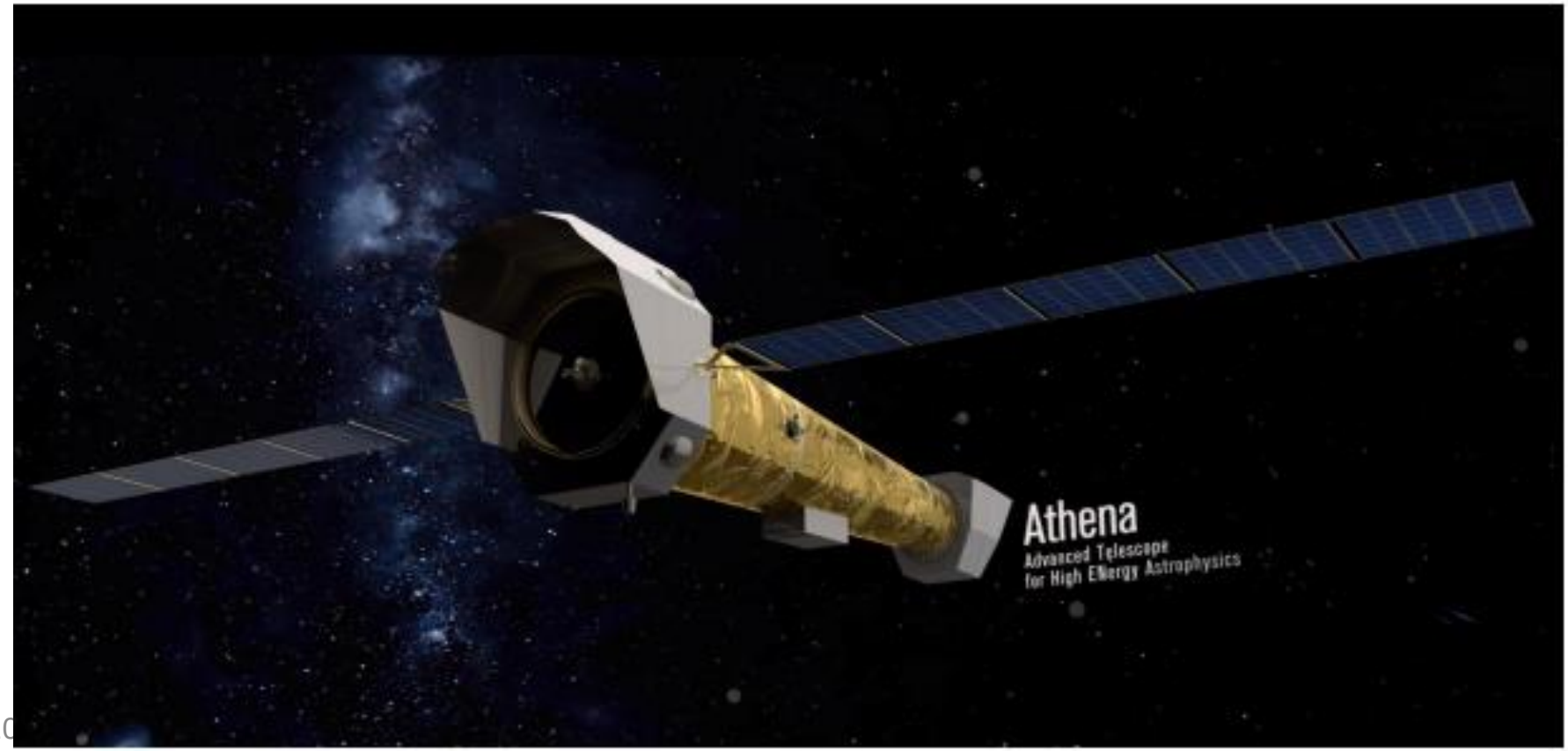
Athena

Hiro Matsumoto (Osaka U.)

Advanced Telescope for High-Energy Astrophysics

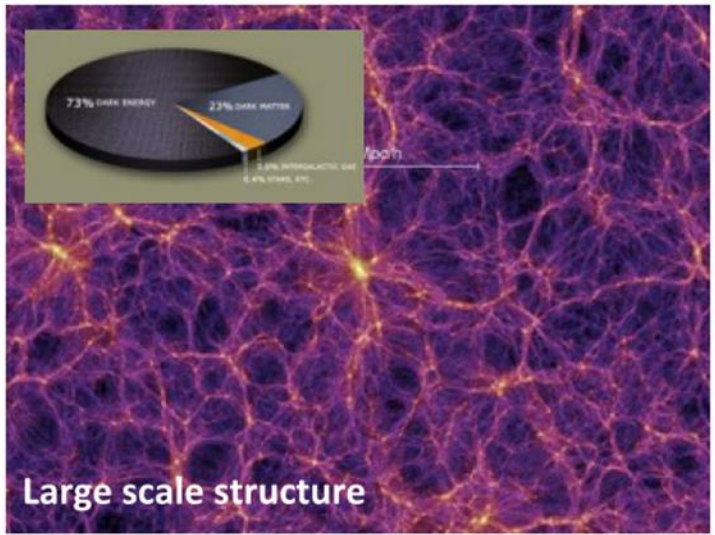


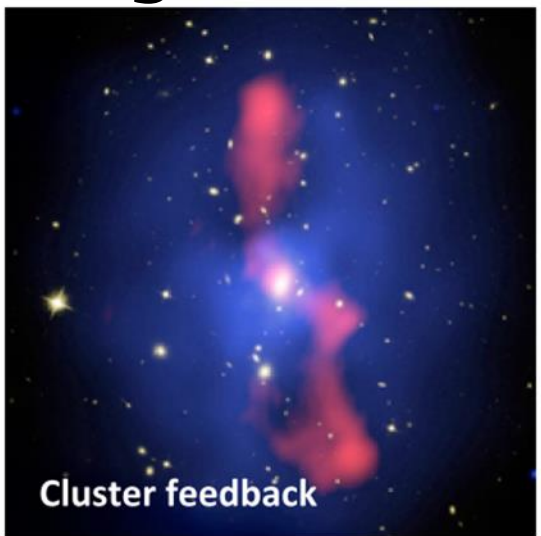
Athena

- The second Large mission of ESA cosmic vision program.
  - With NASA & JAXA collaboration.
- Launch around early 2030s

Athena Science

- Hot Universe
  - How are galaxy clusters formed?
- Energetic Universe
  - How do SMBHs grow?





Space Craft

Focal Length: 12m

~7 tons and 8k Watts

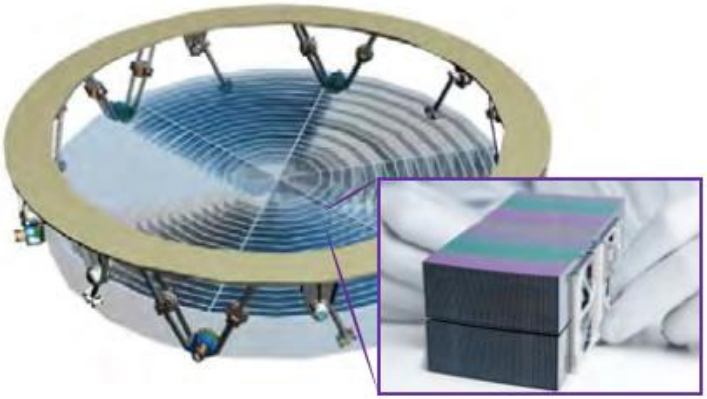
Mission lifetime: 4 years

L2 (or L1) by Ariane 6

Athena Instruments

Mirror

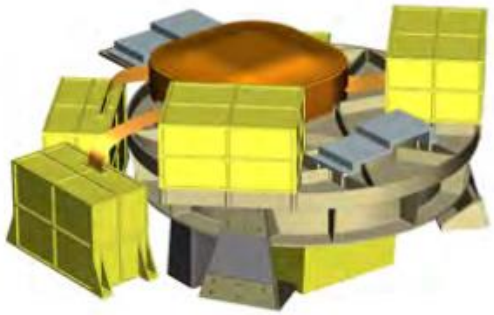
Silicon Pore Optics
Diamter~3 m
EA > 1.4 m^2@1keV
Resolution ~ 5″



Credit: Cosine and ESA

Wide Field Imager (WFI)

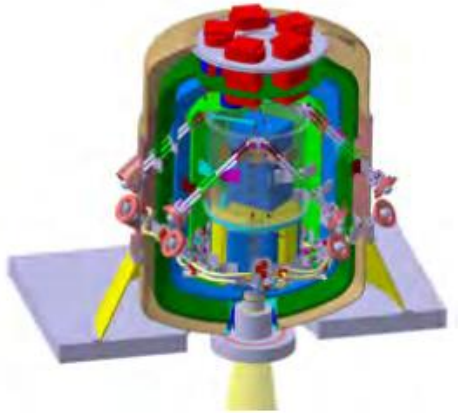
DEPFET
FOV~40′ x 40′



Credit: WFI Team

X-ray Integral Field Unit (X-IFU)

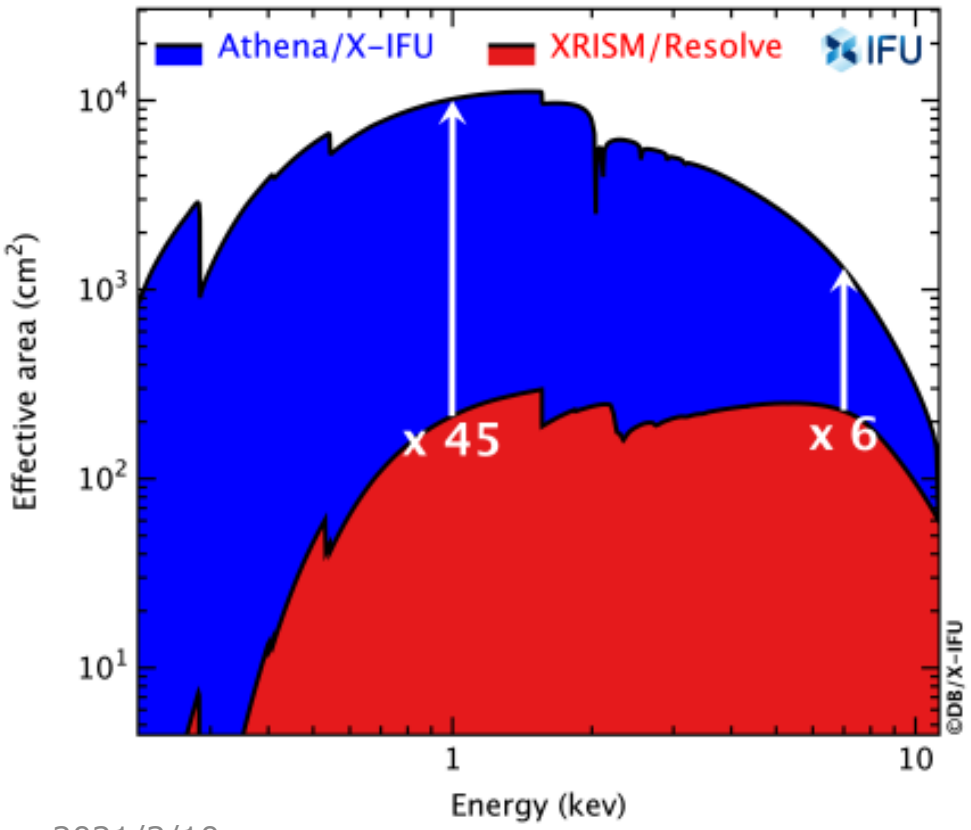
TES X-ray
Micro-calorimeter
Fine resolution $\Delta E \sim 2.5\ eV$
FOV D~5′
3840 pix

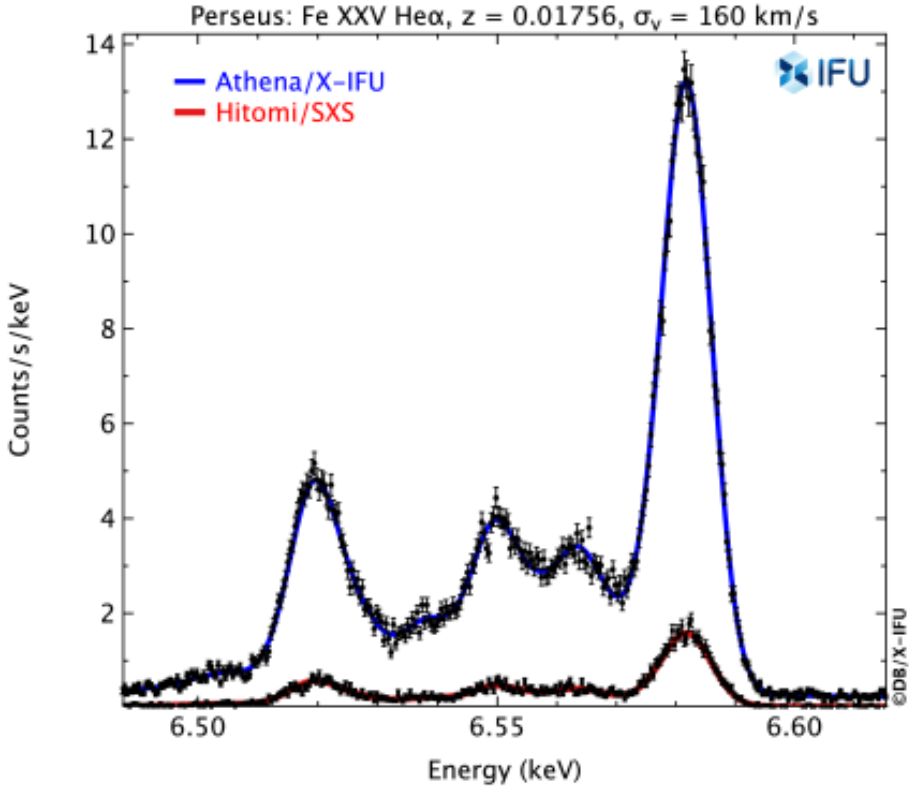


Credit: X-IFU Team (I. Maussang, CNES)

Hitomi、XRISM→Athena

Very Large Effective area



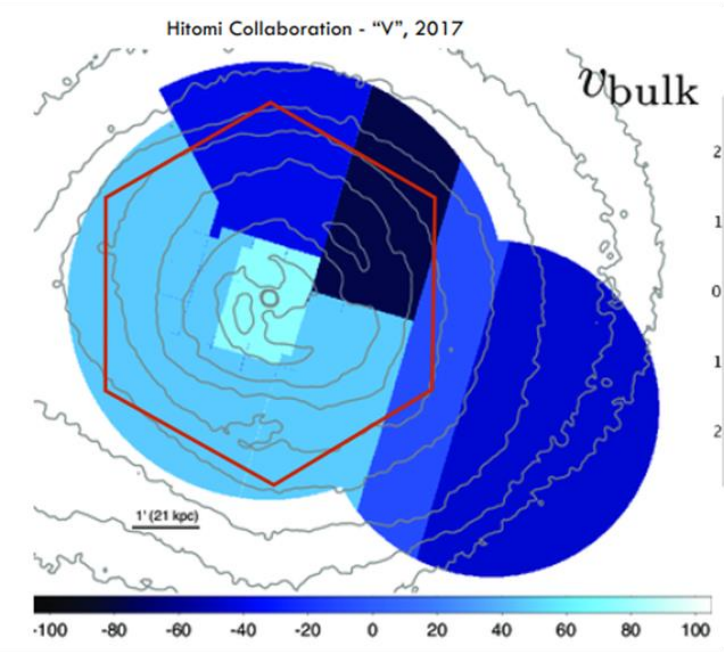


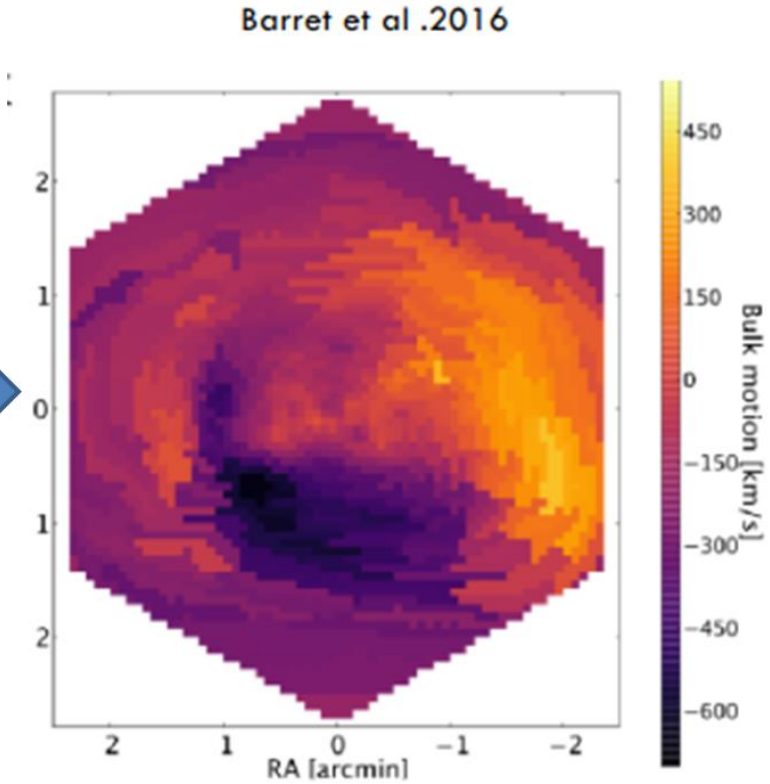
Hitomi, XRISM→Athena

High-Resolution Imaging Spectroscopy

Hitomi、XRISM

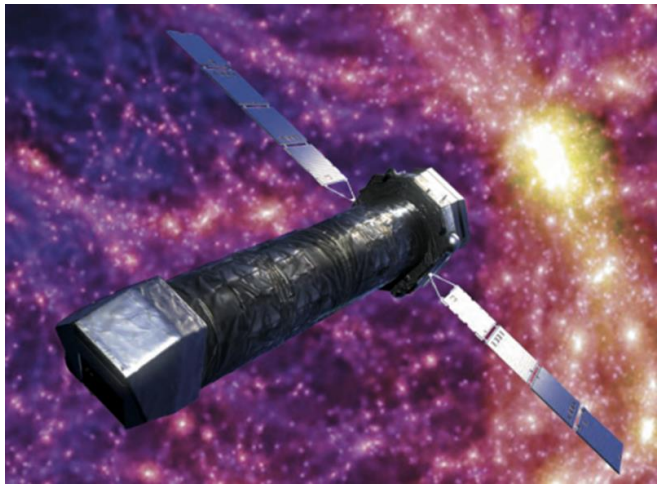
Athena X-IFU





Hitomi、XRISM

nearby bright objects



Athena

distant dim objects

Athena can clarify time evolution.

Athena for the community

Future load map of HEAPA:

Athena is the most important mission after XRISM.

We participate Athena to make Athena feasible, and to maximize the scientific results of Athena.

Japan's contribution

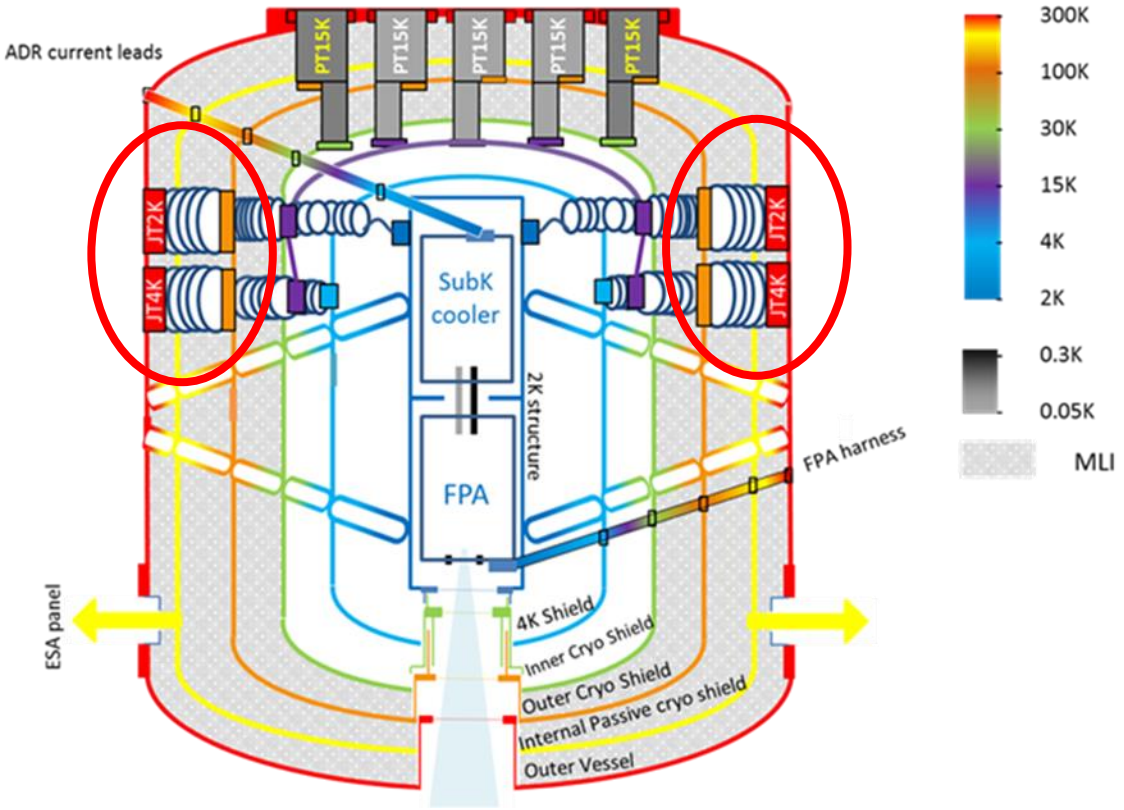
- Science
  - XRISM is the predecessor
- Hardware
  - X-IFU: 2K/4K JT coolers

  And possibly
  - WFI: detector electronics
  - Mirror: coating, buffle

Contributions to X-IFU

Led by N. Yamasaki (ISAS)

2K/4K Joule-Thomson cooler



Heritage from space mission like Hitomi, Suzaku etc.

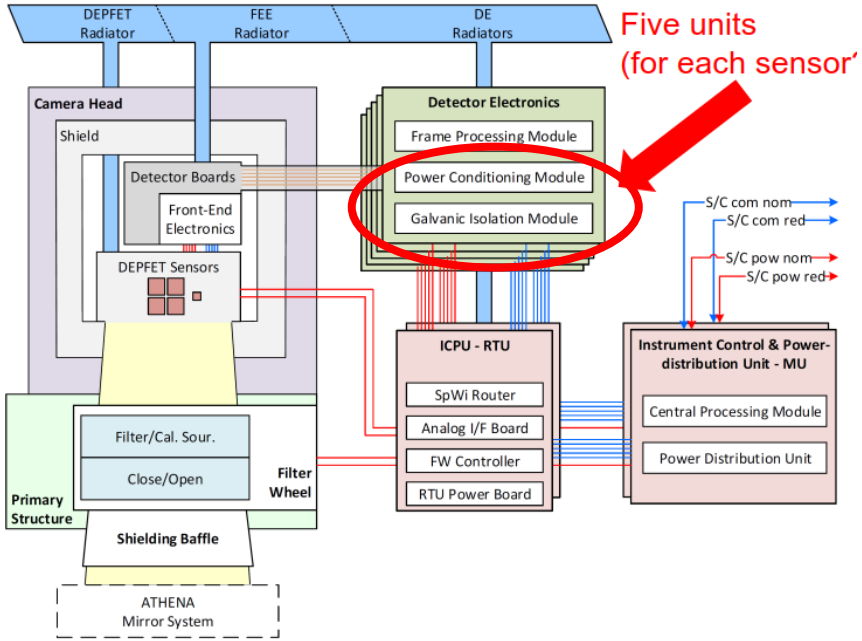
Possible contributions to WFI

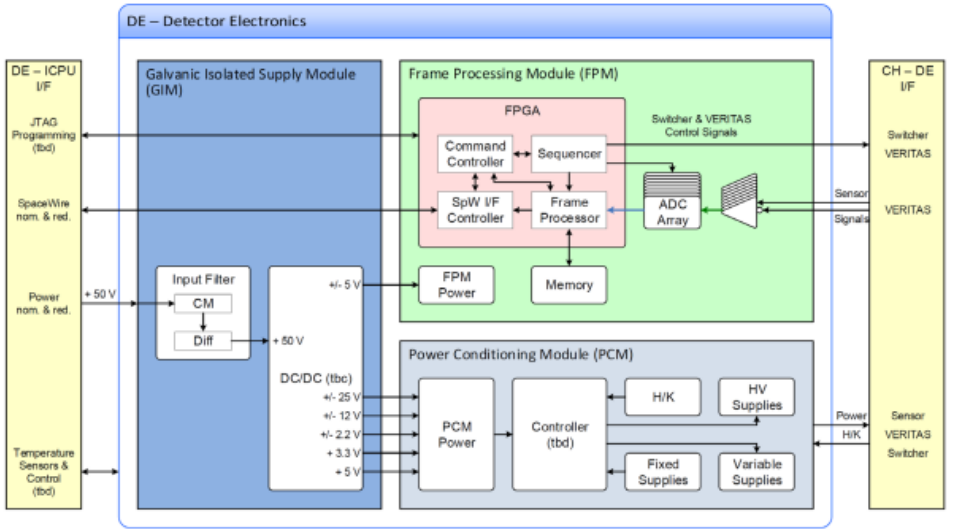
Led by H. Nakajima (Kanto Gakuin U.)

Power Conditioning Module (PCM)

Galvanic Isolation Module (GIM)

Developing breadboard model with MHI



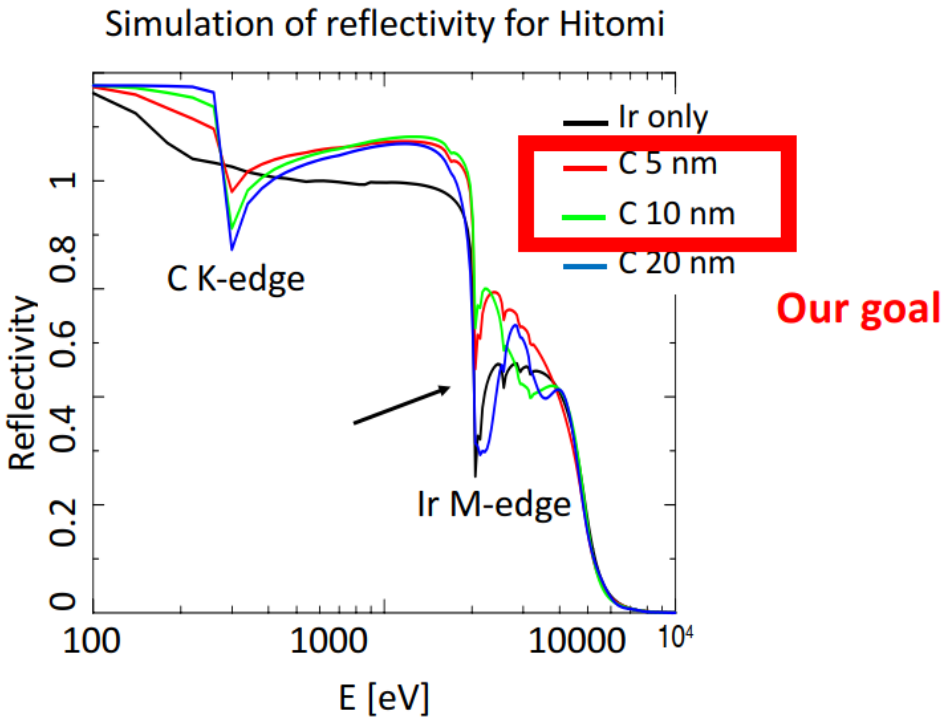


Possible contributions to mirror

Led by Y. Maeda (ISAS)

Coating with light elements to increase the effective area at Ir edge.

Diamond Like Carbon (DLC), BN etc.



We also design baffle to cut stray light and plan to make a breadboard model.