technical ideas and interpretations. Likewise, objections and feedback must also be expressed respectfully.

Personal attacks, including verbal, non-verbal, or written harassment, threatening, bullying, intimidation, disparagement, and exclusion will not be tolerated. It is the responsibility of all XST members to ensure that a respectful environment is maintained and that any inappropriate actions are reported.

Sexual harassment of any kind will not be tolerated. This includes, but is not limited to, inappropriate verbal, written, or physical contact, unwelcome advances, and requests for sexual favors.

XST members should also maintain respectful interactions with members of the astronomical community outside the XST when presenting or discussing XRISM results.

The XST contains participants from many different cultures and backgrounds. In some cases, what is considered appropriate behavior in one culture may differ from that of another culture. XST members should make a good faith effort to understand and respect cultural differences in these regards. However, if questionable behavior arises between members, XST members should also feel free to educate each other on appropriate cultural customs and behaviors, as well as report continued violations.

3. PV Phase Data Rights and Sharing

All XST members have access to all PV phase data. Sharing PV phase data with members of the astronomical community who are not part of the XST is strictly forbidden. In rare cases, target teams may agree that it is scientifically necessary to obtain external help to analyze or interpret data when the sufficient expertise is not already present on the XST. Target teams must request and be granted permission to share PV data outside the XST by the SMO Steering Group.

XST members may share PV phase data from the target teams they are working on with graduate students and postdocs that work under their direct supervision. The names of graduate students or postdocs shall be provided to the SMO Steering Group.

4. Publication and Presentation Policies

Detailed rules regarding publication policies for XRISM PV phase data are contained in the SIP chapter titled “XRISM Publication Policy,” and all team members must abide by these rules.

For as long as the PV-phase data remains proprietary to the XST, no XST member may write, submit, or publish any work that contains PV data, except for those publications that arise from collaborative work within the XST and the relevant target teams.

Members of the XST may give talks on the XRISM mission, including technical descriptions and science objectives and capabilities. In such cases, they should inform the SMO Steering Group of the talk. Without explicit permission from the SMO Steering Group, XST members may not share anything in presentations outside the science team that is proprietary to the XST. This includes but is not limited to: XRISM data that is not yet in the public archive, results that are not yet published, data or results that are embargoed, status of the observatory that has not yet been made public, and findings that have only been discussed within the XST.

5. Social Media Guidelines

Personal social media accounts are a great way to disseminate scientific results to the broader astronomical and public community. XST members with social media accounts are encouraged to share results from the XRISM PV phase, once the results are made public in a journal, press release, or other appropriate venue. However, in general, XST members may not share anything on their social media accounts that is not yet in the public domain. The following are items that may not be shared on social media, even if the account is “private” or “protected.”

- Non-public documents pertaining to flight hardware, the instruments, the spacecraft, operations, integration and testing, telemetry, or scheduling.
- Internal XRISM documents that are proprietary to the XST, the broader XRISM team, or any of the agencies or contracting organizations involved in the mission.
- Slides or any non-public information that is discussed or shared at a XRISM Team meeting. Obtain express permission from the author of the slide and the SMO Steering Group before sharing.
- Photos of flight hardware without the express permission of the SMO Steering Group.
- Emails, confluence posts, or any other communication that is internal to the XST.
- Paper results that are under embargo by a journal until an official release date.

6. Scientific Misconduct

XST members are expected to conduct scientific research in a fundamentally ethical manner. Falsification, fabrication, selective reporting of data, plagiarism, and any other form of scientific misconduct will not be tolerated.

While it is rarely possible to cite every paper that pertains to a given topic, a good faith effort should be made to include references to prior work that are particularly relevant to any publication produced by the XST. Deliberate omission of authors or references is not acceptable.

7. Implementation

All XST members are required to agree to and abide by this Code of Conduct. New XST members, students and postdocs of XST members, and XRISM Guest Scientist participants, will abide by the same standards set forth here.

Any XST member who has a concern about a violation of this Code of Conduct should voice their concerns to the SMO Steering Group. Complaints or concerns will be held in confidence by the SMO Steering Group, and anonymous complaints by those wishing to remain unnamed will be accepted. Retaliation against an XST member for voicing a concern or complaint is unacceptable and is a violation of this Code of Conduct.

In dealing with concerns over a violation of this Code of Conduct, the SMO Steering Group will first attempt to restore an inclusive and respectful environment and rectify any wrongs that may have occurred. If the restoration of such an environment cannot be achieved, the SMO Steering Group, along with representatives from the respective national agencies, have the right and the responsibility to act. Consequences can range from being removed or reassigned to another target team, to removal from the XST, to (in the cases of scientific misconduct or bullying/harassing) reporting the activities of the offending XST member to their institution.