B02 : HiZ-GUNDAM

High-z Gamma-ray bursts for Unraveling the Dark Ages and Extreme Space Time Mission

Daisuke YONETOKU (Kanazawa University)

HiZ-GUNDAM pre project candidate team

- Competitive M-class mission (Epsilon mission) in JAXA
- Down selection review in Apr. – June, 2023
- We are still surviving, down selection review again in Feb. 2024

B02

Further Transformation of Multi-messenger Satellite with Fusion of X-ray and Near-Infrared Observations

Daisuke Yonetoku
Mission PI

Akihiro Doi
Satellite System

Hideo Matsuhara
NIR Telescope

Makoto Arimoto
X-ray Detector

Shuichi Gunji
Mission Processor

Takanori Sakamoto
X-ray Leader

Kohji Tsumura
NIR Leader

More than
- 80 staffs (including science team)
- 20 students

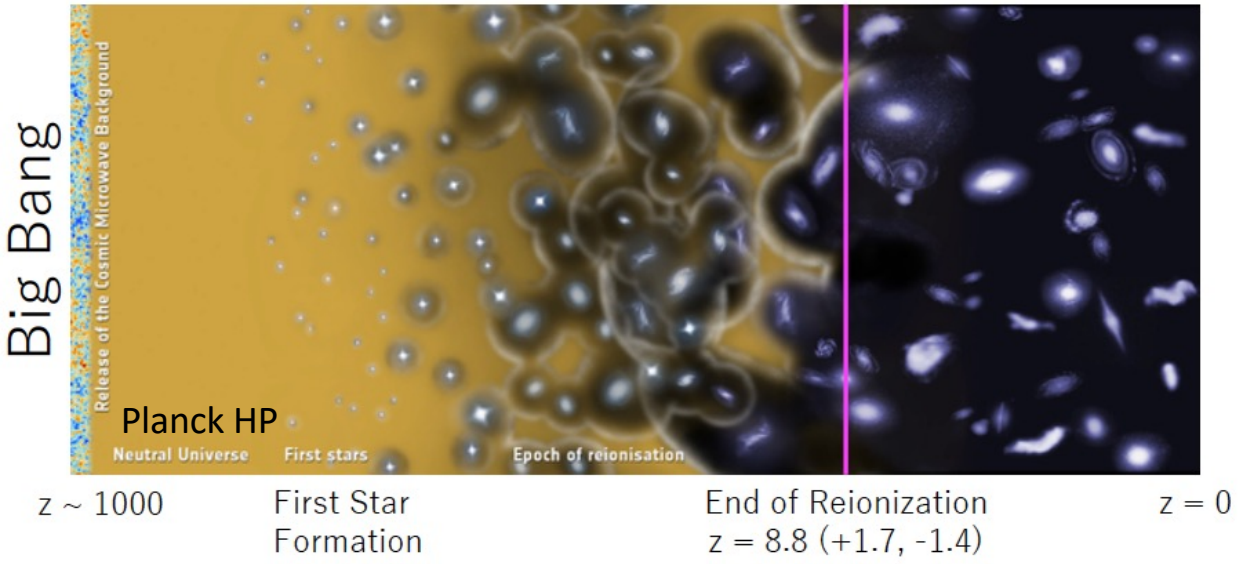
HiZ-GUNDAM : Promotion of Time Domain Astronomy

Key Science 1: Multi-Messenger Astronomy

We timely contribute MM-Astronomy
after achieving design sensitivity of GW facilities.

(1) Localization of high energy phenomena associated with GW and neutrino
(2) Confirmation of existence of relativistic jet
(3) Transition from gravitational energy to heavy element (kilonova) and particles
(4) Diversities of multi messenger sources from X-ray to optical/NIR observation

Key Science 2: Exploration of early universe with GRB



Selection of High-z GRBs,
Rapid spectroscopic obs.
with large area telescopes

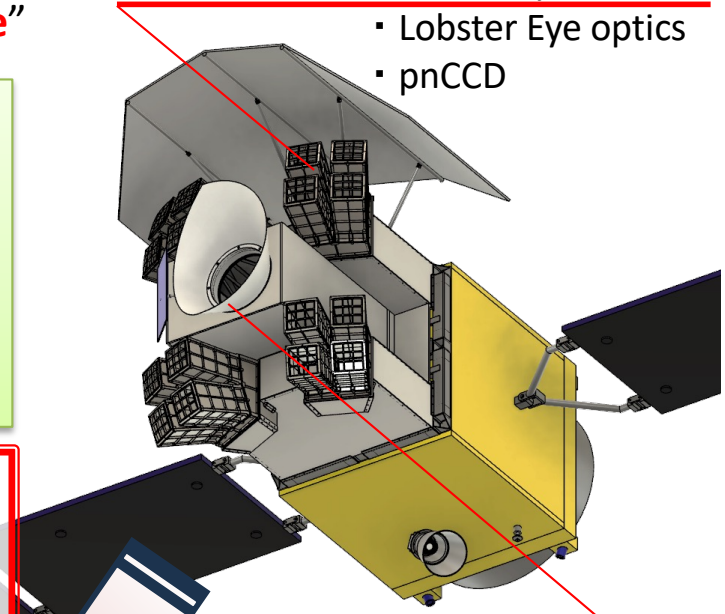
(1) GRB rate at z > 7
(2) Cosmic reionization history
(3) First heavy metals
(4) Survey of Pop-III GRBs

HiZ-GUNDAM (High-z Gamma-ray bursts for Unraveling the Dark Ages Mission)

Mission : Time Domain Astronomy
"**Multi-messenger astronomy**" and "**Exploration of the early universe**"

Observation strategy
(1) Discovery of GRBs/transients with the wide field X-ray monitor
(2) Automatic repointing (T < 300 sec)
(3) Identification of counterpart with the near infrared telescope
(4) Alert message (T << 1 hour)
(5) Spectroscopic observation with large area telescopes (T ~ 1.5 hr)

We will discover treasured targets from a large amount of transient sources, and provide important observation targets to large area telescopes. We will promote "exploration of the early universe" & "MM astronomy" with all the power of astronomy.



8 oral presentations, 6 poster presentations

HiZ-GUNDAM	Daisuke Yonetoku (Oral)	Overview
Wide Field X-ray Monitor	Makoto Arimoto (Oral)	X-ray Monitor
	Junyi Li (Oral)	LEO Optics
	Ryuji Kondo (Oral)	pnCCD
	Issin Nagataka (Poster)	LEO Optics
	Yoshiyuki Ando (Poster)	LEO Optics
	Akito Kutsumi (Poster)	Electron Diverter
NIR Telescope	Hideo Matsuhara (Oral)	NIR telescope
	Kohji Tsumura (Oral)	Kösters Prism
	Rinon Kageyama (Oral/Poster)	NIR Thermal
Onboard Software And Networking	Takumi Togashi (Oral)	Onboard Software
	Keito Watanabe(Poster)	SpaceWire Network
	Haruaki Niinuma (Poster)	NIR software

Current Status　Down selection review (2024/03 – 04)

As an activity in the concept study phase,
the significance and value of the mission and the feasibility of the system were evaluated as appropriate. However, “selection” is pending.

Future Schedule

Fiscal Year	Plans and Milestones
Current	Development of BBM (front loading)
FY2026	Down Selection Review for 3 candidates (HiZ-GUNDAM/Silvia/Lapyuta) Establishment of Pre-Project Team
FY2027	Mission Definition Review (the end of FY2024)
FY2029	System Definition Review Establishment of Project Team
FY2029 – 30	EM phase
FY2030 – 32	FM phase
FY2032 – 33	Launch

High-z Gamma-ray bursts for Unraveling the Dark Ages Mission

Mission Aim: Strong Promotion of
"**Time Domain**" & "**Multi-Messenger Astronomy**".

Key Science1: Progress of Multi messenger Astronomy

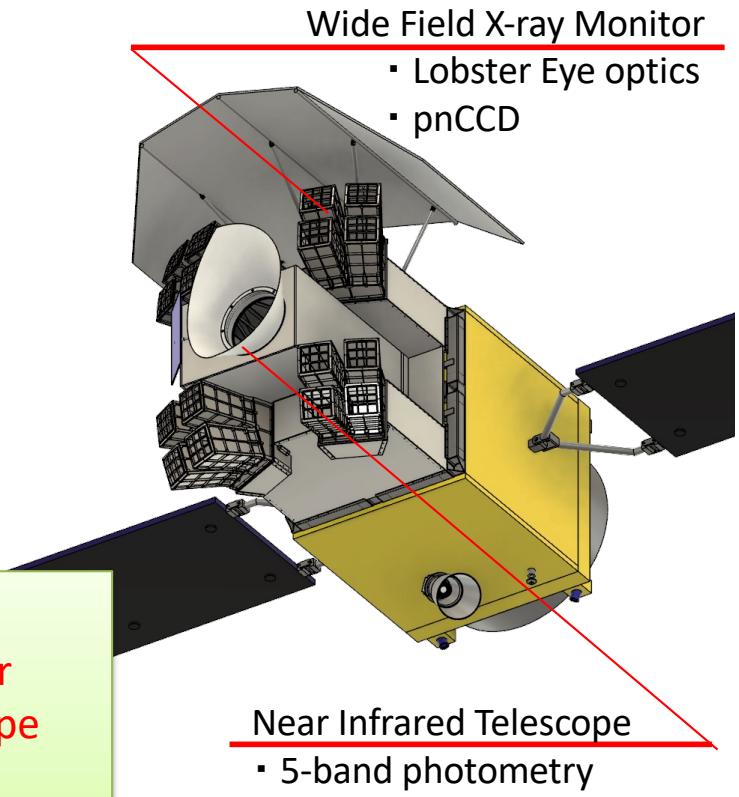
- Localization of X-ray transients from MM sources
- Energy transition from gravity to particles/elements

Key Science2: Probing the Early Universe

- Detection of high-redshift GRBs (9 < z < 14)
- Probing the reionization history and first metal elements

Observation Strategy

(1) Discovery of high-energy transient with Wide Field X-ray Monitor
(2) Automatic/Comprehensive follow-up with Near Infrared Telescope
(3) Sending Quasi-Realtime Alert Messages
(4) Spectroscopy with Large Area Telescopes for selected events



Wide Field X-ray Monitor

Items	Parameters
Energy band (keV)	0.5 – 4 keV
Field of View	> 1.0 str (6 units)
Sensitivity	1e-10 (erg/cm2/s) For 100 sec exposure
Point Spread Function	3 arcmin
Angular accuracy	~ 60 arcsec

Near Infrared Telescope

Items	Parameters				
Aperture size	30 cm				
Field of view	15 arcmin × 15 arcmin				
Integration time	10 minutes (2 minutes x 5 frames)				
Observation Band (μm)	0.5–0.9	0.9–1.3	1.3–1.7	1.7–2.1	2.1-2.5
Limiting mag (AB)	21.4	21.3	21.4	20.8	20.7