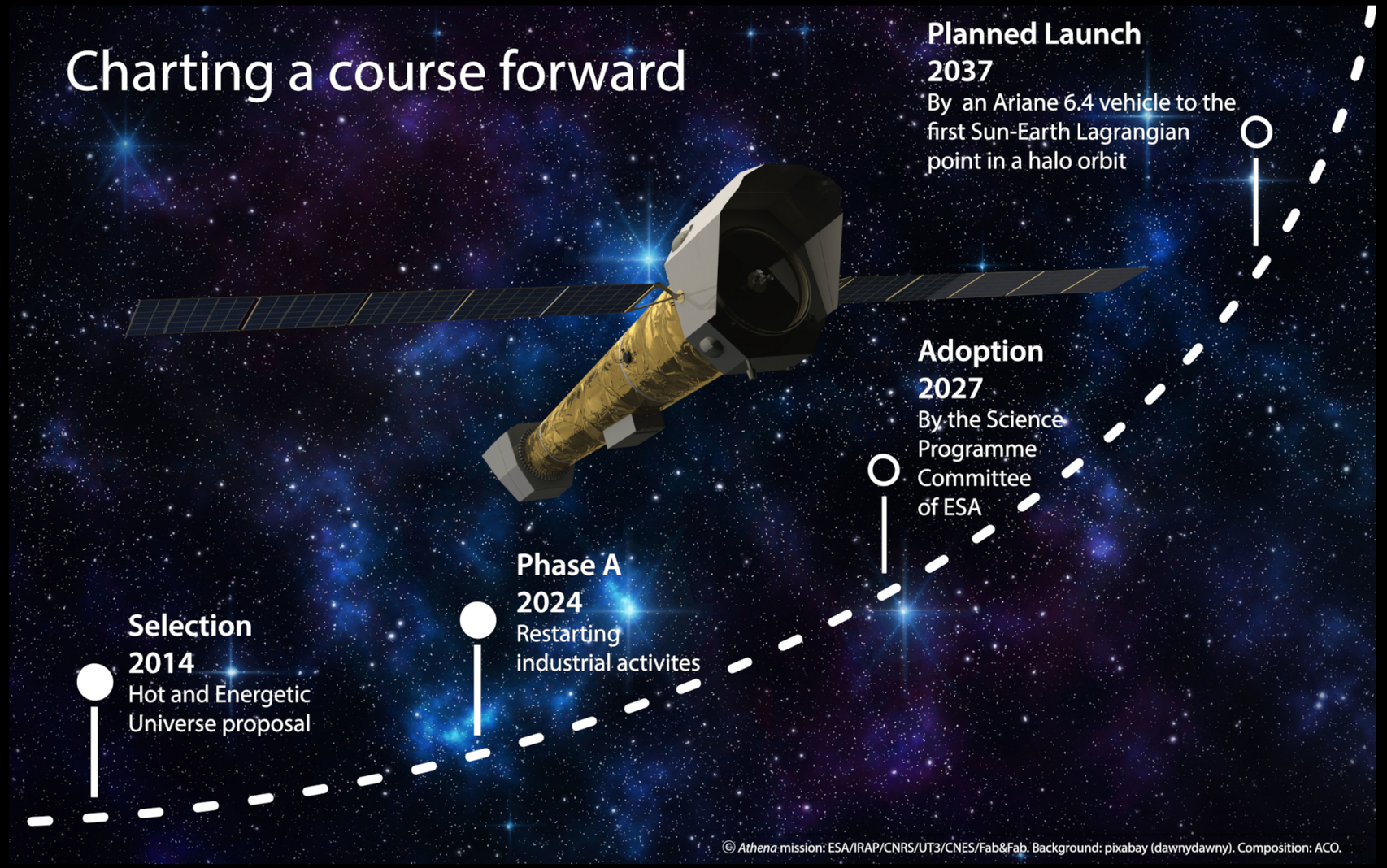
New-ATHENA - High resolution X-ray mission with micro-calorimeter on the board



Agata Różańska + ATHENA.PL, CAMK PAN

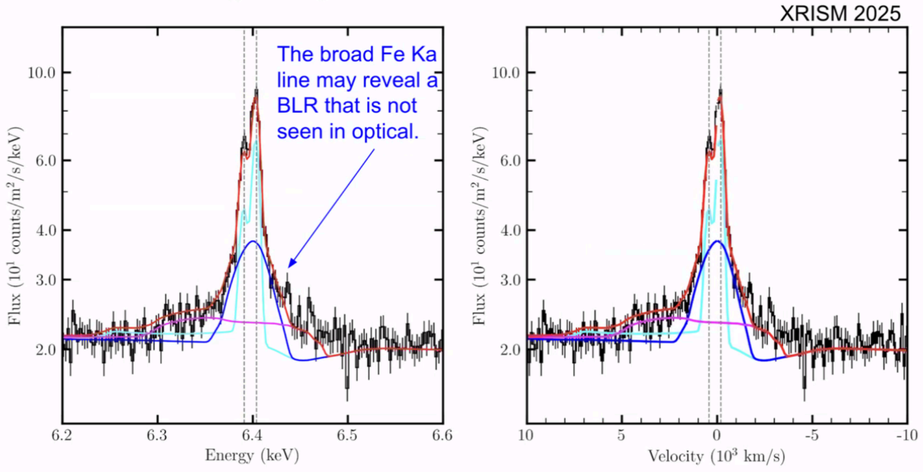
XRISM, X-ray Imaging and Spectroscopy Mission, JAXA recovery mission after the lost of HITOMI

At June 2024, I was participating in XRISM OTAC pannel - reviewing proposals

OTAC - Observing Time Allocation Committee

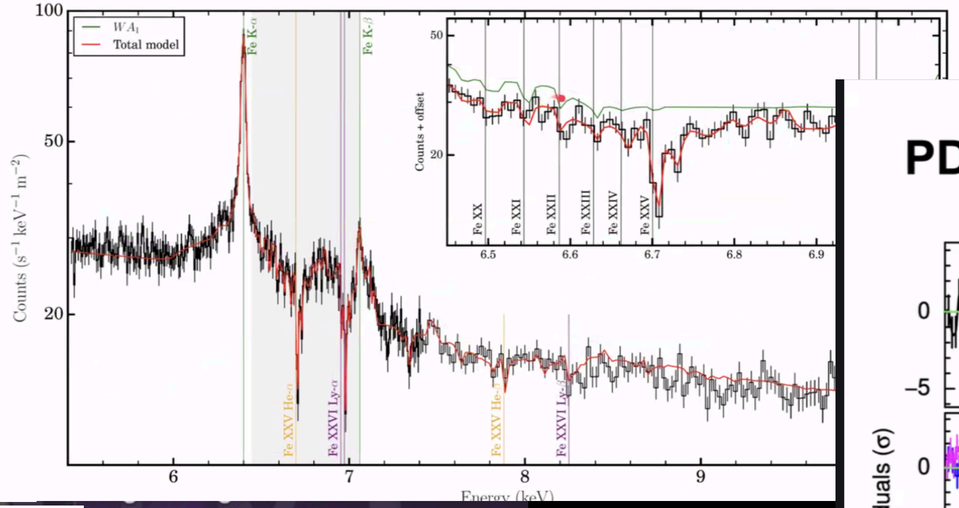
XRISM, X-ray Imaging and Spectroscopy Mission, JAXA recovery mission after the lost of HITOMI

Cen A: radio galaxy

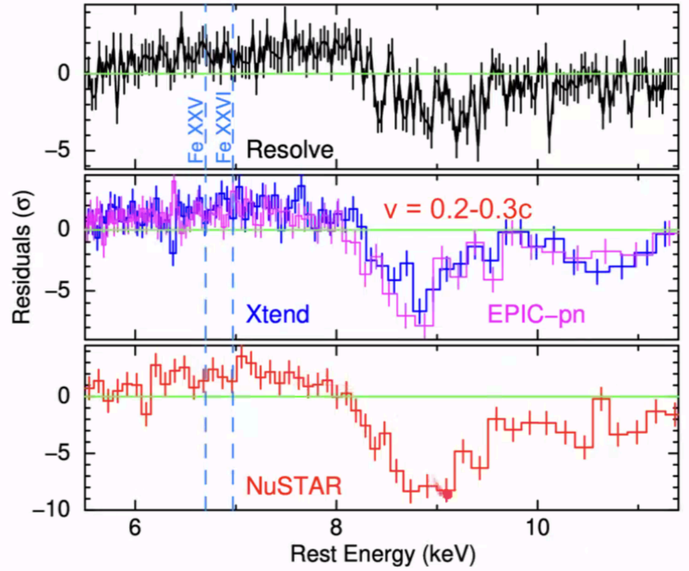


NGC 4151: winds, winds, winds

XRISM, Xiang et al. 2025

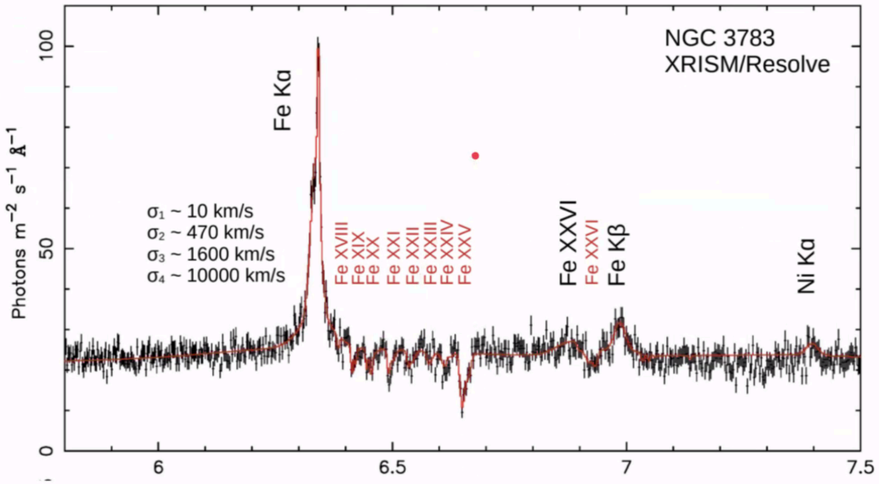


PDS 456: UFOs



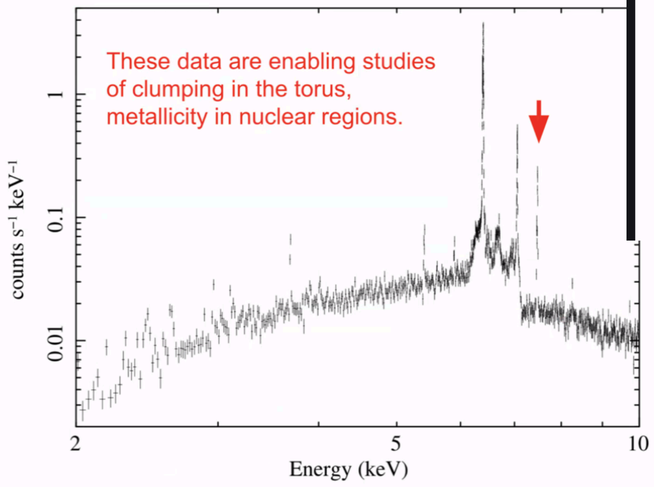
NGC 3783: Unsaturated lines

XRISM, Gu, Kaastra, et al. 2025



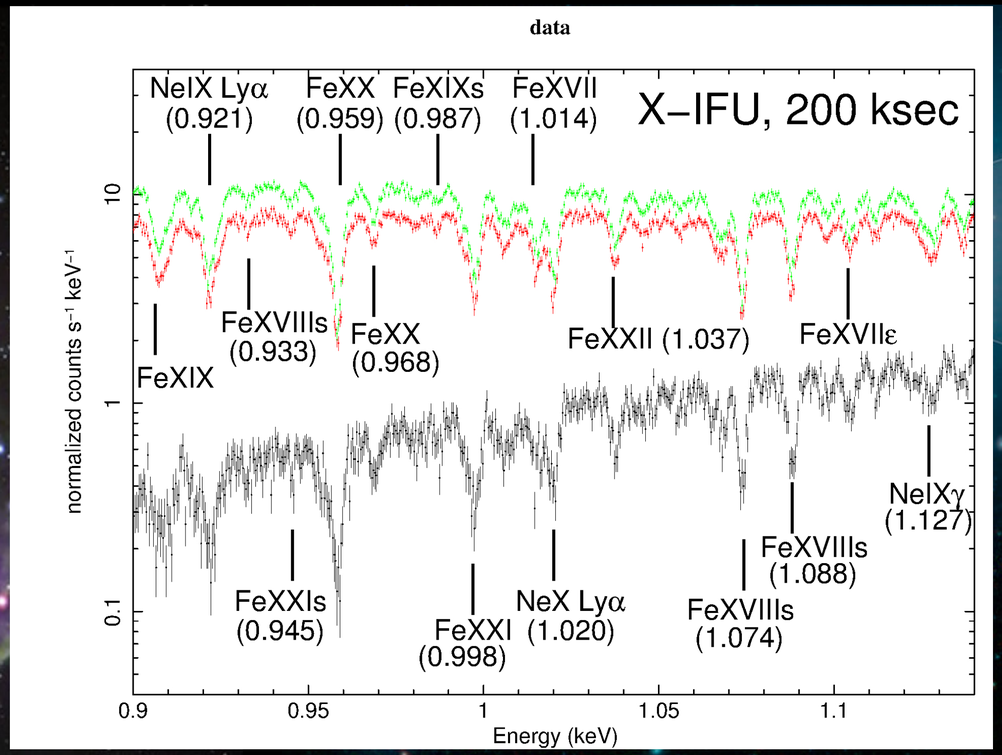
Circinus Galaxy

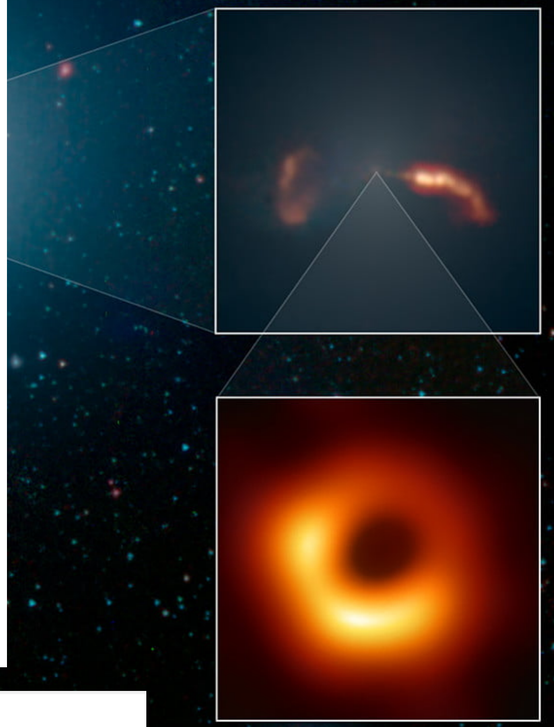
XRISM, Ueda et al. 202

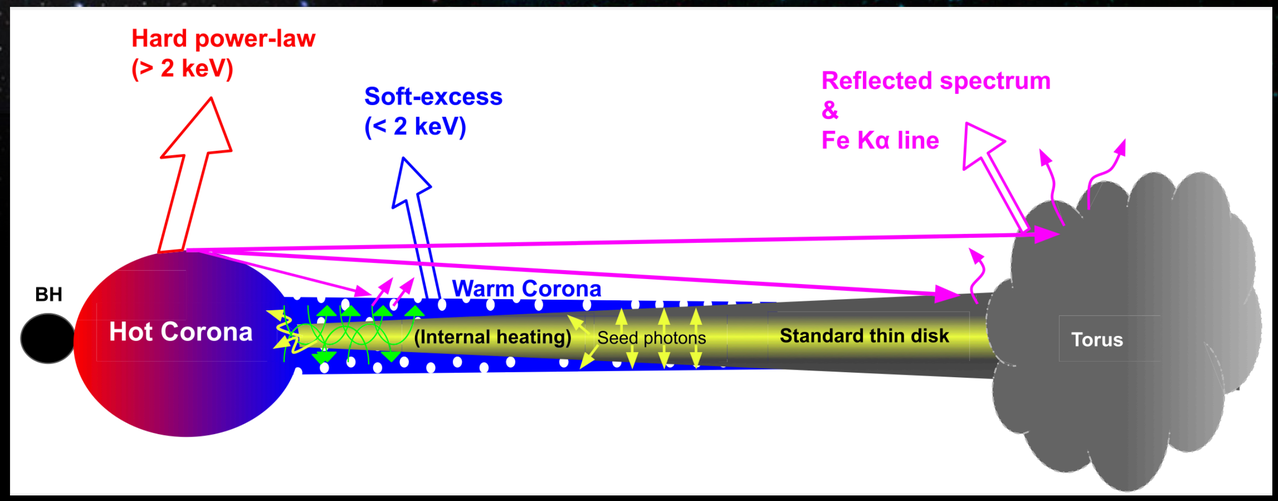


X-ray fingerprints from accreting compact objects

Centaurus A





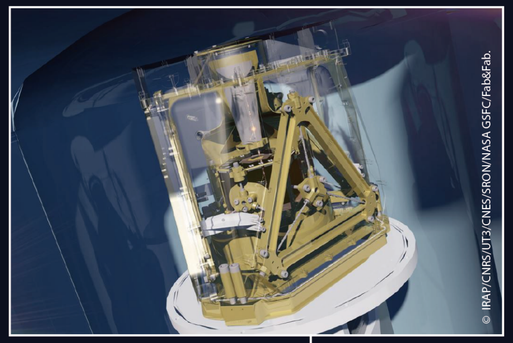


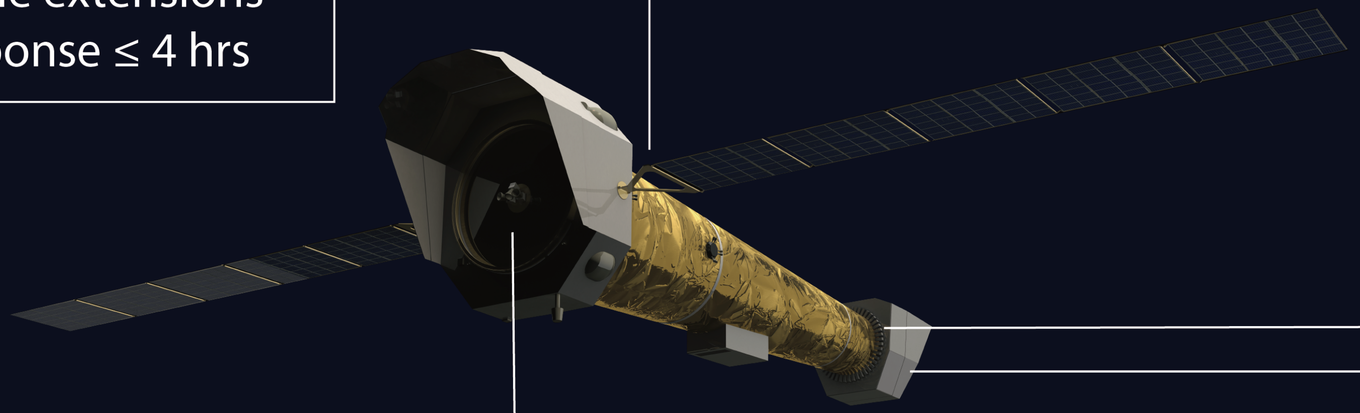
Large ESA flag mission

The *Athena* X-ray observatory

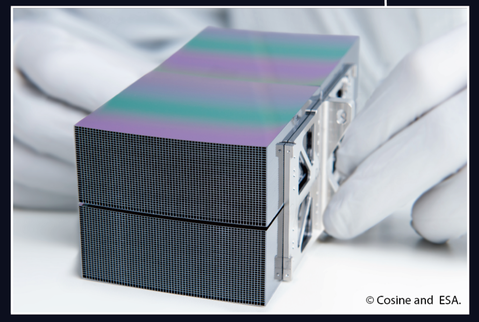
Ariane 6
L1 orbit
4 years nominal mission
+ possible extensions
ToO response ≤ 4 hrs

X-ray Integral Field Unit:
ΔE: 2.5 eV
Field of view: 5 arcmin
Operating temperature: 50 mK

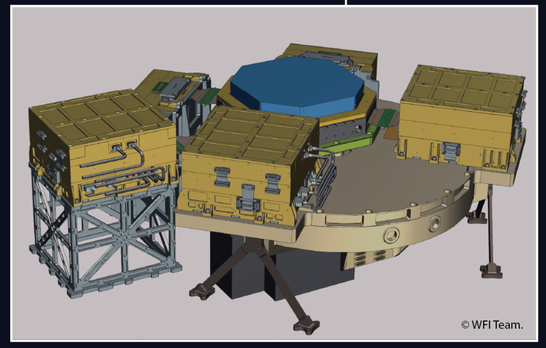




Silicon Pore Optics:
1.4 m^2 at 1 keV
5 arcsec HEW
Focal length: 12 m
Sensitivity: 3 10^{-17} erg cm^{-2} s^{-1}



Wide Field Imager:
ΔE: < 80 eV at 1keV
Field of view: 40 arcmin
Small/Fast detector for
bright sources



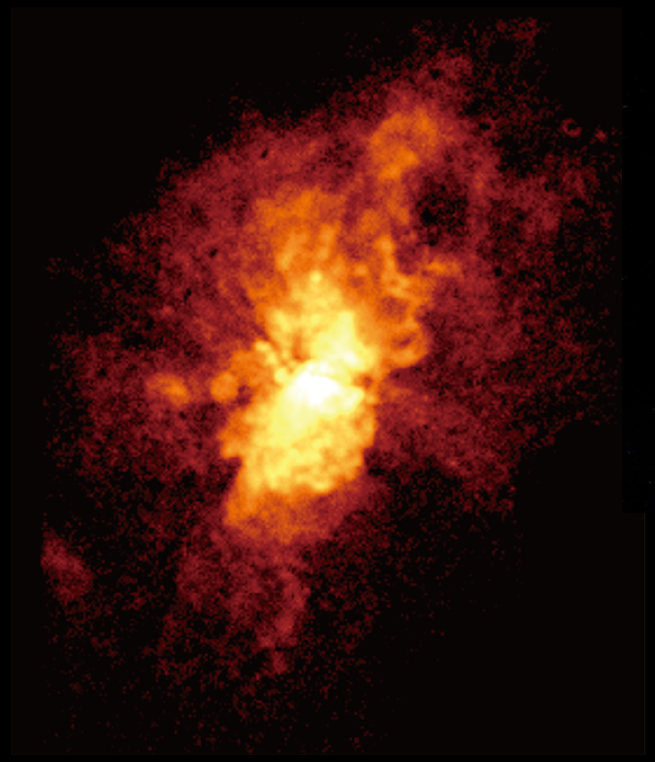
Large ESA flag mission

- How does the large scale structure in the Universe form and evolve?
- How do black hole grow and help shape the Universe?
- How and when are the chemical elements formed?

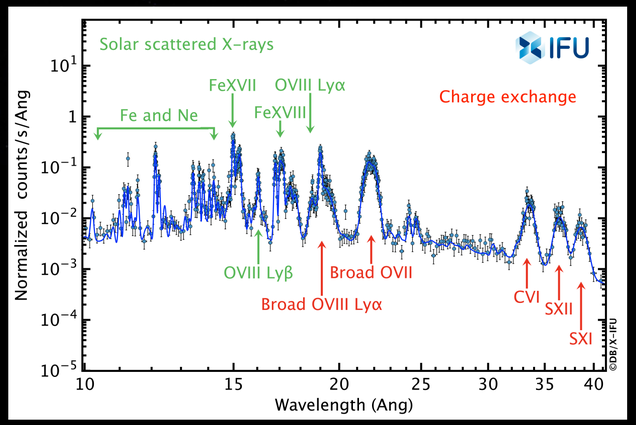
Athena is an observatory with ~500 projects/year:

- Stars, exoplanets, pulsars, neutron stars, gravitational wave events, galaxies
- Unprecedented discovery space

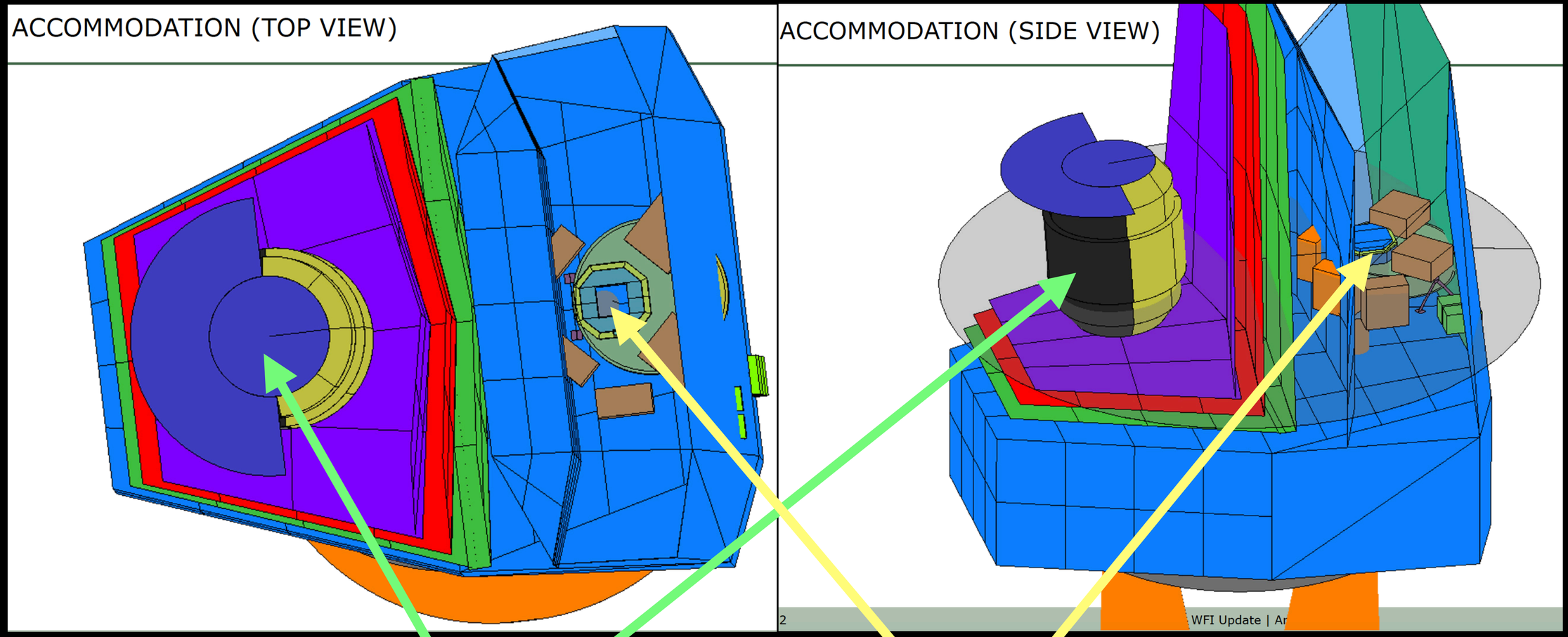
M82. WFI. SIXTE



© ACO & SIXTE Team.



NewATHEAN focal plane re-designing phase

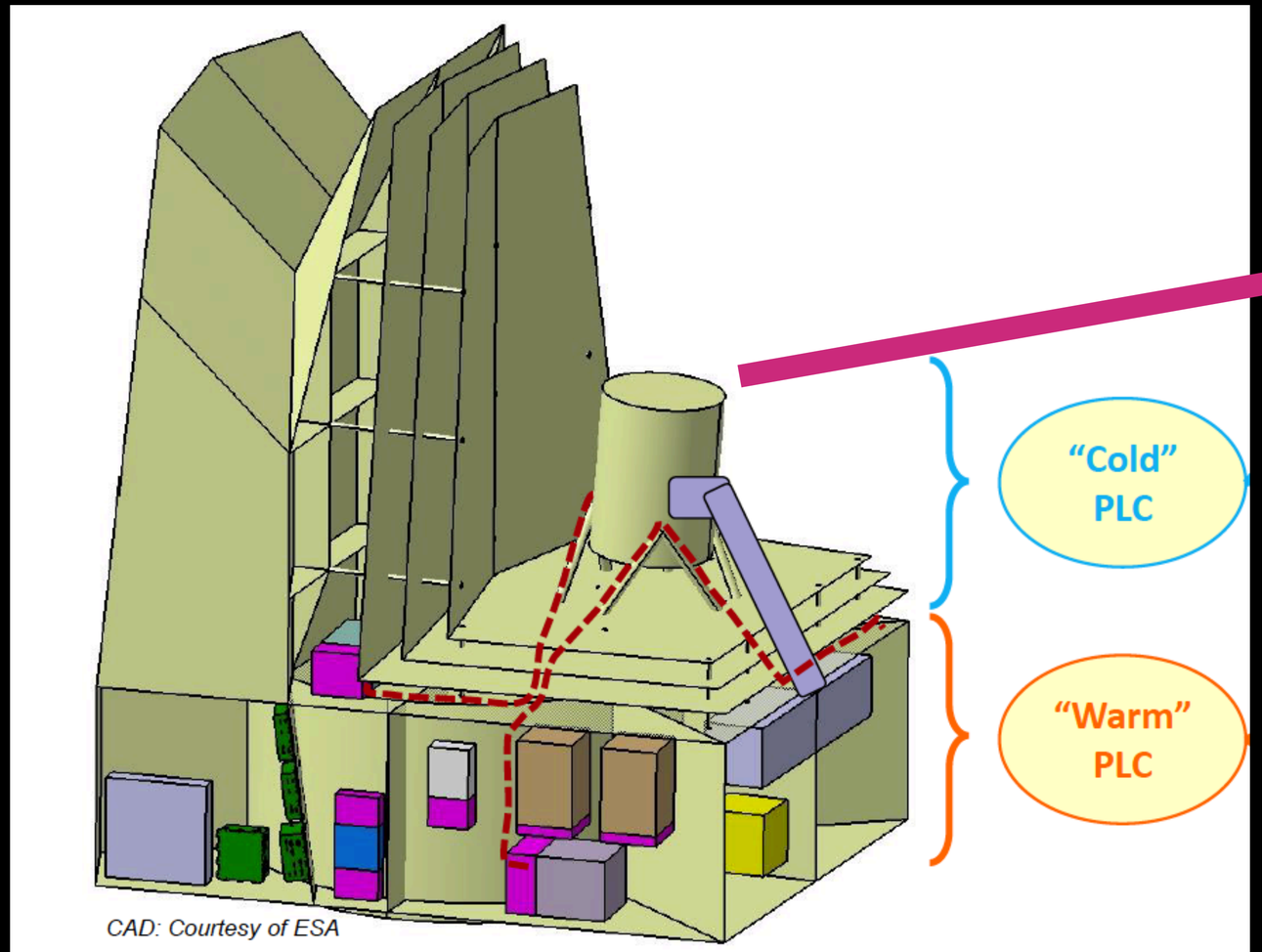


X-IFU

WFI

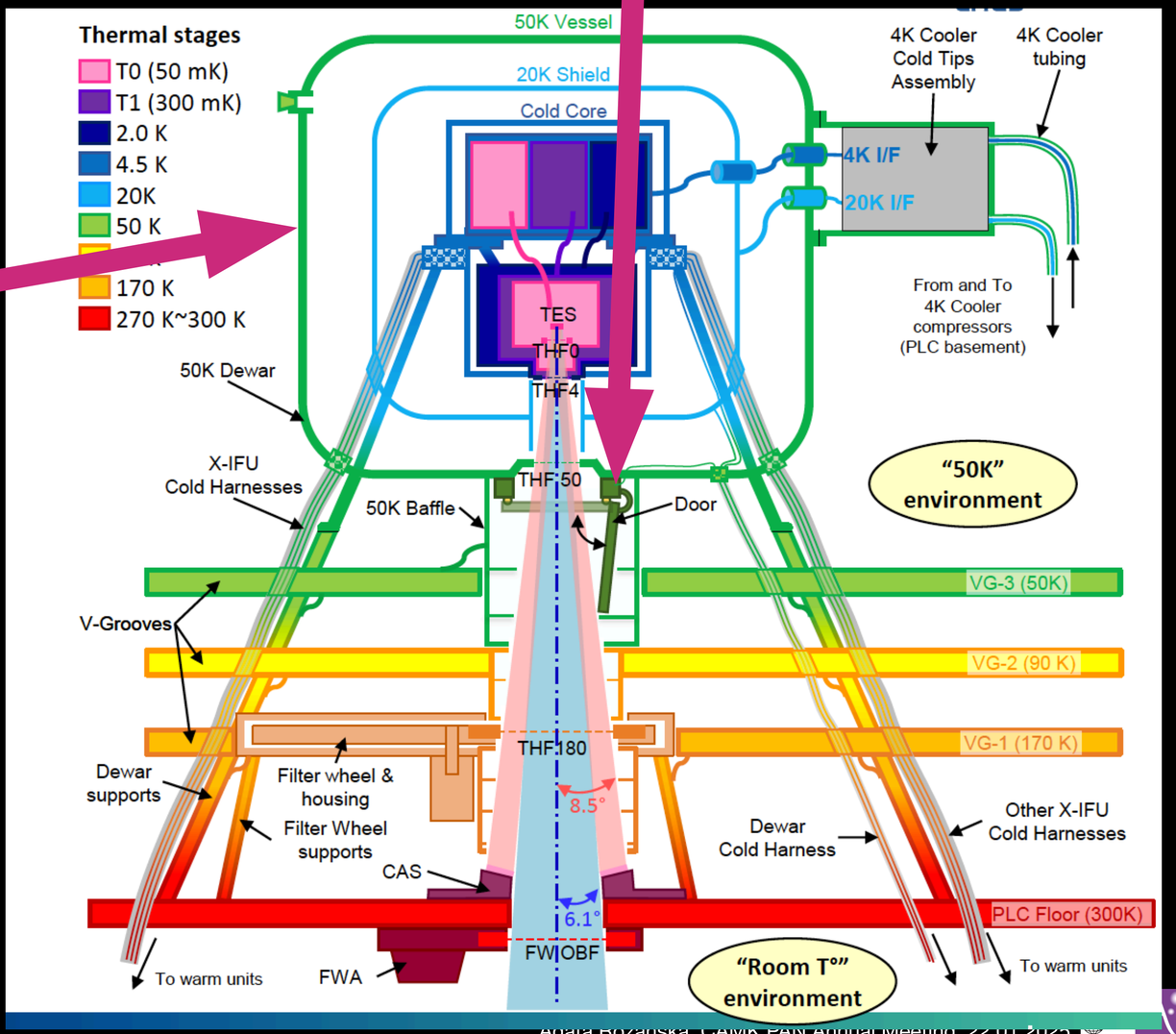
X-IFU - new cooling method, simpler and cheeper

Cold passive cryostat:
V-groove (or L-groover) technology can replace all shield coolers:



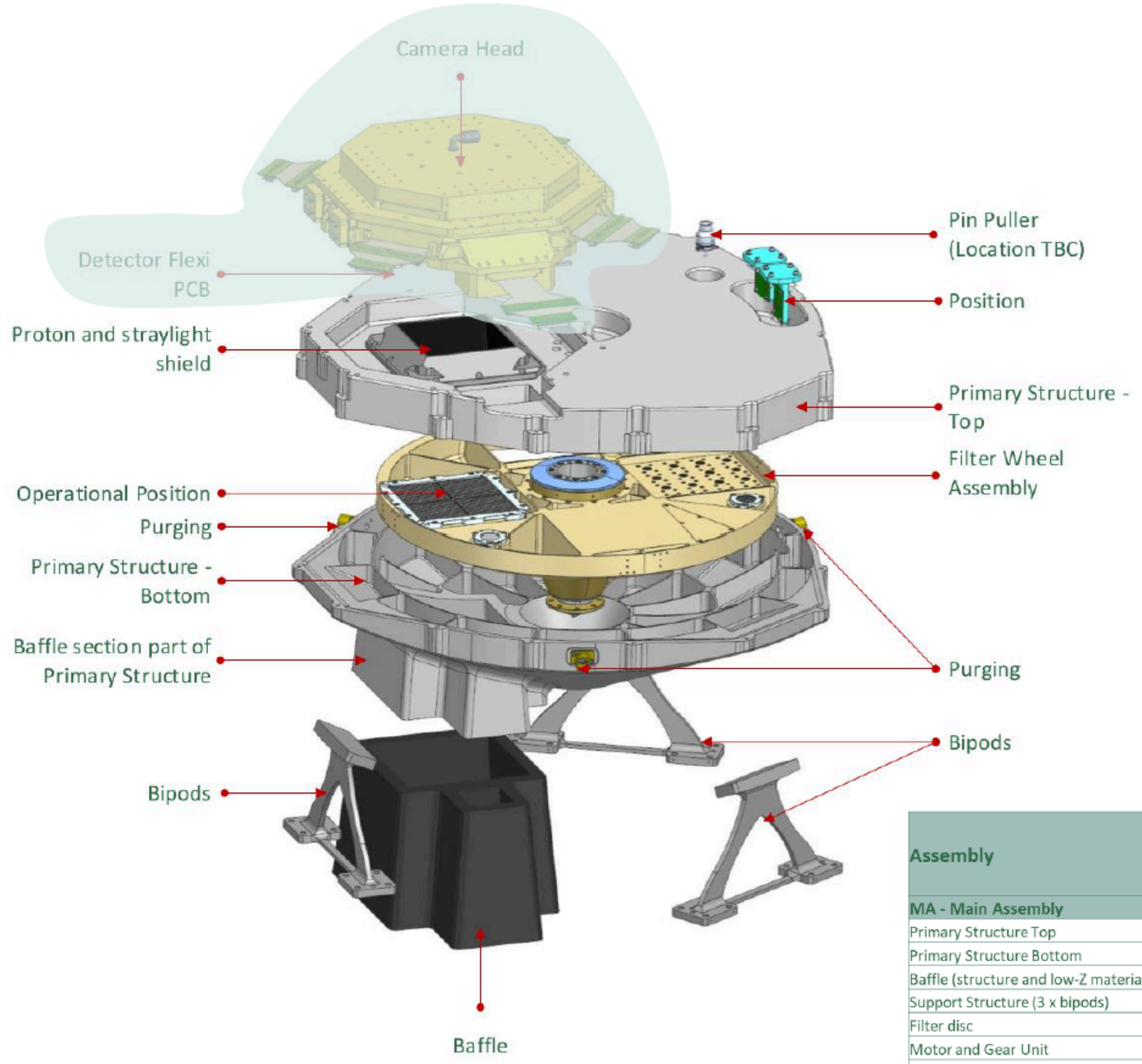
X-IFU in the NewAthena PayLoad Compartment

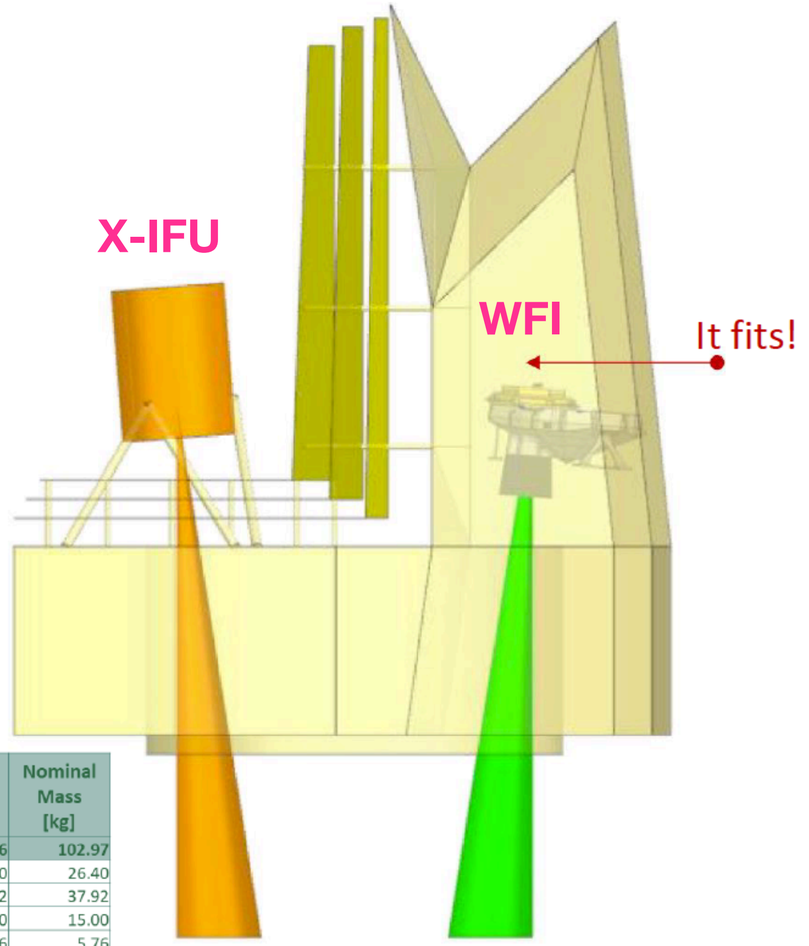
X-IFU Entrence Assembly



Lobbing and Politics come to the game: WFI CM 27.11.2023

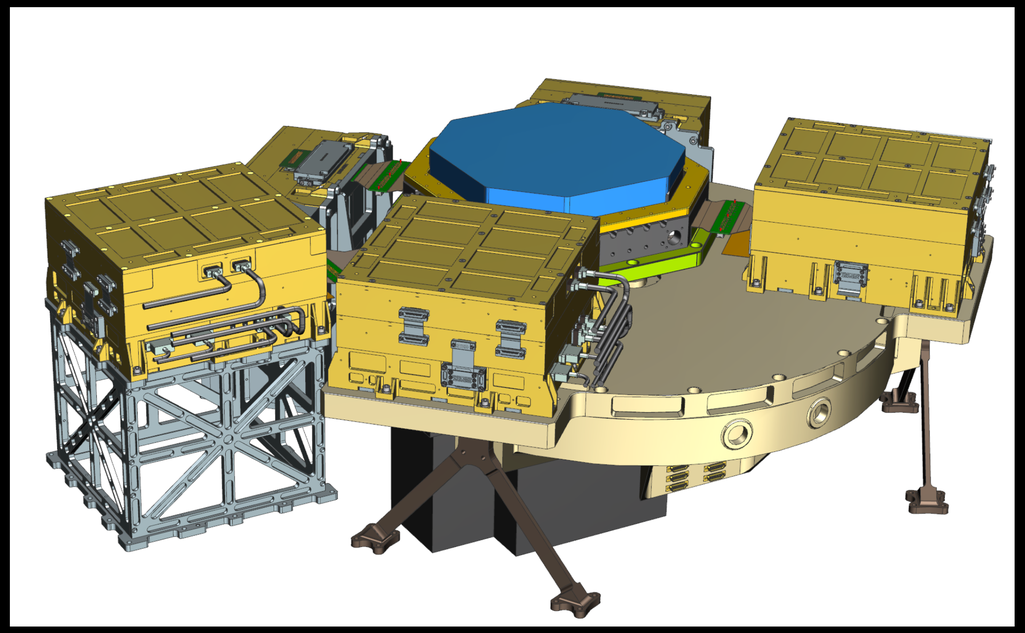
Main Assembly Overview

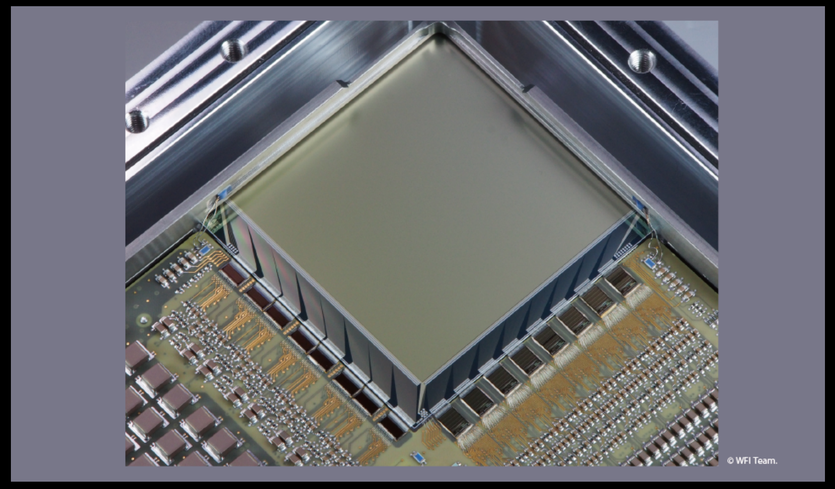




Assembly	Current Best Estimate [kg]	DMM	DMM [kg]	Nominal Mass [kg]
MA - Main Assembly	85.81	20%	17.16	102.97
Primary Structure Top	22.00	20%	4.40	26.40
Primary Structure Bottom	31.6	20%	6.32	37.92
Baffle (structure and low-Z material)	12.5	20%	2.50	15.00
Support Structure (3 x bipods)	4.80	20%	0.96	5.76
Filter disc	7.30	20%	1.46	8.76
Motor and Gear Unit	6.95	20%	1.39	8.34
Functional Components of filter disc	0.66	20%	0.13	0.80

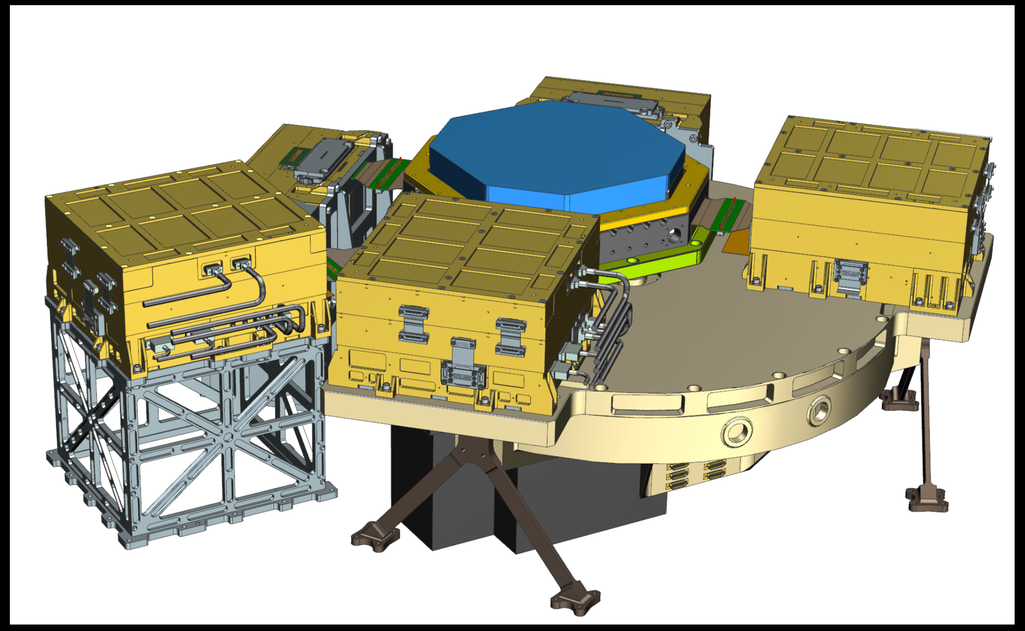
Wide Field Imager - WFI: CBK+CAMK Filter wheel + PSU



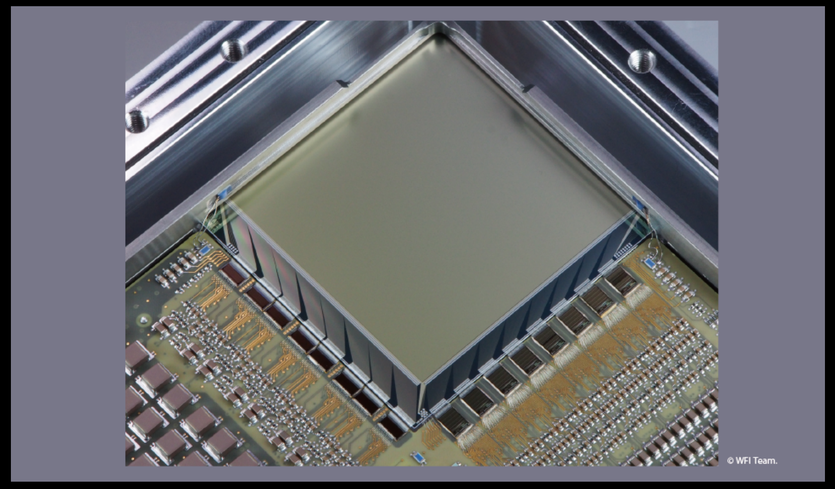


DEPFET - DEPleted Field Effect Transistor

Wide Field Imager - WFI: CBK+CAMK Filter wheel + PSU

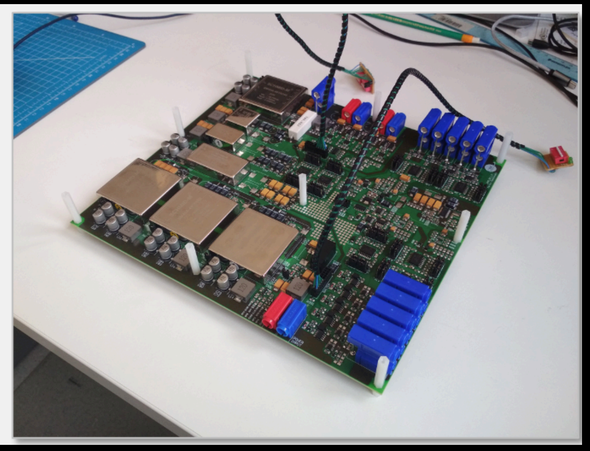


Prototype of the Filter Wheel



DEPFET - DEPleted Field Effect Transistor

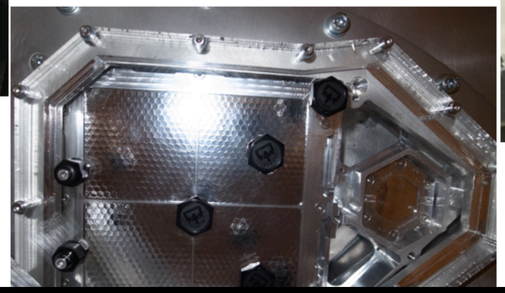
Breadboard of two electronic parts



New-ATHENA - High resolution X-ray mission with micro-calorimeter on the board

Acoustic tests of FWA - results

- All filters survived.
- It was proved that our design is good enough to launch WFI in normal conditions i.e. without vacuum.
- Our filter wheel will be used in ATHENA, and may be used in OTHER missions which require thin, large area filters.



in 2019

MY ACTIONS in 2024 - instrumental projects:

- XRISM OTAC panel - reviewing proposals
- Two Consortia meetings - WFI and X-IFU
- Participation in Ground Segment working groups
- Many discussions on the extension of Polish participation in NewATHENA hardware
- Talk on the conference - ESA missions, by Ministry of Science and Higher Education and ESA - finally our project cards to ESA were signed
- Evaluation of ARCUS mission - proposal for NASA

M S:

- XRISM
- Two Co
- Particip
- Many di HENA hardwa
- Talk on higher Educati
- Evaluat