

A background image showing a satellite in orbit around Earth. The Earth is visible in the bottom left corner, showing a blue and white horizon. The satellite is a blue and white cube-shaped object with solar panels. It is surrounded by several other smaller satellite components and a network of blue lines representing orbital paths or data connections. The background is a deep blue space with some greenish nebulae.

# **Latest Science Achievement of Chinese Space Science Missions**

**Chi WANG**

National Space Science Center, CAS  
March 22, 2022



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SPP II in Development

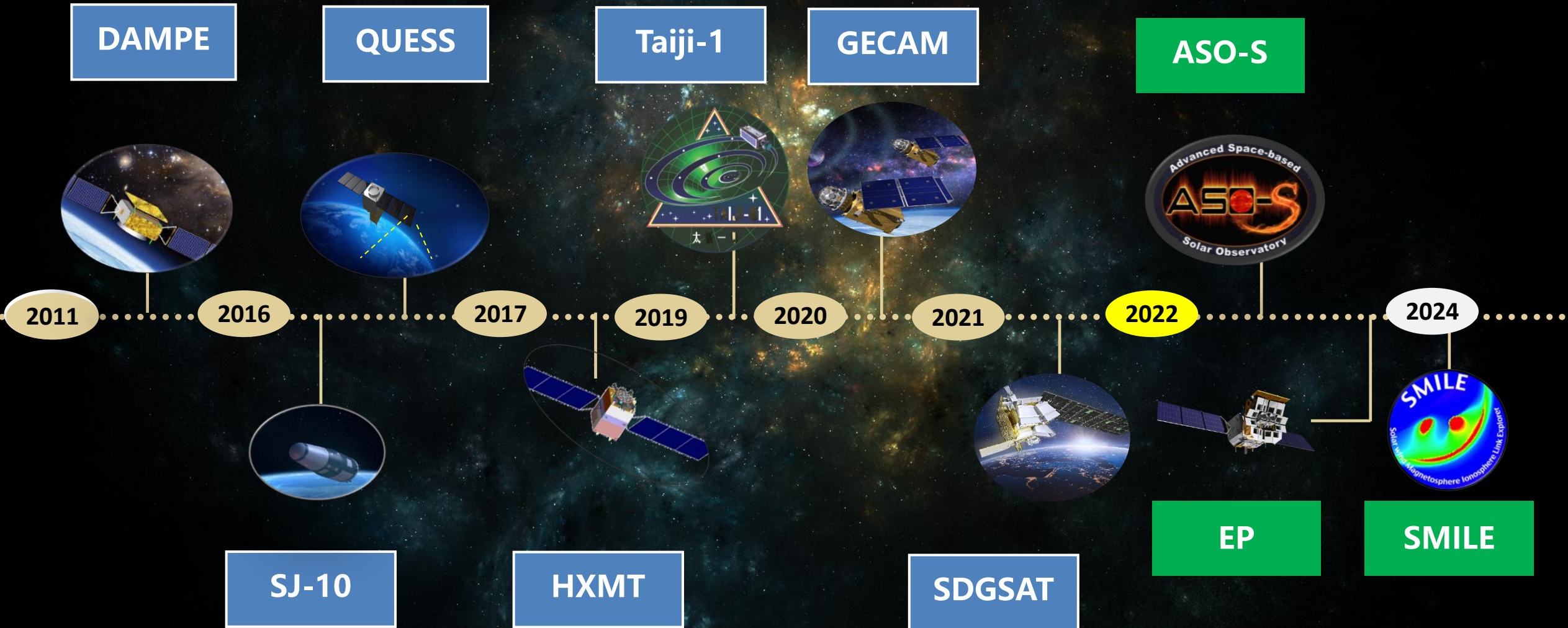
03

New Horizon: SPP III



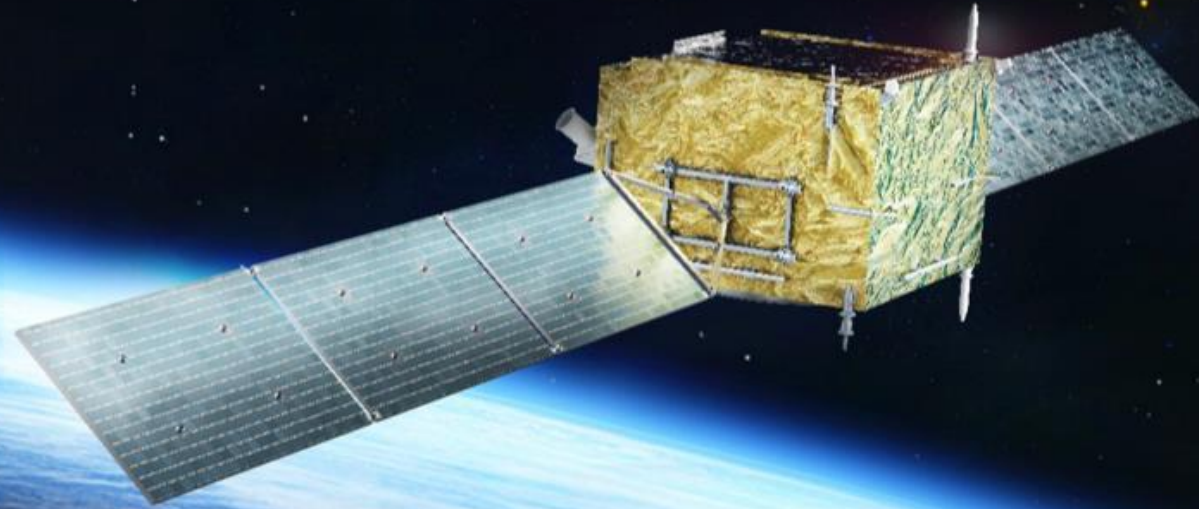


# Strategic Priority Program on Space Science (SPP)



# DArk Matter Particle Explorer (DAMPE)

Launch: Dec. 17, 2015

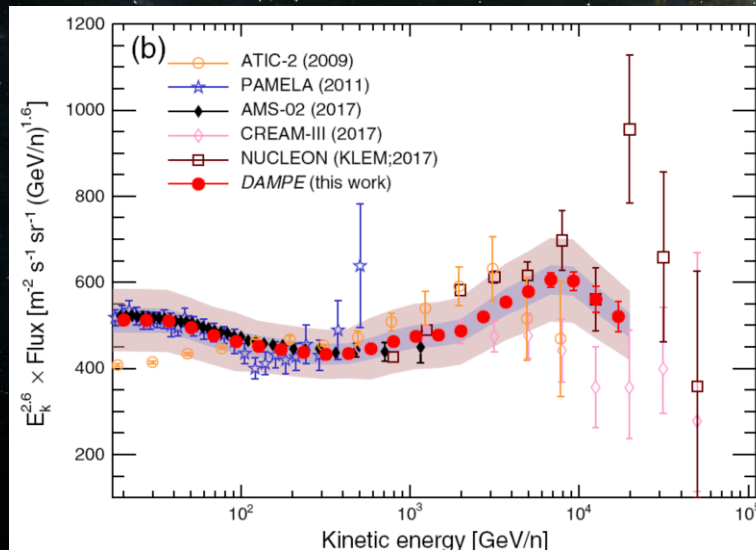


A satellite-borne, high-energy particle and  $\gamma$ -ray detector, dedicated to indirectly detecting dark matter particle and the study of high-energy astrophysics



# DArk Matter Particle Explorer (DAMPE)

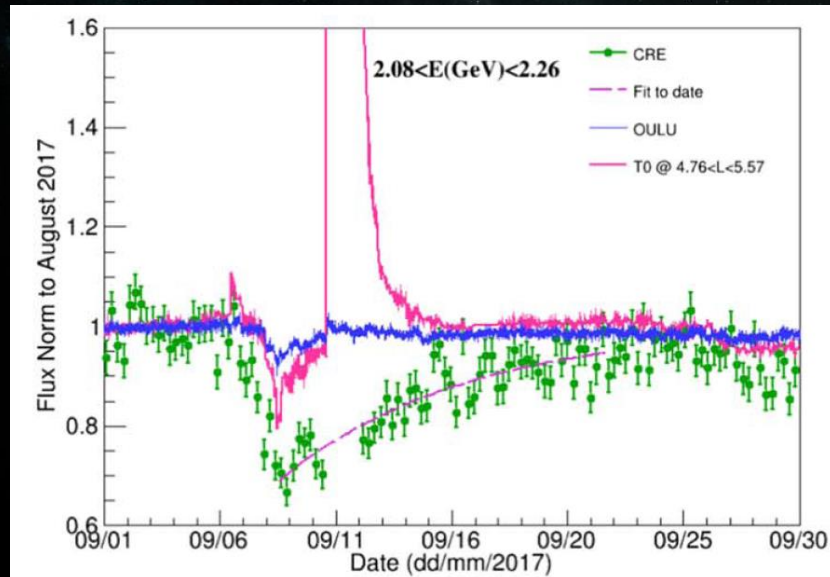
The DAMPE spectral measurements of both cosmic protons and helium nuclei suggest a particle charge dependent softening energy.



Phys. Rev. Lett. 126, 201102, 2021

# DArk Matter Particle Explorer (DAMPE)

Measured the Forbush Decrease Effect of cosmic ray electrons and positrons with the highest time resolution(6 hours)

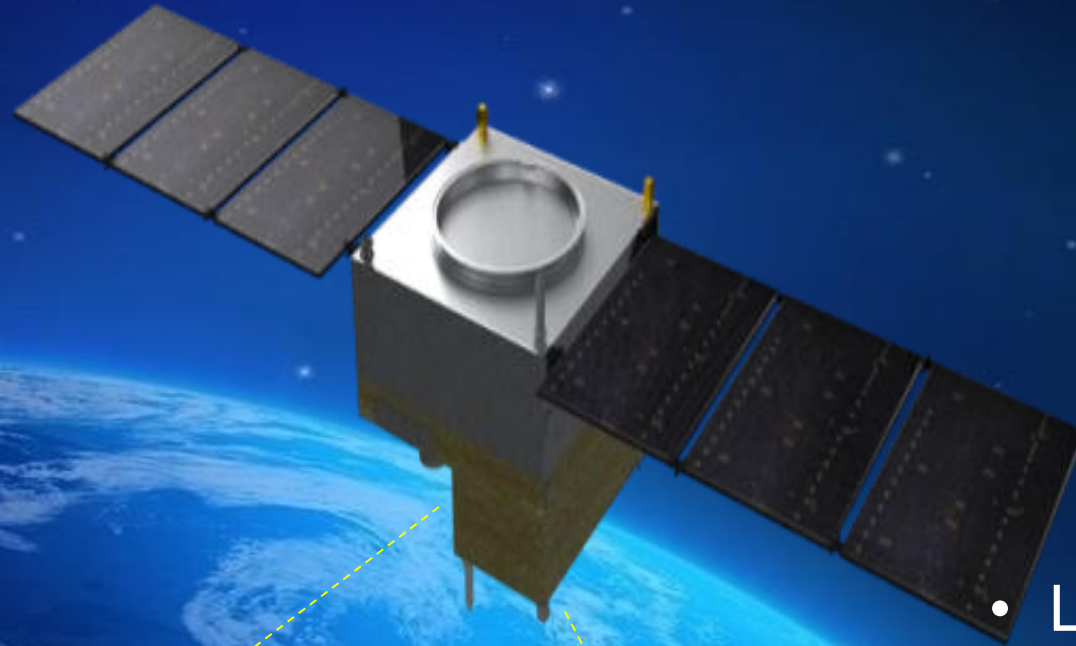


The Astrophysical Journal Letters, 920 L43 2021





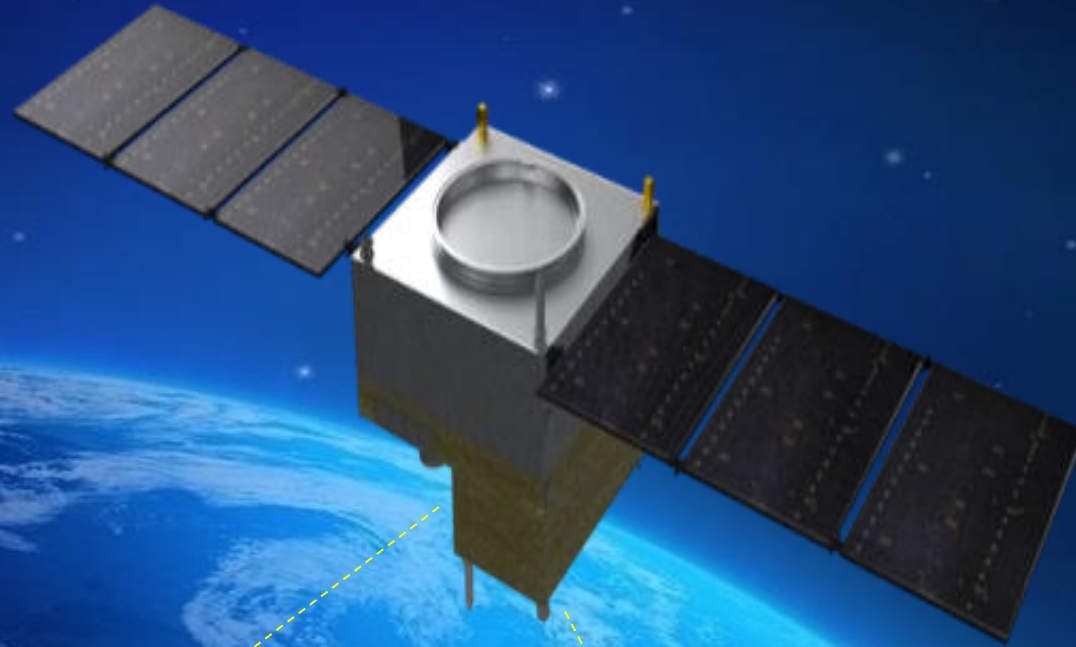
# QUEST (QUAntum Experiments at Space Scale)



- Launch: Aug. 16, 2016
- Orbit: 500km, sun-synchronous
- Status: in extended operation



# QUESS (QUantum Experiments at Space Scale)



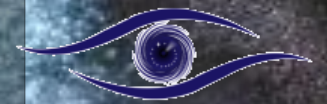
An integrated space-to-ground quantum  
communication network over 4,600  
kilometers

Nature 589, 214-219 (2021)



# Hard X-ray Modulation Telescope (*Insight* - HXMT)

Launch: Jun. 15, 2017



慧眼 - HXMT

*Insight-HXMT* observations of jet-like  
corona in a black hole X-ray binary  
MAXI J1820+070

You et al., Nature Communications, 2021



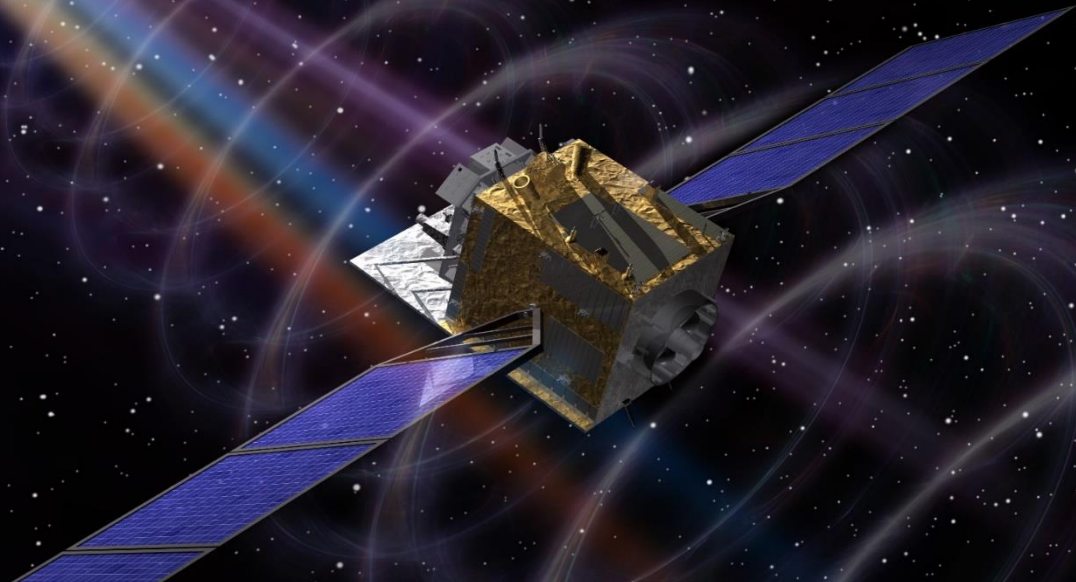


*Insight*-HXMT discovered the X-ray counterpart associated with the fast radio burst and identified it as coming from a magnetar.

Li et al., Nature Astronomy, 2021



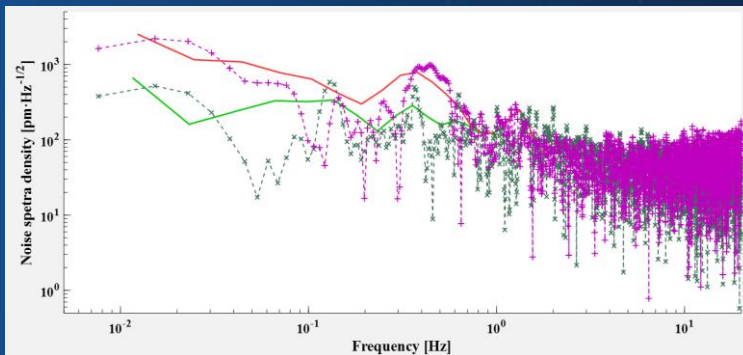
**HXMT**



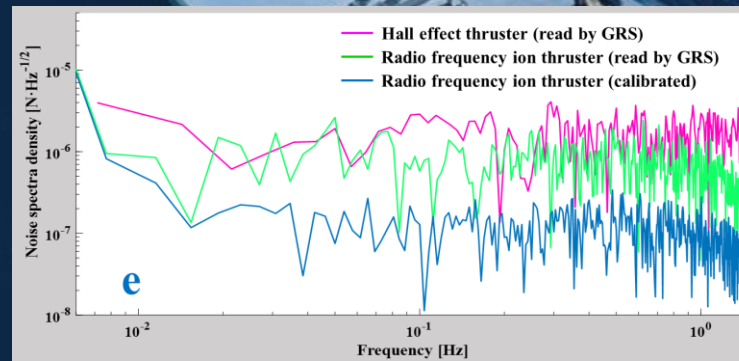


# Taiji

- First technology demonstration mission of space-borne GW detection
- Payloads: Laser interferometer  $\mu$ -Newton Thruster
- Drag-free control experiments



Laser interferometer



$\mu$ -Newton Thruster

Launch: 31 Aug, 2019



# Gravitational wave high-energy Electromagnetic Counterpart All-sky Monitor (GECAM)

Large numbers of bursts discovered:

- GRBs
- SGRs
- X-ray Binary Bursts
- Solar Flares
- Terrestrial Gamma-ray Flashes

**Launch:** Dec. 10, 2020



## CE-4: Findings from the far side of the Moon



### Material Composition

- Impact remnants rich in carbonaceous chondrites
- Rock texture

### Shallow Structure

- Thick lunar regolith: ~12 m
- Reveal subsurface structure

### Space Environment

- Lunar mini-magnetosphere
- First measurements of the radiation exposure
- First in-situ ENA measurements





# CE-5: Sample Return from the moon



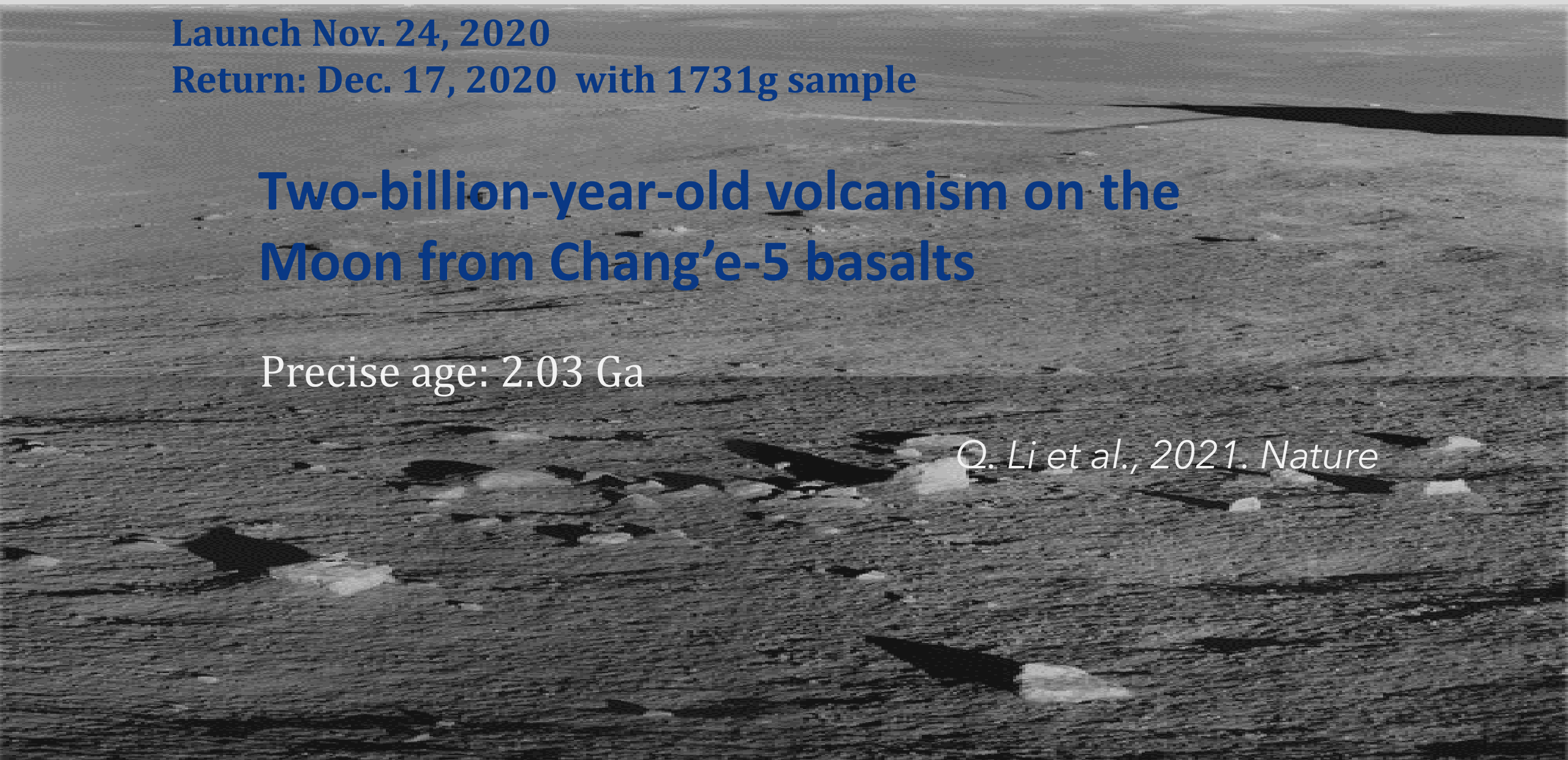
Launch Nov. 24, 2020

Return: Dec. 17, 2020 with 1731g sample

**Two-billion-year-old volcanism on the  
Moon from Chang'e-5 basalts**

Precise age: 2.03 Ga

*Q. Li et al., 2021. Nature*





# CE-5: Sample Return from the moon



Launch Nov. 24, 2020

Return: Dec. 17, 2020 with 1731g sample

## Revealed a dry lunar mantle

Maximum mantle water abundance:  $1\sim5\text{ }\mu\text{g g}^{-1}$

*S. Hu et al., 2021. Nature*





02

**SPP II in Development**

# Advanced Space-borne Solar Observatory (ASO-S)

CME

flare

## Science Objectives

- Relationship between solar magnetic field and solar flares
- Relationship between solar magnetic field and CMEs
- Relationship between solar flares and CMEs

## Payloads

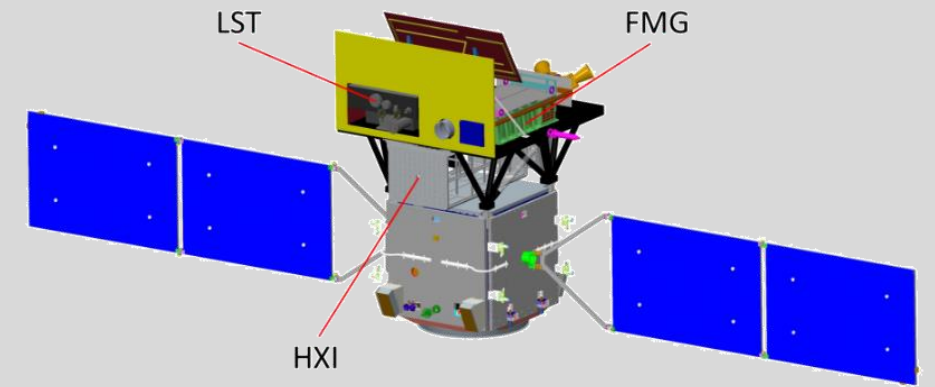
- Full-Disc Vector Magnetograph (FMG): solar magnetic field
- Hard X-ray Imager (HXI): solar flare
- Lyman-alpha Solar Telescope(LST): CME



# ASO-S Progress



- 2021.9, CDR passed
- 2022.1, Satellite platform products accomplished
- 



HXI



FMG

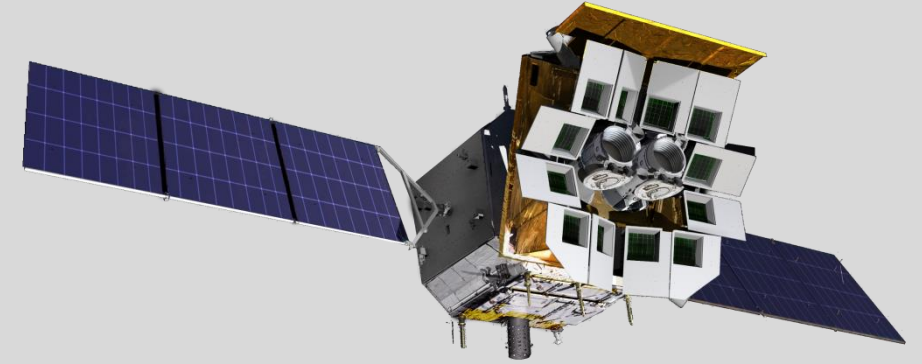


LST

# Einstein Probe (EP)



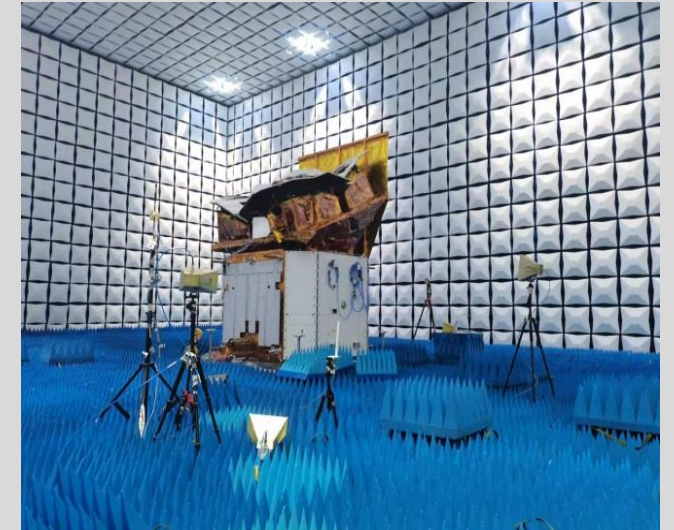
- explore the dynamic X-ray universe
- carry out systematic survey of soft X-ray transients and variability of X-ray sources at unprecedented sensitivity and high cadence



- 04/2020: PDR
- 01/2022: CDR
- 10/2023: Launch



Thermal Vacuum Test



EMC Test



# Solar wind Magnetosphere Ionosphere Link Explorer (SMILE)

## ESA-China Joint Mission

Investigate the dynamic response of the Earth's magnetosphere to the solar wind impact in a unique and global manner

Magnetosheath/  
Magnetopause

SXI FOV  
15.5x26°

UVI FOV  
10x10°

Cusp

Aurora

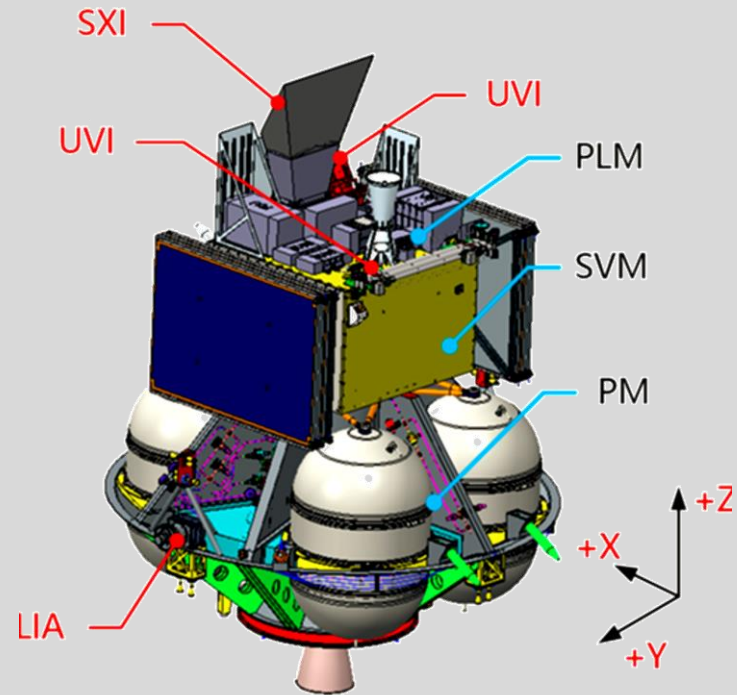
Sun pointing

Comms

*Highly Elliptical Orbit,  
inclination 98 or 70 deg  
5000 km x 19 RE*



# Current Situation



SMILE configuration

- Phase C study
- CDR: Jan 2023
- Launch: before 2024



MAG Boom deployment in ESTEC in Feb.2022



Payload Module integration





# 03

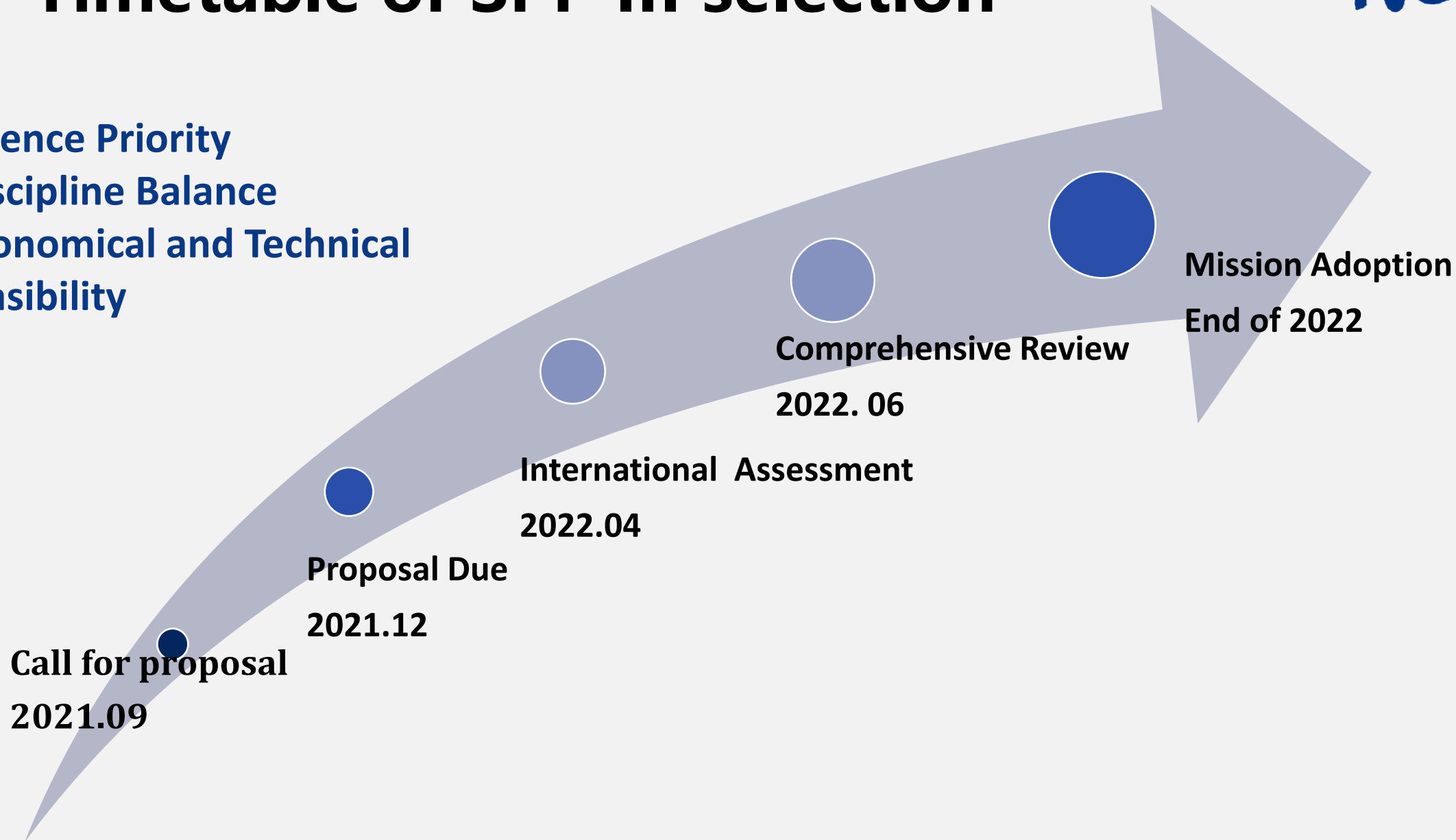
**New Horizon: SPP III**



# Timetable of SPP III selection



- Science Priority
- Discipline Balance
- Economical and Technical feasibility








# Candidate Missions





<b>Astronomy and Astrophysics</b>	<b>DSL</b>	<b>eTXP</b>	<b>DAMPE-2</b>	
<b>Heliophysics</b>	<b>SOR</b>	<b>EOSE-L2</b>	<b>CHIME</b>	<b>SPO</b>
<b>Planetary and Earth Science</b>	<b>ASR</b>	<b>OSCOM</b>	<b>VOICE</b>	<b>CACES</b>
<b>Exoplanets</b>	<b>ET</b>	<b>CHES</b>		

The background of the slide is an aerial photograph of a modern university campus. The main building is a large, multi-story structure with a central section featuring a series of columns. To the right, there are several other buildings, some with glass facades. The campus is surrounded by greenery, including trees and lawns. The sky is a mix of blue and orange, suggesting sunset or sunrise. The image is divided into four vertical panels by thin white lines.

# What we expect in New Horizon: Science and Cooperation