

Questions

1

Is there a significant part of science that is not currently covered by space missions (internationally)?

2.

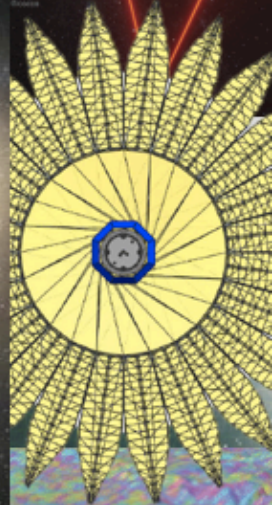
Is there an overlap between current and planned future missions internationally and how can we coordinate the X-ray community to make plans together for the future?

~100 Voyage 2050 White Papers

GAUSS

Voyage 2050 White Paper
Unveiling the Gravitational Universe
at $\mu\text{-Hz}$ Frequencies

Presentation to the community
October 29-30, 2019, CSIC Madrid.
Register at
<https://www.cosmos.esa.int/web/voyage-2050-workshop>



Longonot

AMBITON

Voyage 2050 White Papers relevant for “The X-ray Universe”

[possibly incomplete list, please forgive any omissions]

A Deep Study of the High–Energy Transient Sky - C. Guidorzi

next-generation THESEUS

Polarimetric High Energy Modular Telescope Observatory (PHEMTO) - P. Laurent

next-generation NuSTAR / FORCE

The Voyage of Metals in the Universe from Cosmological to Planetary Scales - F. Nicastro

next-generation XMM-Newton RGS / Arcus

Voyage through the Hidden Physics of the Cosmic Web - A. Simionescu

next-generation Athena

A Polarized View of the Hot and Violent Universe - P. Soffitta

next-generation IXPE / eXTP

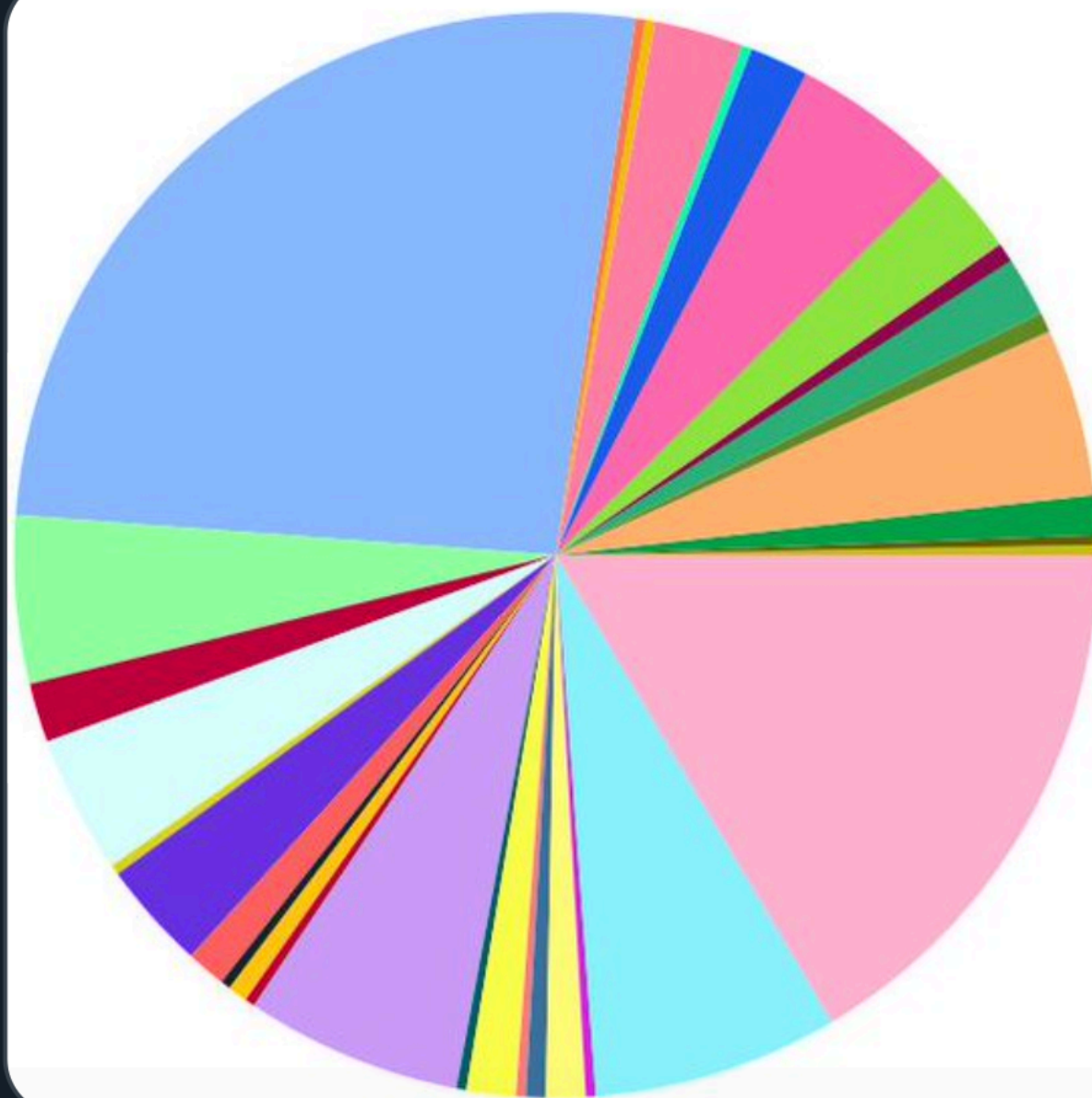
The high energy universe at ultra-high resolution: the power and promise of X-ray interferometry - P. Uttley

the first of its kind? But see MIXIM and MAXIM

[Bonus]: Gamma-ray Astrophysics in the MeV Range - A. De Angelis (*~the next COMPTEL*)

full list at: <https://www.cosmos.esa.int/web/voyage-2050/white-papers>

X-ray astronomers are gathering in Bologna from 33 countries! [#xrayastronomy19](#)



Countries and participants

Brazil 1 (0.3%)	Netherlands 14 (4.1%)
Canada 1 (0.3%)	Pakistan 1 (0.3%)
Chile 4 (1.2%)	Poland 11 (3.2%)
China 17 (5.0%)	Republic of Korea 4 (1.2%)
Colombia 2 (0.6%)	Romania 1 (0.3%)
Czechia 6 (1.8%)	Russian Federation 2 (0.6%)
Finland 2 (0.6%)	South Africa 1 (0.3%)
France 9 (2.6%)	Spain 22 (6.5%)
Germany 17 (5.0%)	Sweden 1 (0.3%)
Greece 6 (1.8%)	Switzerland 5 (1.5%)
Hungary 1 (0.3%)	Taiwan 1 (0.3%)
India 9 (2.6%)	Thailand 2 (0.6%)
Ireland 1 (0.3%)	Turkey 4 (1.2%)
Islamic Republic of Iran 1 (0.3%)	United Arab Emirates 1 (0.3%)
Italy 89 (26.2%)	United Kingdom 25 (7.4%)
Japan 17 (5.0%)	United States 56 (16.5%)
Mexico 6 (1.8%)	

The ESA Fleet for Astrophysics



→ COSMIC OBSERVERS

CONCEPTS



spica

IN DEVELOPMENT



webb
(2021)



ariel
(2028)



euclid
(2022)



cheops
(2019)



plato
(2026)



xrism
(2021)



einstein
probe
(2022)



athena
(2031)



theseus



lisa
(2034)

OPERATIONAL



hubble
(1990-)



gaia
(2013-)



xmm-
newton
(2000-)



integral
(2002-)

microwaves

sub-millimetre

infrared

optical

ultraviolet

x-rays

gamma rays

gravitational
waves

ESA Missions of Opportunity

Corot
Microscope
Hinode
Proba-2
Hitomi
ExoMars
IRIS
Proba-3
XRISM
Einstein Probe
MMX
WFIRST
LiteBIRD
eXTP
Taiji
ULTRASAT
HERA
Lagrange L5
Lunar Gateway

Exoplanets
Fundamental physics
Solar physics
Plasma physics
X-ray astronomy
Planetary science
Solar physics
Solar physics
X-ray astronomy
X-ray astronomy
Planetary science
NIR Astronomy
Cosmic Microwave
X-ray Astronomy
Gravitational Waves
UV All-Sky Survey
Asteroid deflection
Space Weather
Planetary science

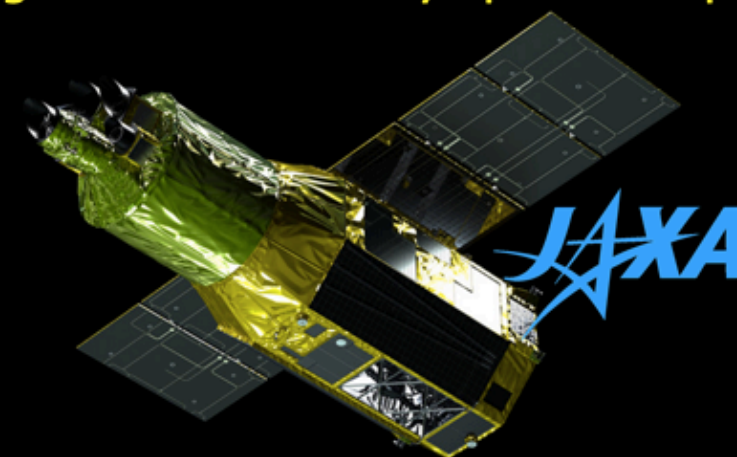
France
France
Japan
TEC/Belgium
Japan
HRE/Russia
NASA
TEC/Belgium
Japan
China
Japan
NASA
Japan/France
China
China
Israel
TEC/OPS/Safety
OPS/TEC/Safety
HRE



ESA is THE
partner of choice for
international cooperation

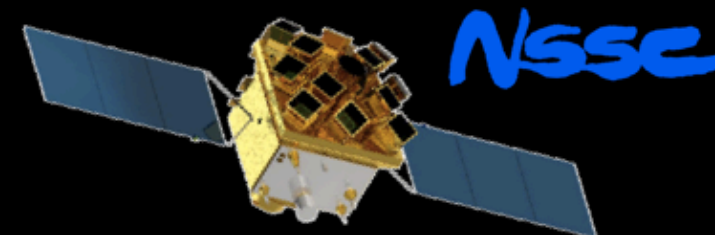
XRISM

High resolution X-ray spectroscopy

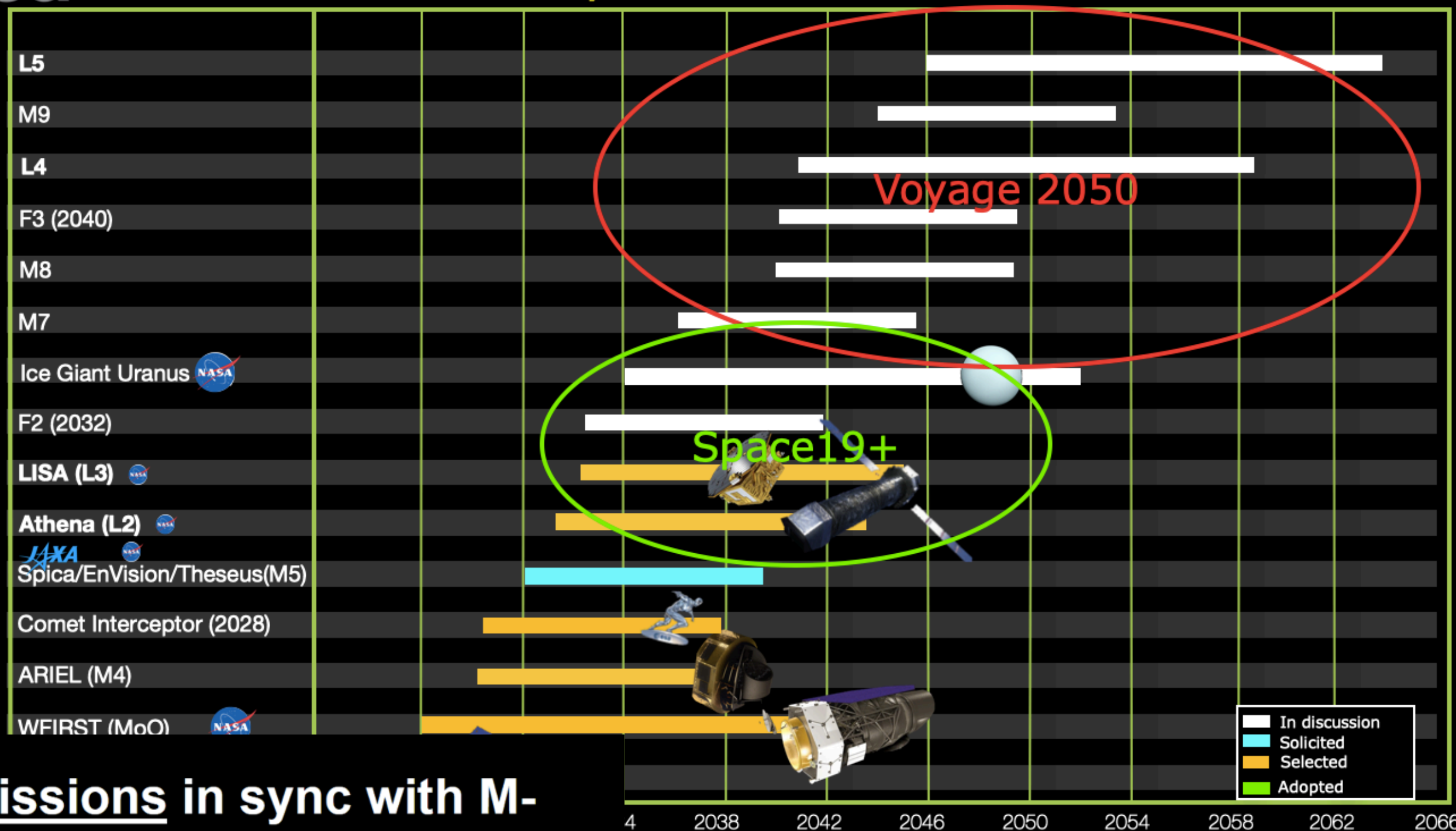


Einstein Probe

X-ray transients, multi-messenger



Future ESA Space Science Missions



F-missions in sync with M-missions (joint launch) → new line of opportunities with special emphasis on novel implementations