High energy multi-band spectral and polarimetric imaging observatory (HEMSPIO): a new space astronomy mission and opportunities for international cooperation

Hui Du on behalf of the project team

China Academy of Space Technology

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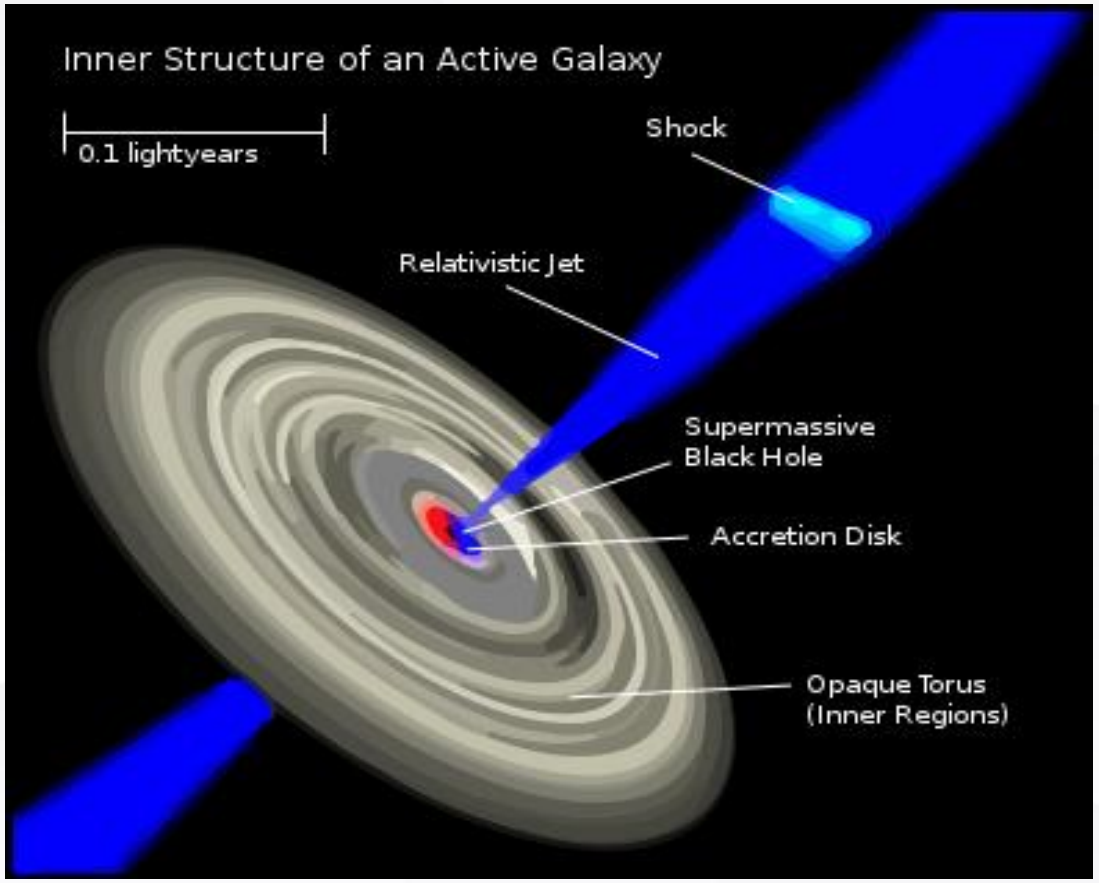
Contents

01 The HEMSPIO Concept

Science

- Understanding the operating processes in extreme conditions such as Active Galactic Nucleus (AGNs).

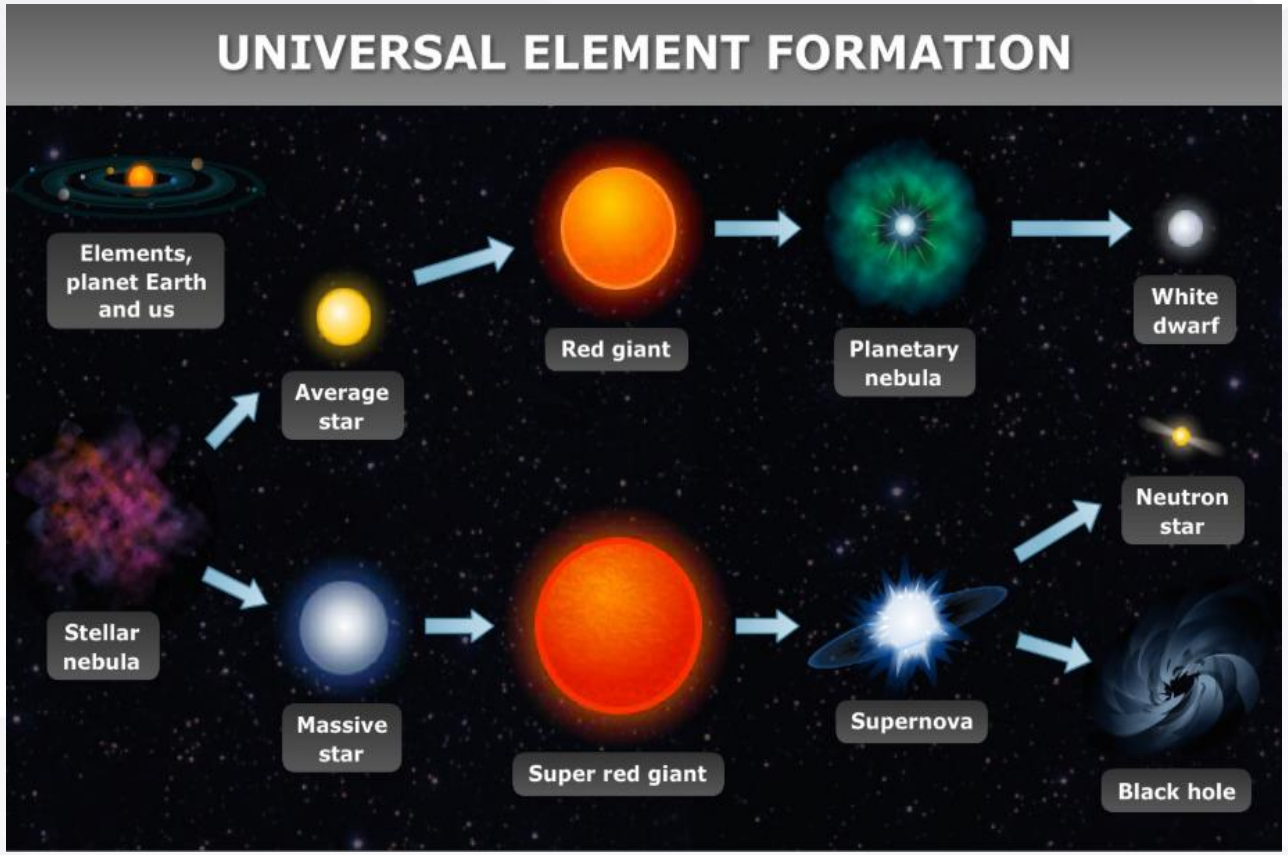


- *Mechanism of cosmic ray acceleration*
- *Origins of Cosmic X-ray Background(CXB)*
- *Multi-messenger astronomy*

Image Credit: Wiki

Science

- Resolving the origin of heavy elements with MeV gamma ray detection ability



- Direct measurement of radioactive decay, nuclei de-excitation and positron annihilation

Preliminary Science Objectives

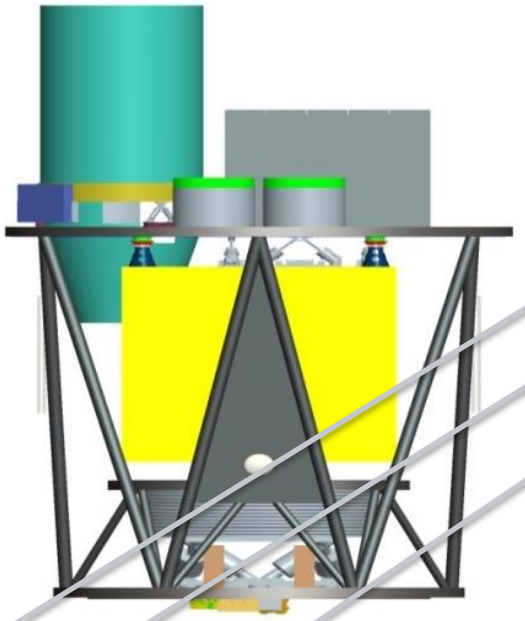
- Answer fundamental questions of physics:
  - Structure of AGNs and black hole double corona
  - Precision measurement of black hole spin
  - Radiation mechanism of blazars
  - Radiation mechanism of gamma bursts
  - Mechanism of cosmic ray acceleration
  - Nucleosynthesis process of supernova bursts
  - Birefringence effects of vacuum
  - Verification of the Hubble constant
  - ……

Preliminary Parameters

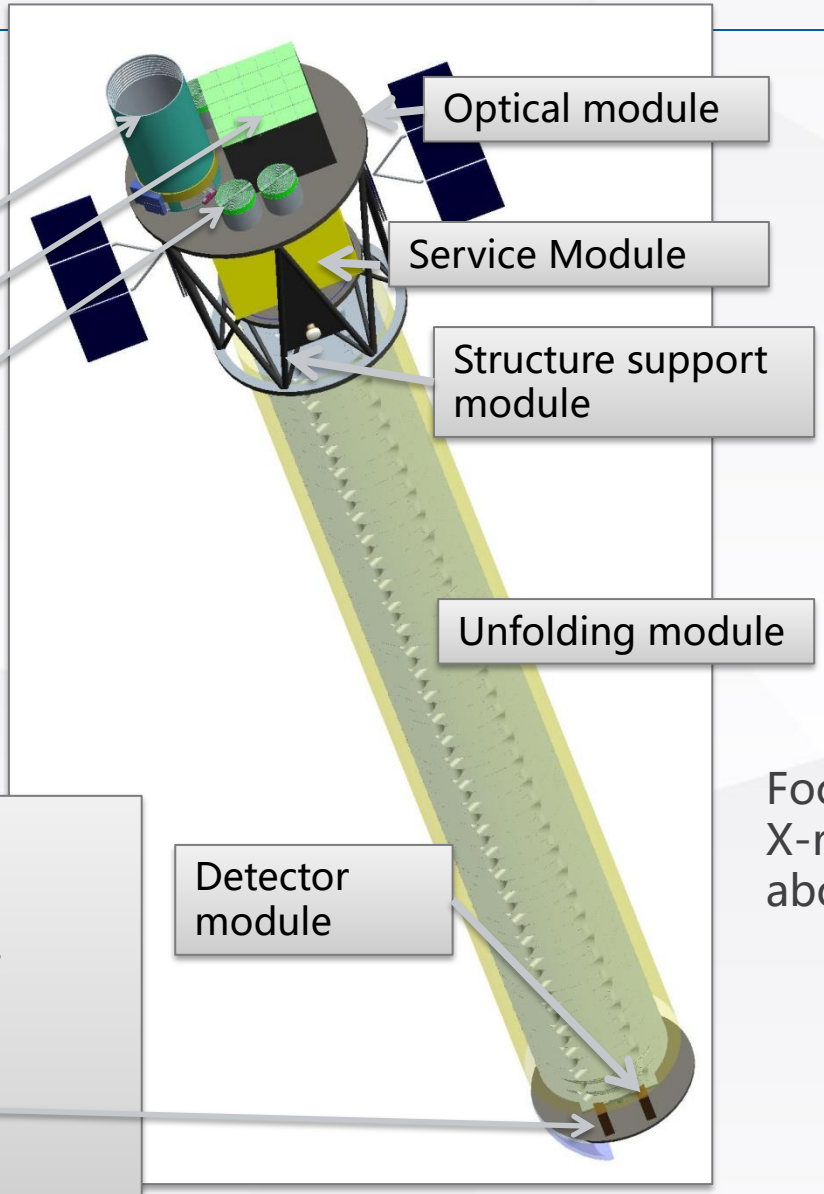
- Circular Earth orbit, 550km high, 20 °inclination .

Telescope	Wavelength / Energy range
Infrared and Ultraviolet Spectral and Imaging Telescope	160 ~ 2200 nm
Wide Spectrum X Ray Polarimetric and Imaging Telescope	3~ 80 keV
Soft Gamma Ray Polarimetric and Imaging Instrument	50 ~ 500 keV
Wide Spectrum Gamma Ray Polarimetric and Imaging Telescope	0.3 MeV ~ 3 GeV

Spacecraft Configuration



Configuration for launch



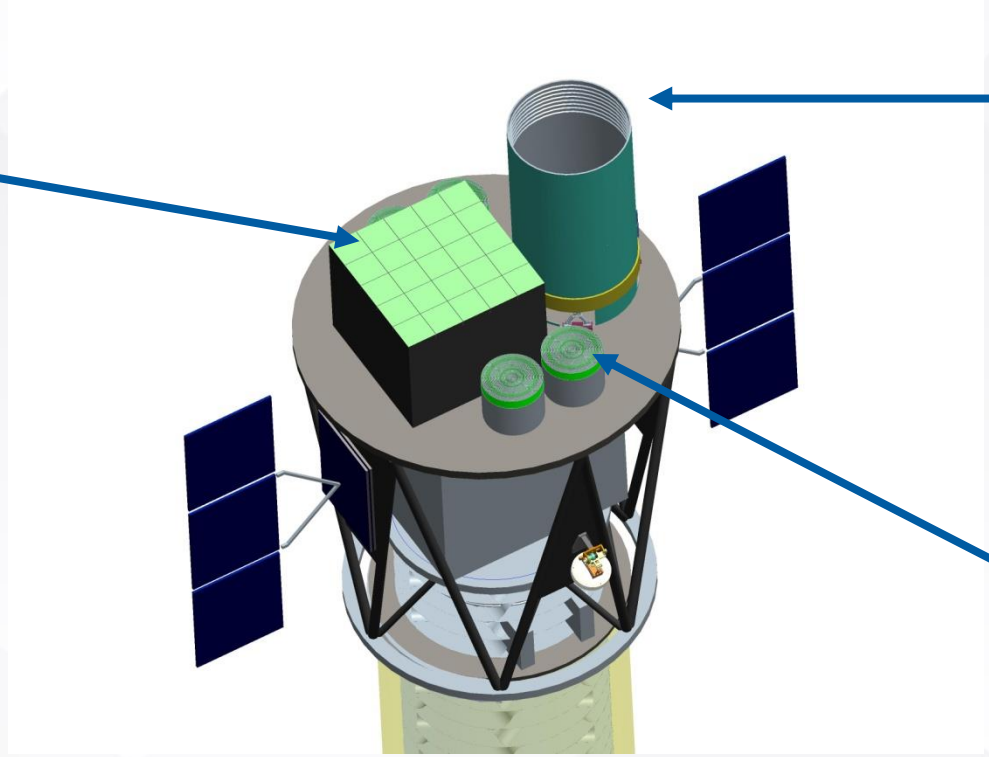
In-orbit configuration

- Infrared and Ultraviolet Spectral and Imaging Telescope
- Wide Spectrum Gamma Ray Polarimetric and Imaging Telescope
- Wide Spectrum X Ray Polarimetric and Imaging Telescope
- Soft Gamma Ray Polarimetric and Imaging Instrument

Focal length for the X-ray telescope: about **20 meters**

Spacecraft configuration

Wide Spectrum Gamma Ray Polarimetric and Imaging Telescope



Infrared and Ultraviolet Spectral and Imaging Telescope

Soft Gamma Ray Polarimetric and Imaging Instrument *(Distributed on different sides of the satellite)*

Wide Spectrum X-Ray Polarimetric and Imaging Telescope

02 Current Status

The high energy multiwavelength observatory project

- HEMSPIO is an important component of the Extreme Universe Exploration Program that was proposed by Chinese scientists in 2018.
- A mission proposed by the China Academy of Space Technology (CAST) in 2020 as a follow-up to the Hard X-Ray Modulation Telescope (HXMT) mission launched in 2017.

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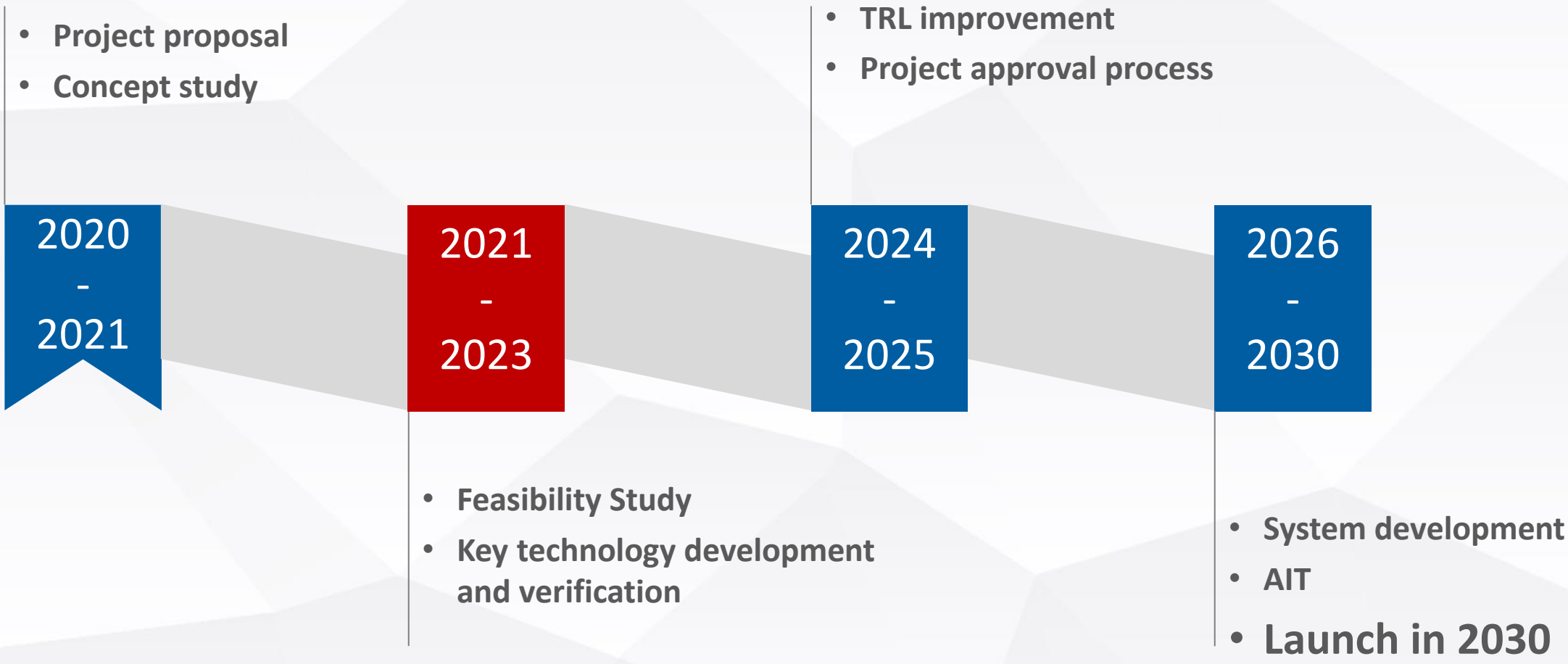
Current status and plan



Funded by CNSA, HEMSPIO has already entered into the feasibility study phase.

Domestic partners

- Institute of High Energy Physics, China Academy of Sciences
- Nanjing University
- Beihang University
- Tsinghua University

03 Opportunities for International Cooperation

International cooperation

- Entities and individuals who are interested and willing to contribute to high energy astronomy development are welcome to join us.
- Win-win cooperation based on equality and mutual respect.
- No exchange of money is preferable.
- Levels of cooperation: inter-governmental, space agency level, institute level……

International cooperation

- All kinds of cooperation are welcome:

✓ Jointly defining scientific objectives

✓ Complementary observations with other space based telescopes or ground-based infrastructure

✓ Flight opportunities for international payloads

✓ Joint development of advanced instruments

✓ Scientific data sharing

✓ ……

Thanks

Welcome to join us!

Hui DU

China Academy of Space Technology (CAST)

hui.du-space@outlook.com

No.104, Youyi Road, Haidian District, Beijing 100094, China