

ISAS/JAXA Deep Space Fleet Cut into the Solar System



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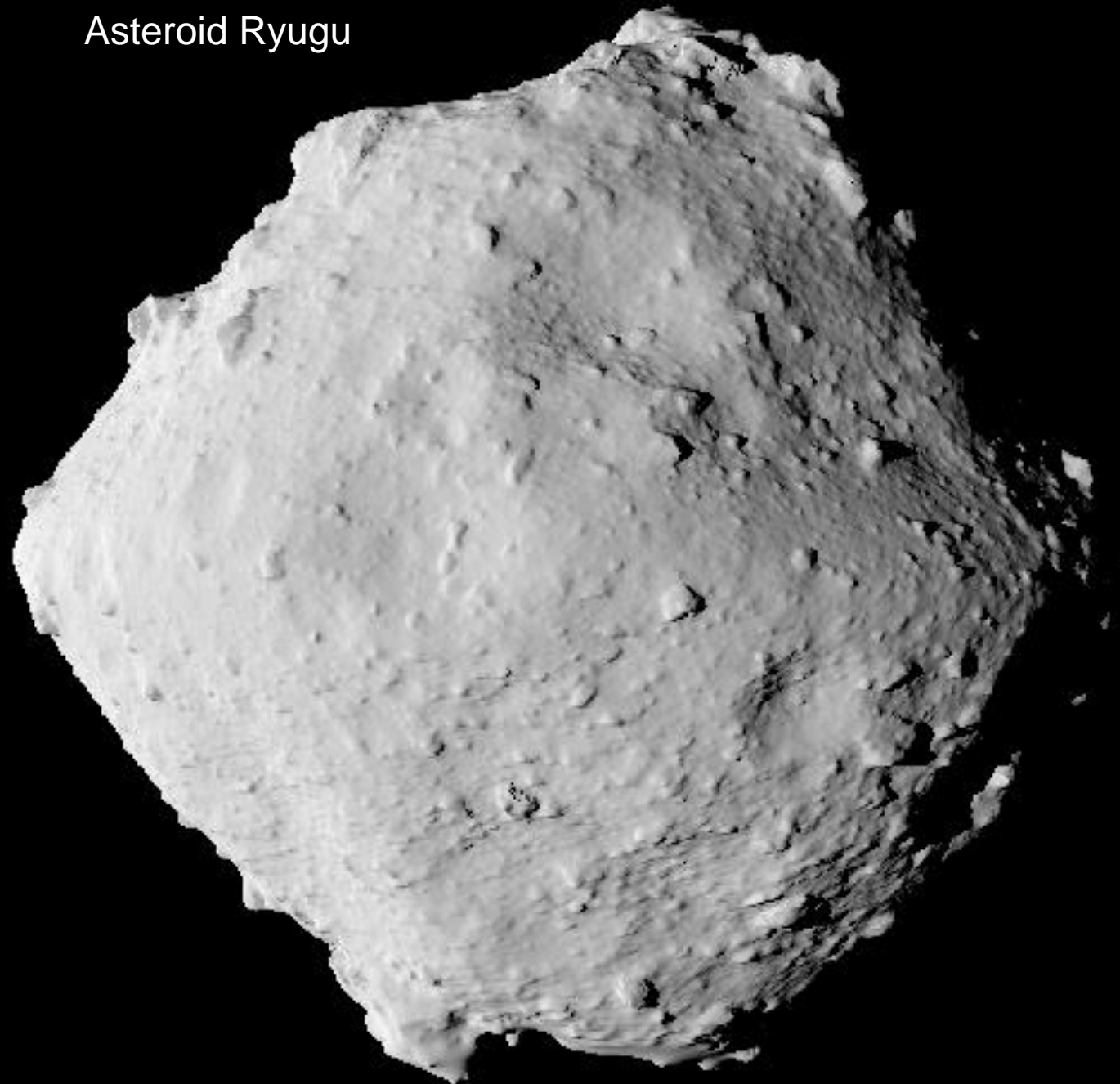
June 13, 2019

“Hayabusa” spacecraft brought back the material of Asteroid Itokawa while establishing innovative ion engines. “Hayabusa2”, while utilizing the experience cultivated in “Hayabusa”, has arrived at the C type Asteroid Ryugu in order to elucidate the origin and evolution of the solar system and primordial materials that would have led to emergence of life.



Spacecraft	Hayabusa	Hayabusa2
Target	Itokawa	Ryugu
Launch	2003	2014
Arrival	2005	2018
Return	2010	2020

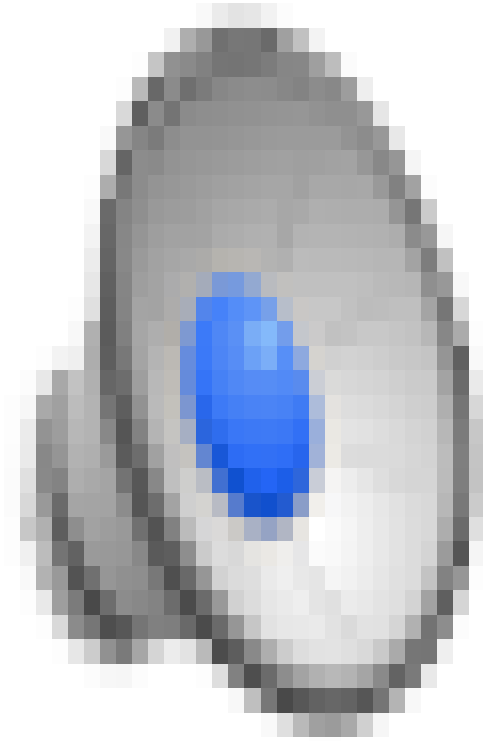
Asteroid Ryugu



Asteroid Itokawa



Hayabusa2 executed to land on the asteroid on Feb 22, 2019.



Hayabusa2 executed to land on the asteroid on Feb 22, 2019.



Ground Demonstration of Impactor



Ground Demonstration of Impactor





SCI collision experiment science: crater



- Terrain change before and after the SCI collision.
(Blink image before and after collision for comparison)
 - Crater formation
 - Boulder evacuated and moved
 - Boulders dispersed around the region



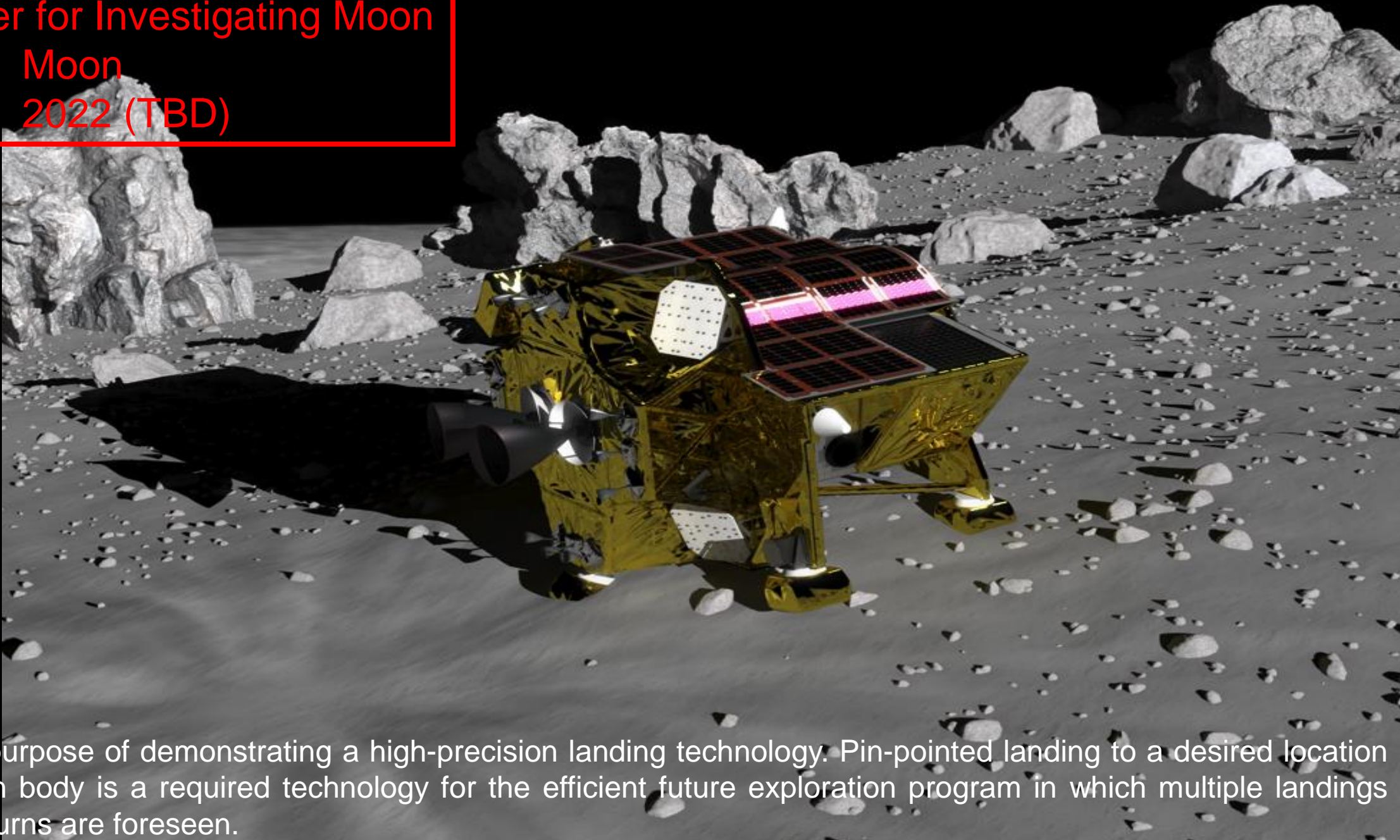
(Image credit: JAXA, University of Tokyo, Kochi University, Rikkyo University, Nagoya University, Chiba Institute of Technology, Meiji University, University of Aizu, AIST)

MMO/BepiColombo is a probe to Mercury to elucidate its magnetic field and its interaction with the harsh solar wind in the close proximity to the Sun. Due to the technical difficulties such as Mercury orbit insertion and intense thermal environment, Mercury has remained mysterious. BepiColombo is a cooperative inter-disciplinary project between Japan and Europe for answering the questions inherited from NASA MESSENGER.



Spacecraft **BepiColombo/MMO**
Mercury Magnetospheric Orbiter
Japanese Nickname **Mio**
Target **Mercury**
Launch **2018**
Arrival **2025**

Spacecraft **S L I M**
Smart Lander for Investigating Moon
Target Moon
Launch 2022 (TBD)



SLIM has the purpose of demonstrating a high-precision landing technology. Pin-pointed landing to a desired location on a gravitation body is a required technology for the efficient future exploration program in which multiple landings and sample returns are foreseen.

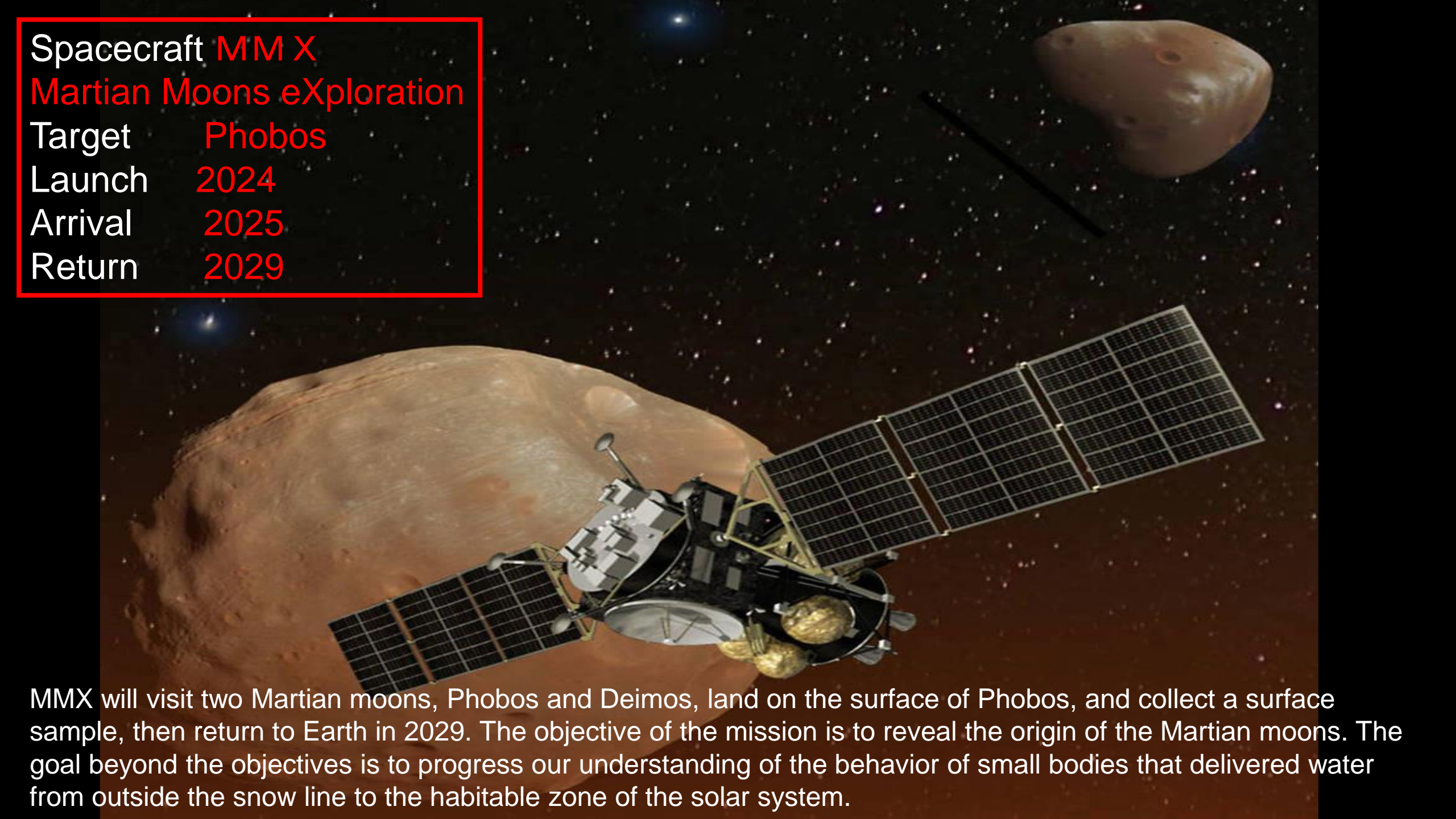
Spacecraft **MM X**
Martian Moons eXploration

Target **Phobos**

Launch **2024**

Arrival **2025**

Return **2029**



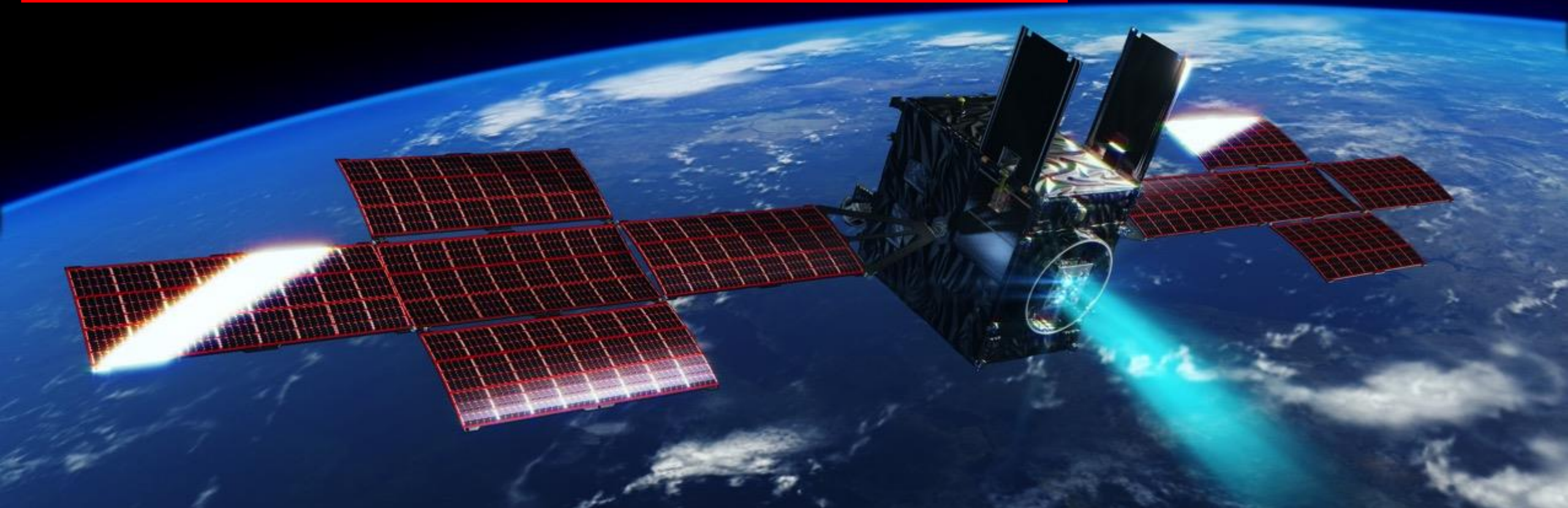
MMX will visit two Martian moons, Phobos and Deimos, land on the surface of Phobos, and collect a surface sample, then return to Earth in 2029. The objective of the mission is to reveal the origin of the Martian moons. The goal beyond the objectives is to progress our understanding of the behavior of small bodies that delivered water from outside the snow line to the habitable zone of the solar system.

Spacecraft **DESTINY+**

**Demonstration and Experiment of Space Technology for
INterplanetary voYage, Phaethon fLyby and dUst Science**

Target **Phaeton**

Launch **2022(TBD)**



DESTINY+ is a planned mission to demonstrate the small platform for planetary exploration by the spiral raising from Earth orbit. It will reveal the physics of cosmic dust from the in-situ analysis during interplanetary cruise and from flyby observations of the Geminid meteor shower parent body 3200 Phaethon.

OKEANOS
Jupiter Trojan
Asteroid Explorer

SLIM
Smart Lander
for Investigating Moon

MIO/BepiColombo
Mercury Magnetospheric Orbiter

JUICE
Jupiter Icy Moons Explorer

AKATSUKI
Venus Climate Orbiter

EQUULEUS
EQUilibrium
Lunar-Earth-point 6U
Spacecraft

HAYABUSA2
Asteroid Explorer

OMOTENASHI
Outstanding Moon exploration
Technologies demonstration for
Nano-Semi-Hard Impactor

MMX
Martian Moons Exploration

CAESAR
Comet Astrobiology
Exploration Sample Return

DESTINY+
Demonstration and Experiment of
Space Technology for Interplanetary
voyage, Phaethon flyby
and DUST science

ISAS DEEP SPACE FLEET



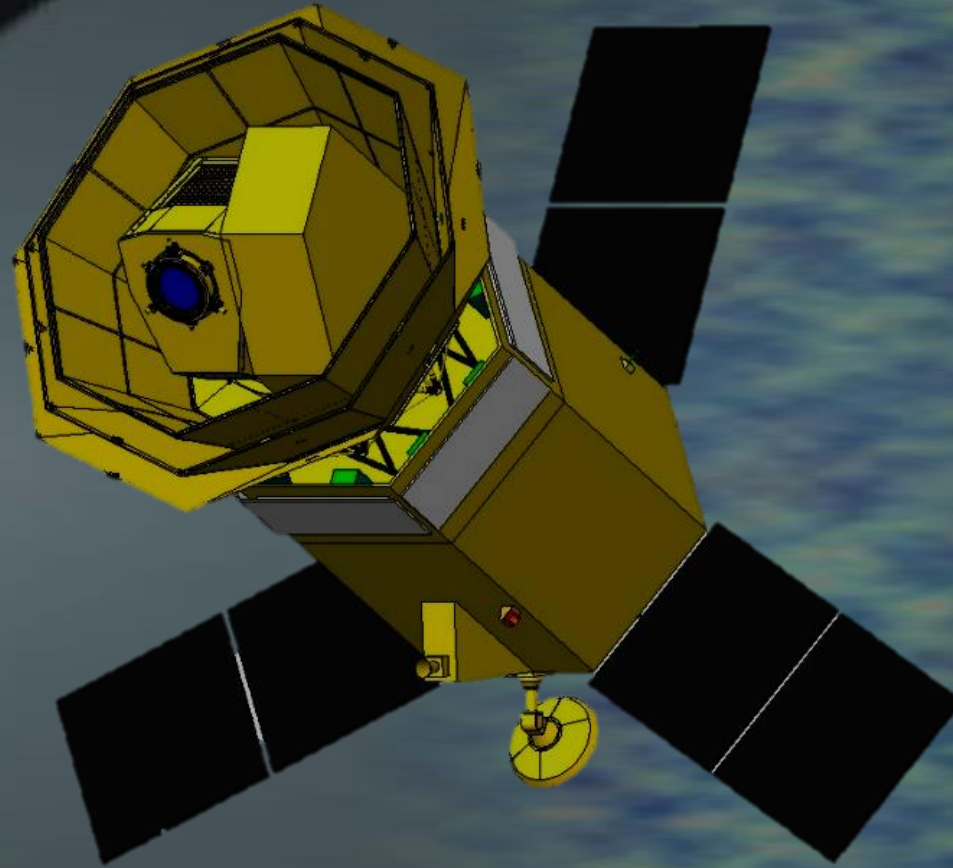


Recovery mission of the ASTRO-H installing Soft X-ray Spectrometer and Soft X-ray Imager. Pioneering new horizon of the Universe with unprecedented high resolution X-ray spectroscopy. International collaboration with NASA and ESA.

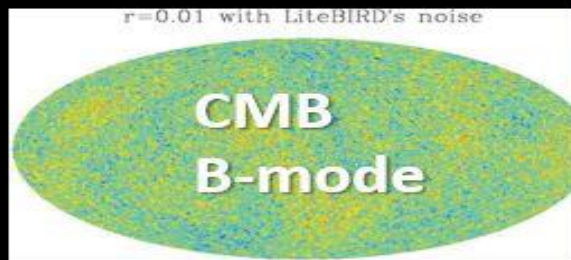
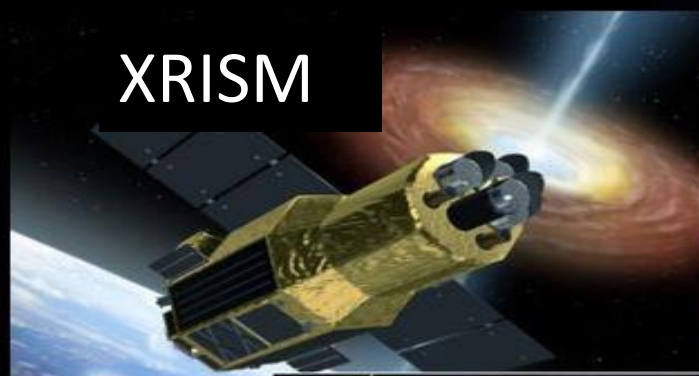


Spacecraft	XRISM
X-Ray Imaging and Spectroscopy Mission	
Target	X-ray
Launch	2022(TBD)

Spacecraft	LiteBIRD
Light (Lite) Satellite for studies of B-mode polarization and Inflation from cosmic background Radiation Detection	
Target	Sun-Earth L2
Launch	2027(TBD)



LiteBIRD will carry out all-sky millimeter-wave surveys to map the polarization of cosmic microwave background (CMB) with an unprecedented precision. The mission will provide a definitive search for the CMB B-mode polarization from cosmic inflation, either making a discovery or ruling out well-motivated cosmic inflation models.



Formation and Evolution of
Galaxies, Clusters, and
Super Massive Black Holes



Origins of Space-Time and Matters in the Universe
Possibility of Life in the Universe

Cosmic
Inflation

ISAS Astronomy and Astrophysics Strategy

