Status Report on the X-ray Imaging and Spectroscopy Mission (XRISM)

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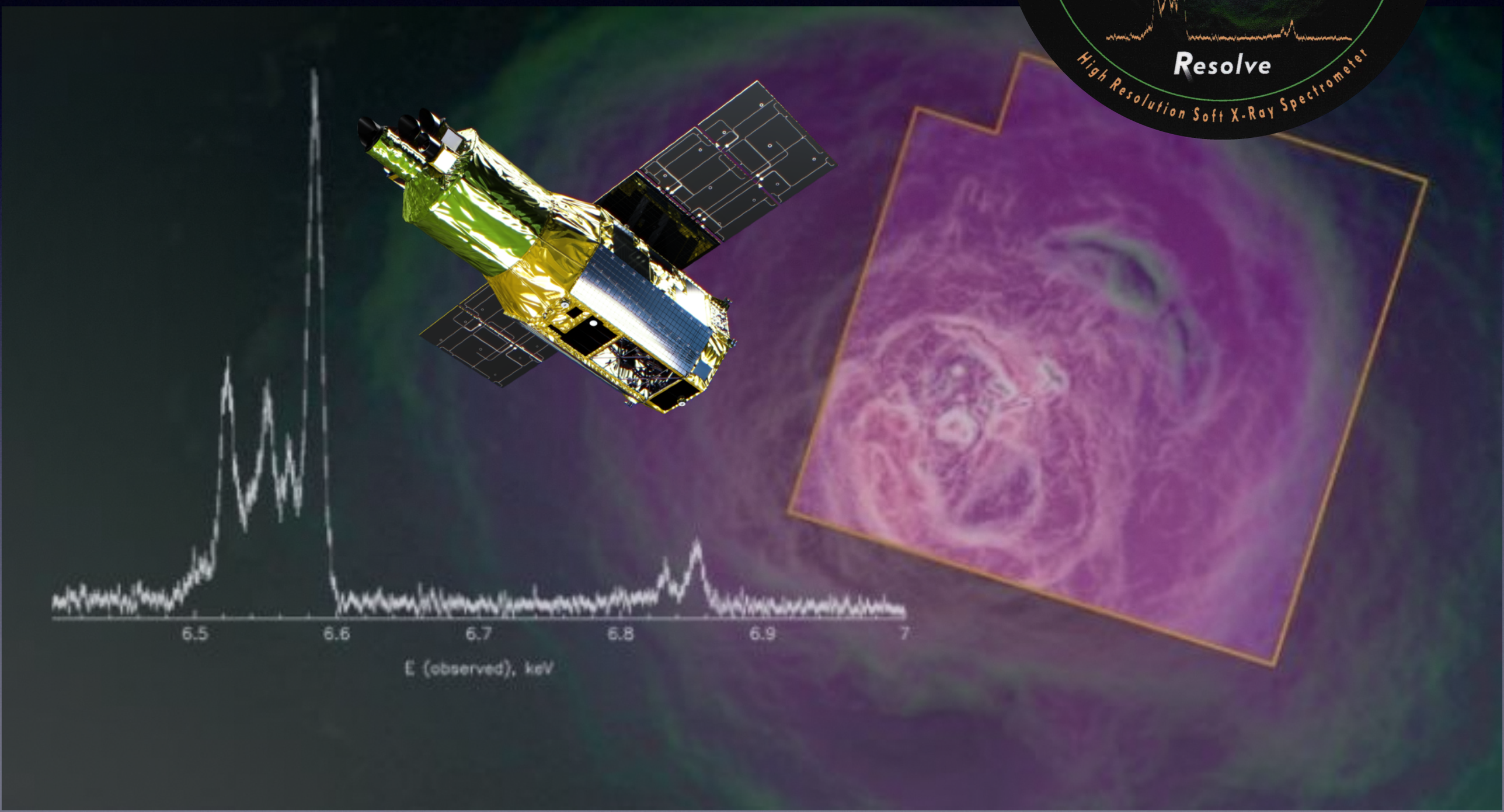


XRISM Executive Summary

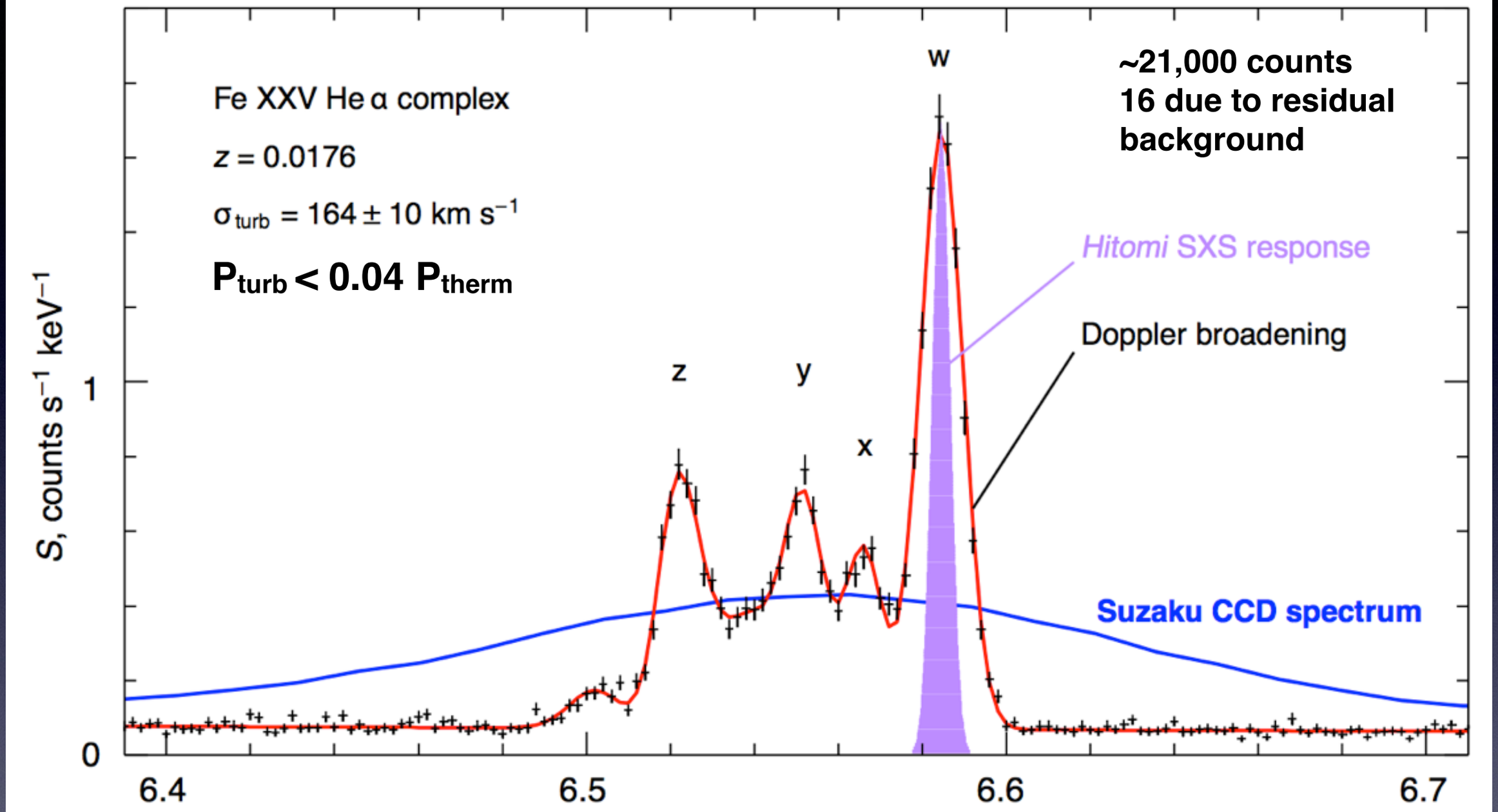
XRISM, formerly the X-ray Astronomy Recovery Mission (XARM), is a JAXA/NASA collaborative mission with ESA participation. The objective of the mission is to investigate celestial X-ray objects in the Universe with high-throughput imaging and high-resolution spectroscopy, “recovering” the science that was lost as a result of the Hitomi (Astro-H) mission.

The XRISM payload consists of two instruments:

- **Resolve:** a soft X-ray spectrometer, which combines a lightweight X-Ray Mirror Assembly paired with an X-ray microcalorimeter spectrometer, and provides non-dispersive 5-7 eV energy resolution in the ~0.4-12 keV bandpass with a field of view of about 3 arcmin.

- **Xtend:** a soft X-ray imager, is a CCD detector that extends the field of the observatory to 38 arcmin over the energy range ~0.4-12 keV, using an identical lightweight X-Ray Mirror Assembly.

5 eV energy resolution achieved in orbit, full array



Hitomi Collaboration, Nature, 2016

Black: Hitomi SXS data
Purple: SXS line response function
Blue: Best previous spectrum (Suzaku CCD)

Resolve Top-Level Performance Requirements

Parameter	XRISM Requirement	Hitomi on-orbit values
Energy resolution	7 eV (FWHM)	5.0 eV
Energy scale accuracy	± 2 eV	± 0.5 eV
Residual Background	2 x 10^{-3} counts/s/keV	0.8 x 10^{-3} counts/s/keV
Field of view	2.9 x 2.9 arcmin	same, by design
Angular resolution	1.7 arcmin (HPD)	1.2 arcmin
Effective area (1 keV)	> 160 cm^2	250 cm^2
Effective area (6 keV)	> 210 cm^2	312 cm^2
Cryogen-mode Lifetime	3 years	4.2 years (projected)
Operational Efficiency	> 90%	> 98%

- From March-July of 2020, there was no travel to Japan. I&T was supported remotely. In summer 2020, approval was given for a small team to travel.
- Three teams have traveled to Japan since then. More travel will be arranged when necessary. Travel is extremely taxing on those involved (requiring a 14-day hotel quarantine upon arrival).
- The XRISM Science Team holds semi-annual meetings. The spring and fall 2020 meetings were both held virtually.

COVID-19 and XRISM

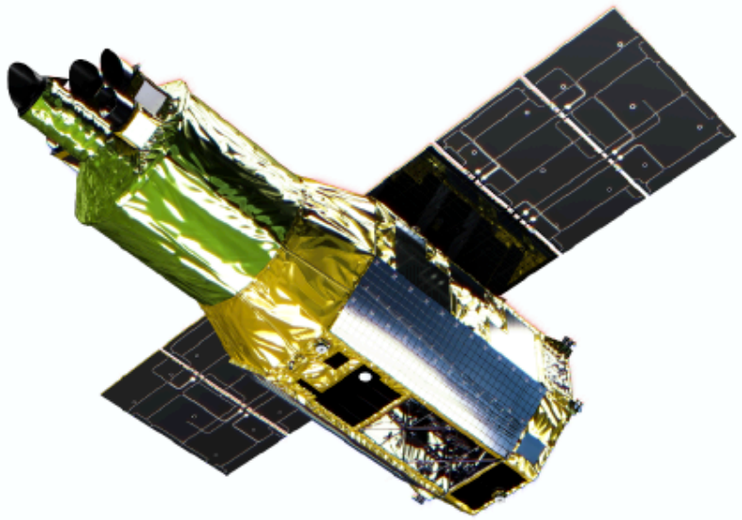
Instrument Status

- I&T of the Resolve instrument is proceeding in Niihama, Japan
- In March 2020, the team identified a small liquid-He leak in the JAXA dewar that houses the Resolve instrument
- The NASA team is supporting JAXA as they systematically work to identify the source of the leak. Although slowed by COVID-19, significant progress has been made.
- JAXA is working towards a plan to complete the leak investigation and repairs within the dewar by April 2021.
- Testing and calibration continues on the X-ray Mirror Assemblies. A small change in focal length has been measured, slightly degrading their spatial resolution. The cause of this is under investigation, as are potential solutions.
- Current launch window: JFY 2022 (April 2022 - March 2023)

XRISM
X-Ray Imaging and Spectroscopy Mission

White paper on science with XRISM

Science with the X-ray Imaging and Spectroscopy Mission



This white paper was prepared by members of the XRISM Science Team for the benefit of the general astronomical community. This paper describes the capabilities of XRISM, offers a sampling of the many science topics that the mission will address, and discusses the synergies of XRISM with the plethora of planned and existing facilities in the 2020s and beyond.

http://xrism.isas.jaxa.jp

arXiv:2003.04962; search ADS for author “XRISM Science Team”

XRISM and You

- **Performance Verification (PV) Phase**
  - Pre-selected targets for first ~6 months of science observations
  - Targets selected ~Feb. 1 2021, list will be published online
  - PV observations proprietary to XRISM Science Team, ***HOWEVER…***

- **XRISM Guest Scientist (XGS) Program**
  - Allows participation in observation and analysis of PV phase targets
  - Individual scientists will join team for (preselected) PV phase targets
  - On average, one XGS participant per targets (~50 targets)
  - NASA release through ROSES; includes funding for US-based scientists

- **Early Release Science Targets**
  - A small number of objects will be observed immediately after commissioning (and before calibration) for immediate public data release
  - Allow community a glimpse of instrument performance before AO1 proposals are due
  - Data will be uncalibrated, and thus unsuitable for scientific publication

- **XRISM Guest Observer Program**
  - Annual cycles, with observations starting 9-10 months after launch
  - AO to be released simultaneously by JAXA, NASA, ESA ~2 months after launch, due 3 months later
  - Includes opportunity for XRISM-related laboratory astrophysics work
  - Includes NASA funding for US-based scientists

Communication with the US Community

- We will be offering XRISM data analysis workshops closer to launch, continuing until after launch
- Additionally, we will prepare data analysis guides and tutorials to prepare community
- Once travel is possible again, members of the Project Science office are available to visit your institution to give a talk on XRISM. Please let us know if you're interested! We can also give virtual talks.

xrism.isas.jaxa.jp - JAXA XRISM site (in both Japanese and English)
nasa.gov/xrism - NASA public site (only in English)
NASA XRISM site for researchers launching next month!

XRISM X-Ray Imaging and Spectroscopy Mission