XRISM: MISSION STATUS

Makoto S. Tashiro (ISAS/JAXA, Saitama University)
on behalf of XRISM team
• Perseus Cluster
• N132D
• IGR J 16318-4848
• RX J 1856.5-3754
• G21.5-0.9
• Crab
• … to be continued by XRISM
• How does the large structure formed?
  • What forms and sustain the clusters of galaxies structure against gravity?
    • Gas pressure, turbulence, and their spatial distribution
• How was the elements and energy produced and distributed in the universe?
  • Metallicity of SNs and their remnants
  • Dissipation of the material
  • Velocity of elements of SNR metals
    and Accretion and outflow (winds) of AGNs, galaxies
• New astrophysics with X-ray micro-calorimeter
MISSION CONCEPT OF RECOVERY

- Recovery of X-ray fine spectroscopy
  - Recover the X-ray micro-calorimeter science, ASAP
  - Conservative combination with conventional CCD covering same energy band

<table>
<thead>
<tr>
<th>Instrument</th>
<th>FOV/pix</th>
<th>ΔE (FWHM @6 keV)</th>
<th>Energy band</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolve (XMA + X-ray</td>
<td>2.9’ □ /</td>
<td>7 eV (goal 5 eV)</td>
<td>0.3 – 12</td>
</tr>
<tr>
<td>microcalorimeter)</td>
<td>6 x 6 pix</td>
<td></td>
<td>keV</td>
</tr>
<tr>
<td>Xtend (XMA + X-ray CCD)</td>
<td>38’ □/ 1280 x 1280 pix</td>
<td>&lt;250 eV at EOL</td>
<td>0.4 – 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(&lt;200 eV at BOL)</td>
<td>keV</td>
</tr>
</tbody>
</table>

Mass: 2.3 t
Dimension: 7.9 m x 9.2 m x 3.1 m
Design life: 3 years + cryogen free operation
Orbit: Altitude 575 +/- 15 km, Inc lination 31 degree
DEVELOPMENT STATUS

System level
- Mission Requirement (2017.4)
  - System Requirement (2017.4)
  - Sub-system design (2019.4)
    - Component design (2019.9)

Sub-system level
- Component design (2019.9)
  - Sub-system test (2019.9~2020.3)
  - System test (IFT → PFT)
    - Operation/observation (2019.4~2020.3)
  - Component test (2019.9~2020.3)

Development • production
- Development (2019.4~2020.3)
STATUS: SPACECRAFT

• Major changes from Hitomi;
  • Attitude Control System
    • Sensors
      • STT → conventional and reliable model, user 2 out of 3 sets
      • DSS → wider FOV, (cold) redundant system
    • Processor (software)
      • Fault Detection Isolation Reconfiguration → reviewed and revised; will test as we fly

X-ray Astronomy 2019: XRISM: mission status: M. S. Tashiro
STATUS: RESOLVE

- Dewar
  - DWR Gate Valve open; XRISM introduces Eddy Current Dumper to reduce shock to thermal/optical filters
  - Mechanical Cooler micro-vibration isolator; XRISM introduces launch lock system to have tolerance to the new mechanical environment due to the dual launch.
STATUS: RESOLVE

Status
• FM Detector performance is as expected.
• FM Calorimeter Sensor Insert (CSI) has been fabricated → now on-ground calibration

Plan
• Pre-Shipment Review is held in the next week
• CSI will be shipped to Japan, after calibration
• CSI installation is planned in November in SHI.
STATUS: XTEND

• Hitomi-SXT/SXI worked well but light leakage through the HXT light path was observed → XRISM Xtend
  • requires “darkness” in the Spacecraft
  • Improve process to reduce light leak through “pin holes” on the Optical Blocking Filter

• Status:
  • CCD chips; selected FM 4 chips out of 12 → now under calibration
  • Camera system; industrial CDR was finished → Under production
SUMMARY OF MISSION INSTRUMENT PRODUCTION

• Resolve
  • XMA (fabrication → assembly)
  • CSI
    • Detector Array (completed → cal)
    • ADR (completed)
  • ApA (completed)
  • ADRC (assembly)
  • DWR, cooler, CD (assembly)
  • Xbox (nearly completed)
  • PSP (fabrication)

• Xtend
  • XMA (fabrication → assembly)
  • CCD (screening → calibration)
  • SXI-S (procurement)
  • Electronics (procurement/assembly)

Resolve sensor @ NASA/GSFC

Mile stones...
2019-12 system integration 1
2020-04/05 mission I/F test
2020-07 system integration 2, 3, 4
2021-01 proto-flight test
2022-01 launch
FOR SCIENCE PRODUCTION

2018-10-1/3 @Kanazawa

Science Team meeting (SM1)
2018-10-1/3 @Kanazawa

International Team Meeting (TM1) 2018-5 @Nara

AOs for Participating Scientists

Hitomi Lessons Learned summary and share
XARM proposal → JAXA, NASA, ESA collaboration

“XARM” proposed
Hitomi termination → LLs investigation

XRISM Guest Scientists for PV (TBD)

AOs for GO-1 (TBD)

SM2 (2019-10 @Ehime)

SM3 (2020-5 @Michigan U)

XRISM team meeting #2
14-17 May 2019, Sagamihara, Japan

Phase-A 2019
Phase-B 2018
Phase-C 2017
Phase-D 2016

2023 GO Program
Launch & PV

Verifications & GND Calibration
Fabrication/ Integration

2021
PQR

2020
CDR

PDR

SDR, project

RFP

MDR/SRR

2019-09-13 X-ray Astronomy 2019: XRISM: mission status: M. S. Tashiro
OPERATION PHASES AND GUEST OBSERVER PROGRAM

• Initial phase (launch to 3 months)
  • Critical operation (~1 week (TBD))
  • Commissioning (~12 weeks (TBD))

• Nominal phase (until 3 years after launch)
  • Initial calibration & performance verification (~6 months)
  • Nominal observation (GO phases)

  (mission completion/extension review)

• Latter phase
XRISM FOR YOUR SCIENCE