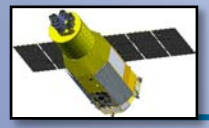


X-Ray Imaging and Spectroscopy Mission

XRISM


ASTRO-H “*Hitomi*”
Launched on 17 Feb. 2016

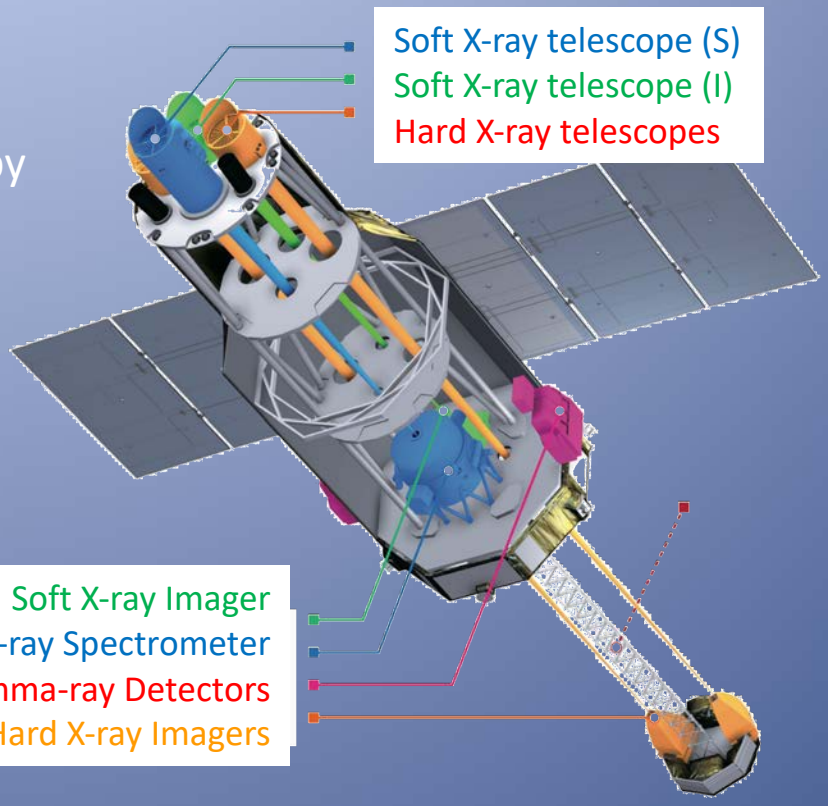


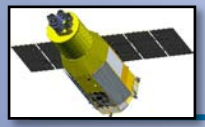
ASTRO-H/Hitomi Mission

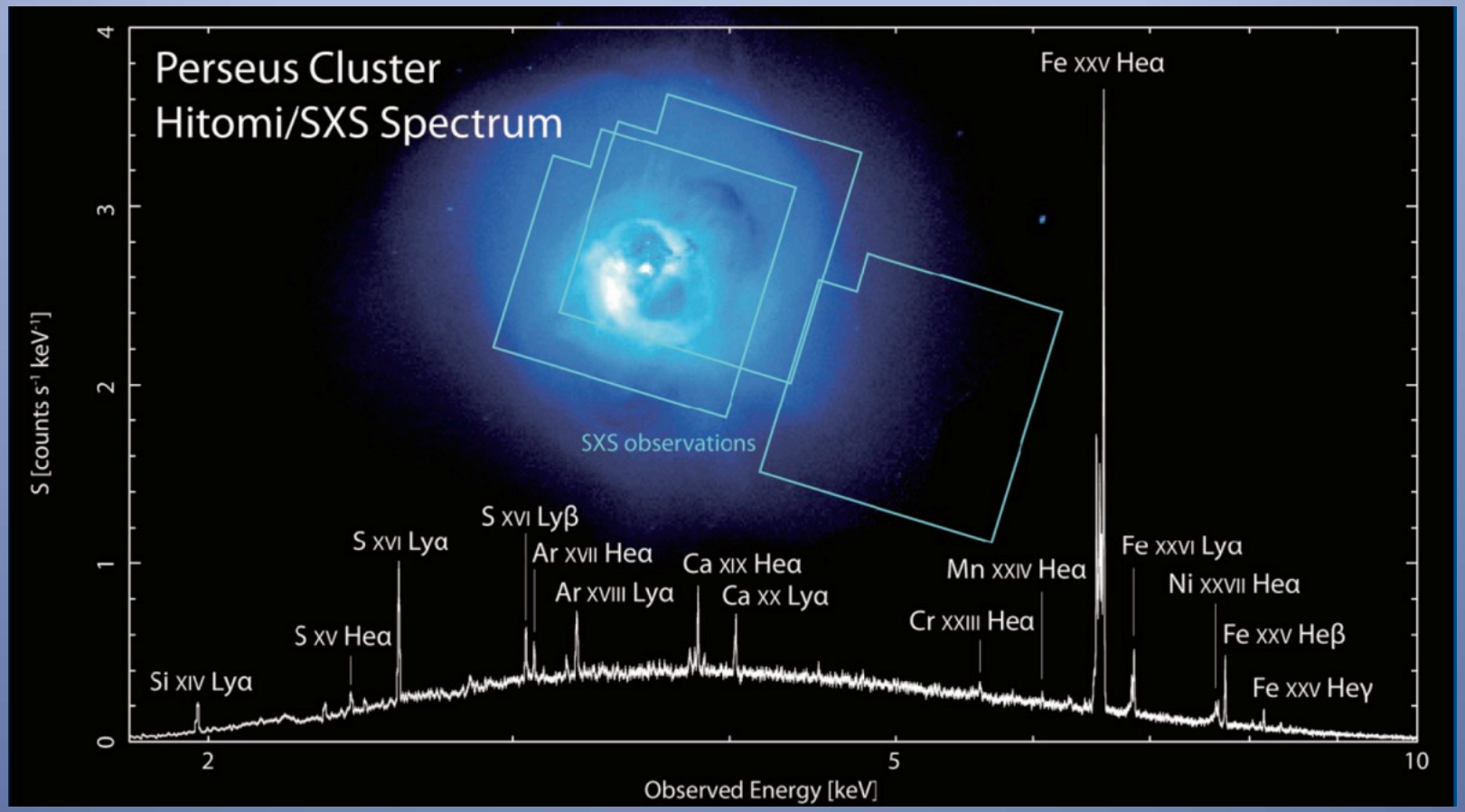
- X-ray observation in 0.3 ~ 600 keV
  - ✓ High resolution spectroscopy
  - ✓ Wide FOV Imaging
  - ✓ Hard X-ray Imaging spectroscopy
  - ✓ Super sensitive gamma-ray spectroscopy
- 2016.2.17 Launch
- 2016.3.26 communication lost
- 2016.4.28 Operation terminated

Objects observed during check-out phase

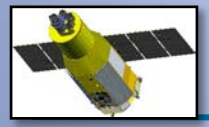
- Perseus Cluster of galaxies
- N132D
- IGR J16318-4848
- RX J1856.5-3754
- G21.5-0.9
- Crab



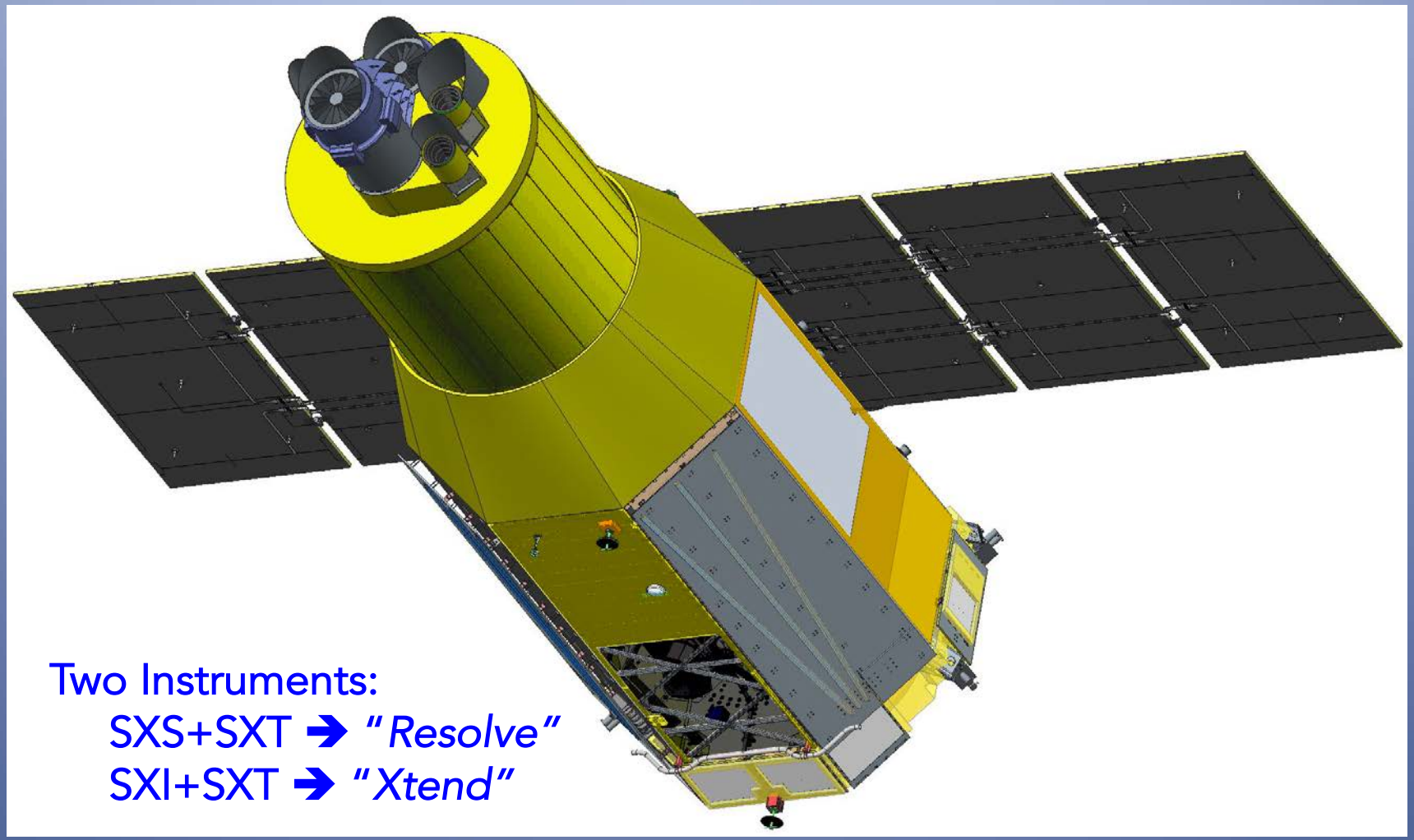




X-ray Imaging and Spectroscopy Mission



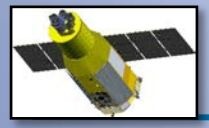
XRISM



Two Instruments:

SXS+SXT ➔ *"Resolve"*

SXI+SXT ➔ *"Xtend"*



Science objectives

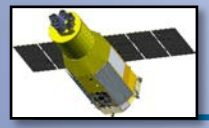
- Structure formation of the Universe and evolution of clusters
- Circulation history of baryonic matters in the Universe
- Transport and circulation of energy in the Universe
- New science with unprecedented high resolution X-ray spectroscopy

Mission requirements

- Measure ICM turbulence velocity in the accuracy of 100- 150 km/s
- Determine SNR abundance (N to Ni) and measure expanding velocity (~100 km/s)
- Measure AGN iron line profile (200 km/s)
- Measure galaxy/accretion disk wind velocity (100-150 km/s)
- General purpose X-ray observatory (100 typical targets per year)

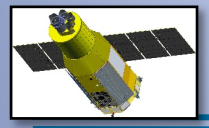
Performance requirement

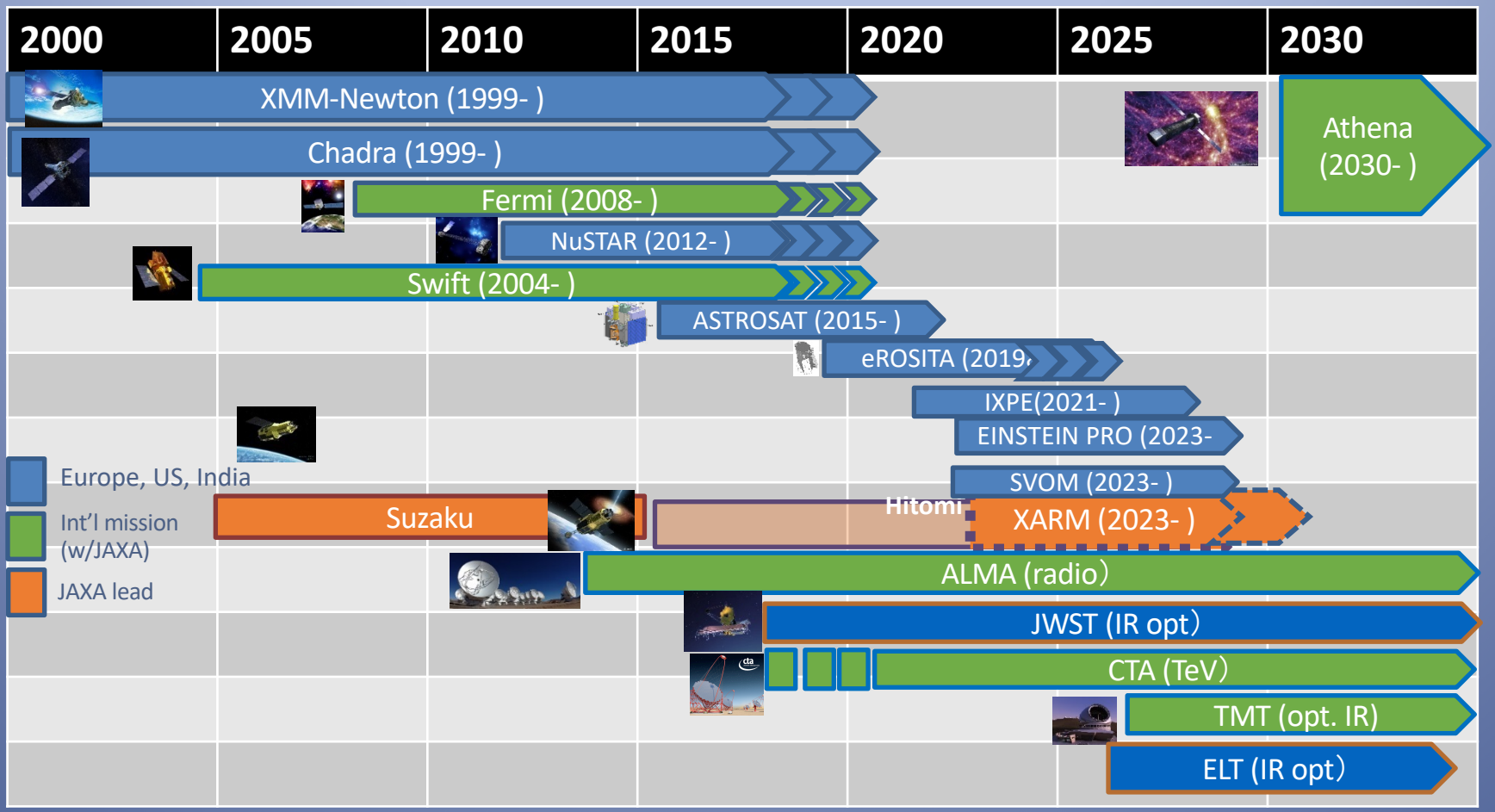
- Energy resolution < 7 eV (FWHM at 6 keV)
- Angular resolution < 1.7 arcmin (to resolve core of nearby cluster)
- Effective area at 6 keV > 500 cm^2 (> 200 cm^2 for calorimeter + > 300 cm^2 for CCD)
- Energy range 0.3-12 keV (for calorimter)



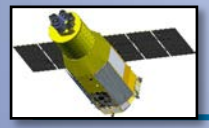
instruments

X-ray mirrors	**Conically approximated Wolter I optics (203 nested shells**	
Focal length	5.6 m	
Detector	X-ray microcalorimeter	X-ray CCD
Effective area	> 210 cm^2 @ 6 keV	> 300 cm^2 @ 6 keV
Field of view	2.9 x 2.9 $arcmin^2$	> 30 x 30 $arcmin^2$
energy range	0.3 – 12 keV	0.4 – 13 keV
Absolute energy scale accuracy	< 2 eV	
Energy resolution	< 7 eV FWHM @ 6 keV (goal 5)	< 250 eV @ 6 keV (EoL)
Non X-ray background	< 2 10^{-3} c/s/keV/array	< 1 10^{-6} c/s/kev/$arcmin^2$/cm^2





X-ray observatory：XMM-Newton, Chandra, Suzaku, Hitomi, XARM、Athena
Swift: GRB/H-X survey　Fermi:GeV gamma-ray, NuSTAR:Hard X-ray imaging, eROSITA:soft X-ray survey



Summary

- After the mishap of Hitomi…
  - Root causes of the Hitomi mishap were investigated.
  - JAXA makes revision for the science mission management

- To resume the X-ray Astrophysics that should be achieved by Hitomi, especially with the
  high energy-resolution spectroscopy with **E/ΔE ~1200 (goal of ΔE~5eV @ 6keV)**

- in the decade that no such large-scale X-ray fine spectroscopy mission is planned

- strong support by NASA, ESA and European institutes.

