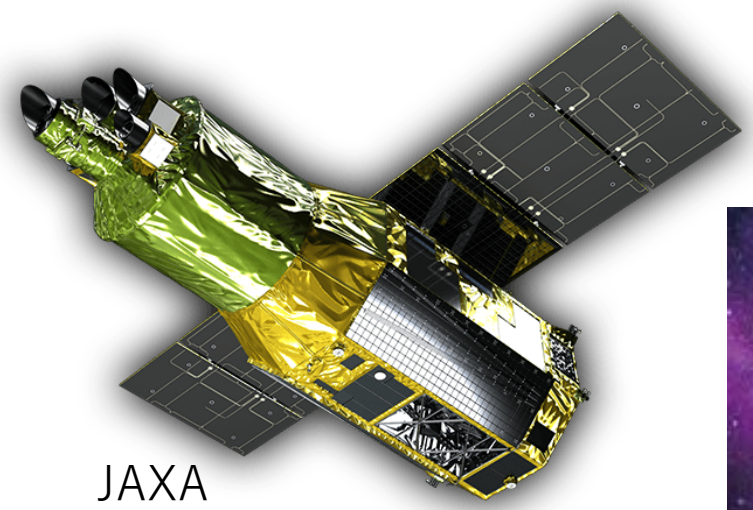
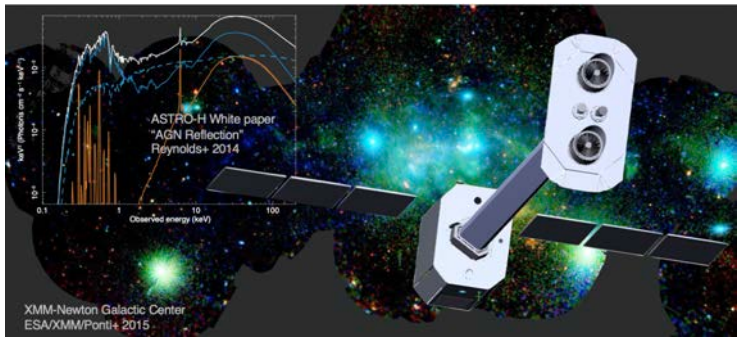
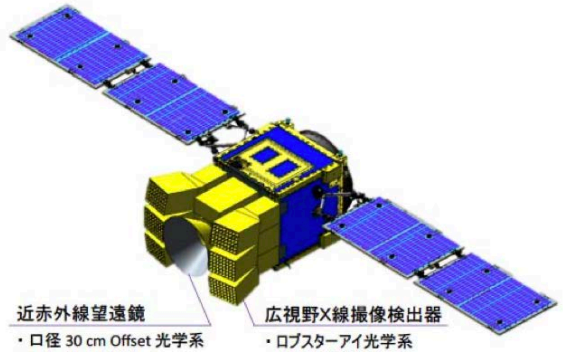
Road map of HEAPA-related future missions

HEAPA 4th Future Plan Review Committee 2020/10-2022/9
Lead: Kazuhiro Nakazawa (Nagoya-U/KMI)



JAXA





近赤外線望遠鏡
- 口径 30 cm Offset 光学系
- 4バンド同時測光
- 検出感度（10分露光, S/N=10）
  0.5 – 0.9 μm : 21.4 mag(AB)
  0.9 – 1.5 μm : 21.3 mag(AB)
  1.5 – 2.0 μm : 20.9 mag(AB)
  2.0 – 2.5 μm : 20.7 mag(AB)
- 視野：34 x 34 分角

広視野X線撮像検出器
- ロブスターアイ光学系
- CMOS 撮像検出器
- 観測エネルギー帯 0.4 – 4 keV
- 検出感度（100秒露光）：
  10^{-10} erg/cm2/s
- 視野：約 1.2 str（6台合計）

PHYSICS OF ENERGETIC AND NON-THERMAL PLASMAS IN THE X-REGION
PHOENIX

Vision

Preface

Astronomical X-ray and Gamma-ray observations are directly related with understanding the how matter and energy exits within the Universe, not only celestial objects, but also the volume itself. They are also key enablers to dig into the extreme physics. In the two broadest aims of astrophysical research, understand the Universe as of now, and understand how it came to be as such, high-energy astrophysics plays an essential role.

Vision: three big goals

Understand our Universe; matter, energy and spacetime, and its origin

Dark matter : LSS/clusters to see where DM are, and search for DM direct signal
Missing baryon : how the baryon and metals are distributed in the Universe

Origins of the large diversity in Universe and celestial objects

Galaxy and SMBH co-evolution and their impact on re-ionization
Metal synthesis in the Universe
Relativistic high-energy phenomena in the Universe

Verifying fundamental physics in extreme condition

Extreme gravitation : stellar-mass BH, SMBH
Extreme high-density matter EoS : Neutron star, quark star
Extreme magnetism : Magnetar
Diffusive shock : wide variety of yet to be known interactions therein
Dark Matter (Re): search for its direct signal

Mission Categories by JAXA

class	How to launch	Definition and budget
Strategic Large class	H-IIA, H-III	Top science. Flagship mission of each community. Can be international, lead by Japan. (< ¥30B ~ $300M)
Competitive Middle class	Epsilon	Agile and challenging (< ¥15B ~ $150M))
MoO	Large International Collaboration	Within JAXA total budget of ¥1B/year ($10M/yr)
Small projects	Small international Collaboration (sub-paylode, balloon, ISS etc.)	Each project shall be < ¥0.2B ($2M) total

Science “Environments”

USA and ESA

Decadal survey (Large missions and Probes) + MIDEX/SMEX proposals
Lynx, AXIS, Strobe-X, TAP, Arcus, IXPE, COSI-SMEX, +
Cosmic Vision and Voyage 2050
Athena + Theseus, + many under discussion

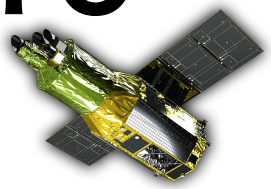
China, India and Others

Aim of this session

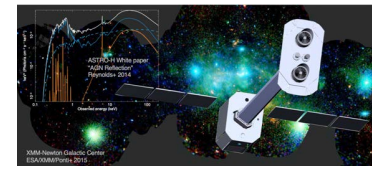
Astrophysics and Cosmology overall

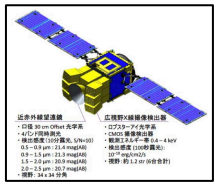
JWST, LSST, SKA, CTA will come within this decade. GW: LIGO (US, India)/Virgo are improving or up-coming, also KAGRA (Japan). Neutrino: ICE cube, Hyper-KAMIOKANDE will also come. We are living in a multi-frequency/multi-messenger astronomy era. Time domain is also an emerging field.

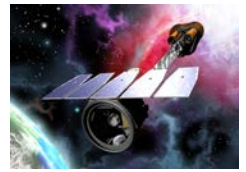
HEAPA Road Map as of 2020/10



		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	
HEAPA main stream	XRISM	Dev.				Obs.					Late-phase Obs.							High-reso Spectroscopy
	Athena	Dev.														Obs.		
	FORCE	Dev.									Obs.							Wide-band (incl. hard X-rays)
HEAPA-involved inter community	HiZ-GUNDAM	Dev.									Obs.							transient
	PhoENiX	Dev.									Obs.							solar mag-reconnection
International contribution	IXPE	Dev.					Obs.											soft X-ray polarimetry







Ballooning (XL-Calibur, Smile, GRAINE etc..)
Nano-sats
International contribution

JAXA Continuous technology development activities

Refer to the following talks for details of these missions

Tasks for 4th committee (2020/10-2022/9)

Revisiting road map 2021-2030

- Continuous update

Start discussing visions for 2040

- Wide vision
  - Japan-lead with international major collaboration,
  - Japan-local with international support,
  - foreign-lead Japan major contribution,
  - foreign-lead Japan support

+ Young researchers encouraging actions: increasing space-born mission development experiences, and international collaboration activities