



A large, semi-transparent white text box is centered over a background image of Earth and several satellites in space. The background is a dark blue with stars, and the Earth is visible on the left. Two large, light blue rectangular satellites are positioned in the center and right of the text box. The text box contains the following text:

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

**Chi WANG**

National Space Science Center, CAS  
March 22, 2022

**Nsse**

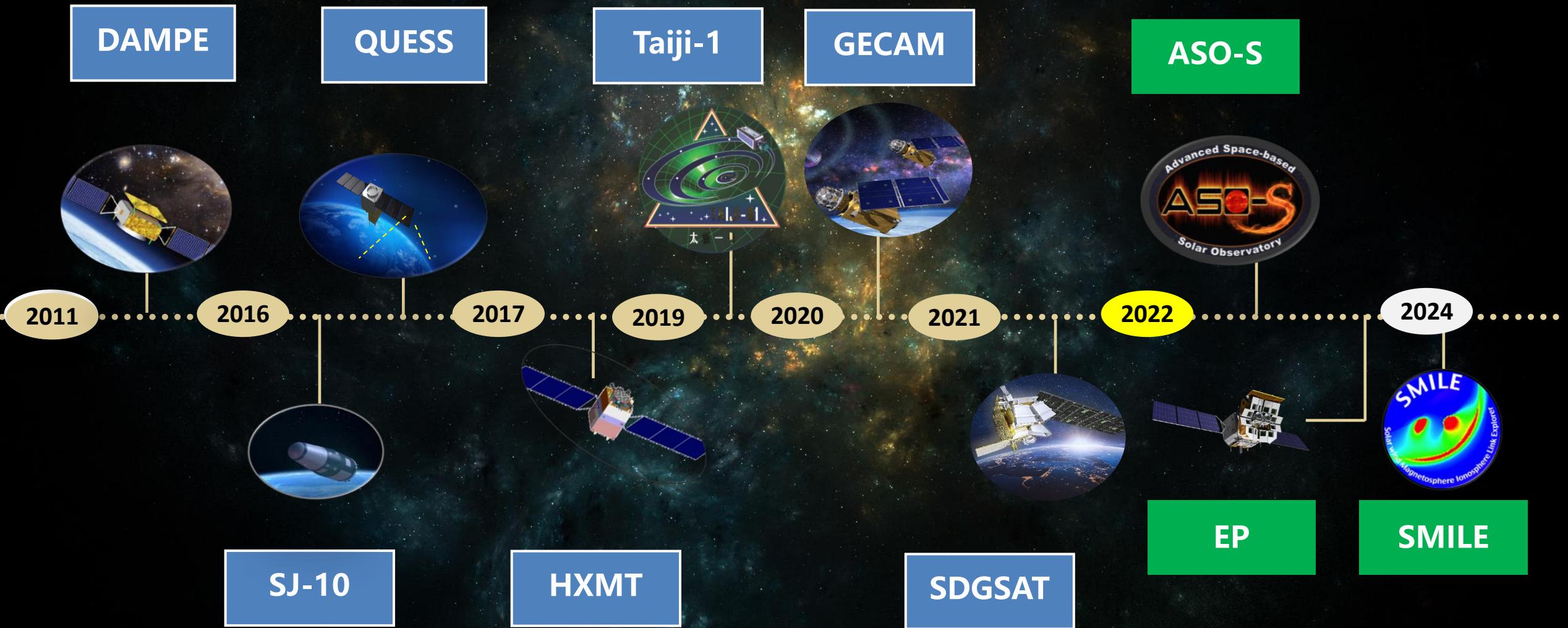


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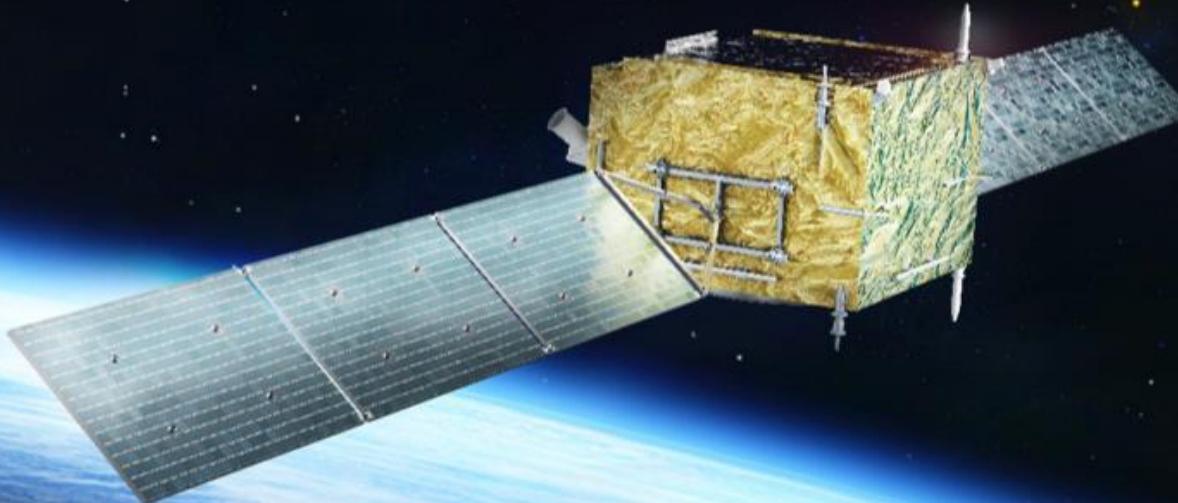


# Strategic Priority Program on Space Science (SPP)



# DArk Matter Particle Explorer (DAMPE)

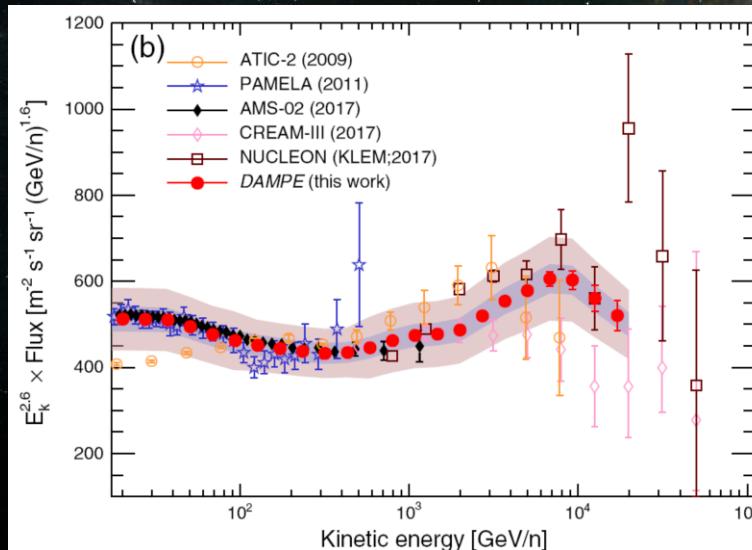
Launch: Dec. 17, 2015



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)

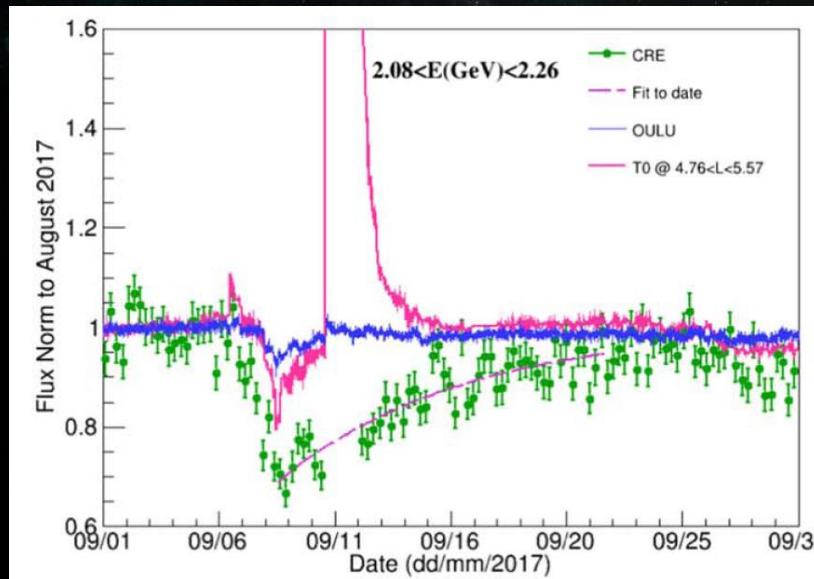
The DAMPE spectral measurements of both cosmic protons and helium nuclei suggest a particle charge dependent softening energy.



Phys. Rev. Lett. 126, 201102, 2021

## DArk Matter Particle Explorer (DAMPE)

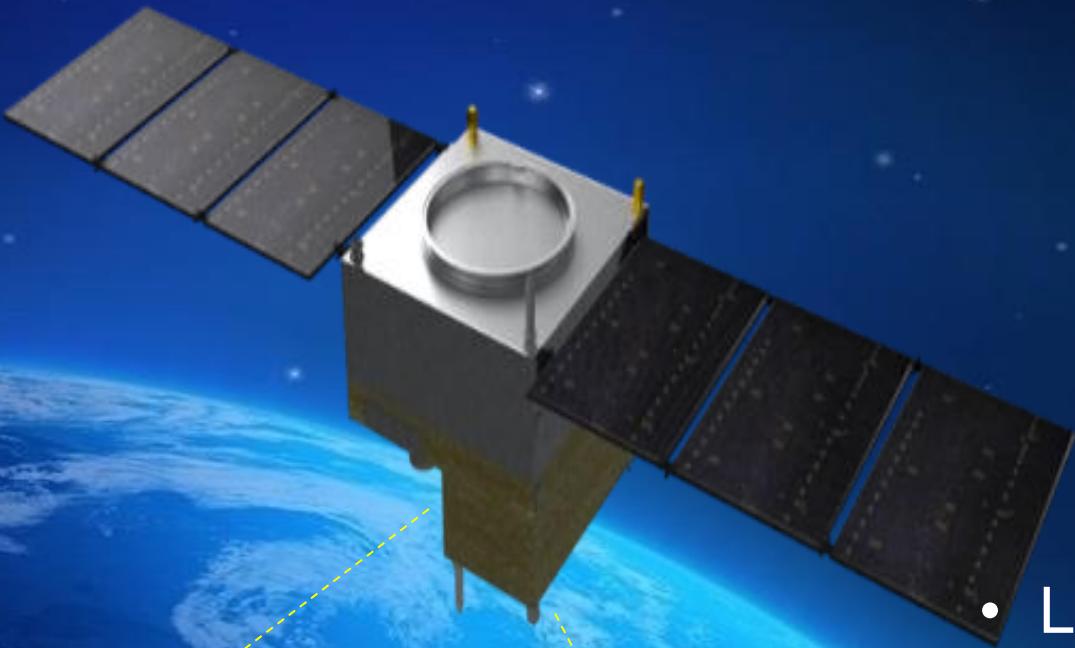
Measured the Forbush Decrease Effect of cosmic ray electrons and positrons with the highest time resolution(6 hours)



The Astrophysical Journal Letters, 920 L43 2021



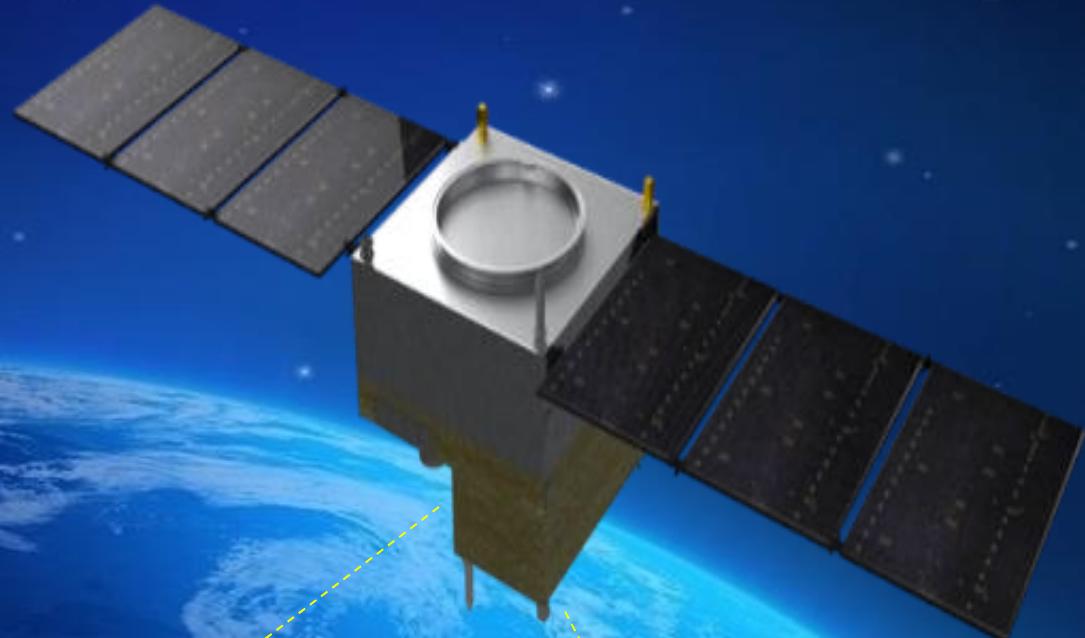
# QUESS (QUantum Experiments at Space Scale)



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



# QUESS (QUantum Experiments at Space Scale)



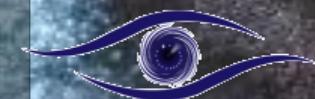
An integrated space-to-ground quantum communication network over 4,600 kilometers

Nature 589, 214-219 (2021)



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

Launch: Jun. 15, 2017



慧眼 - *H X M T*



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

You et al., Nature Communications, 2021



**HXMT**

Disk + outflowing corona evolve with time



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

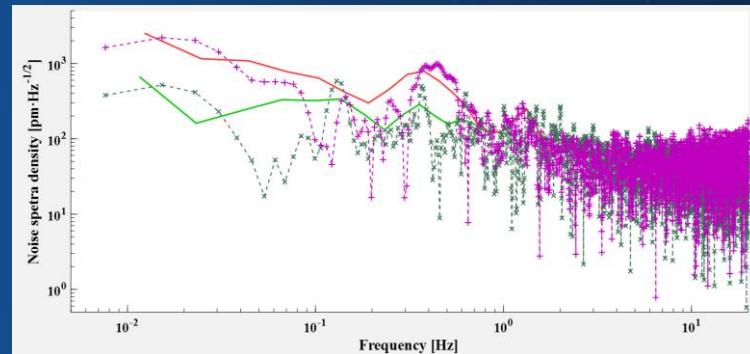
Li et al., Nature Astronomy, 2021

**HXMT**

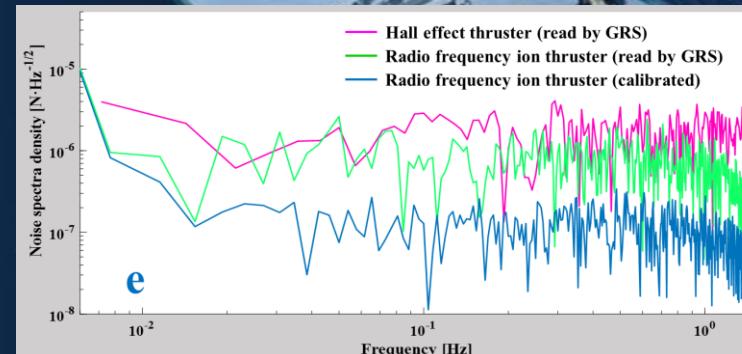


# Taiji

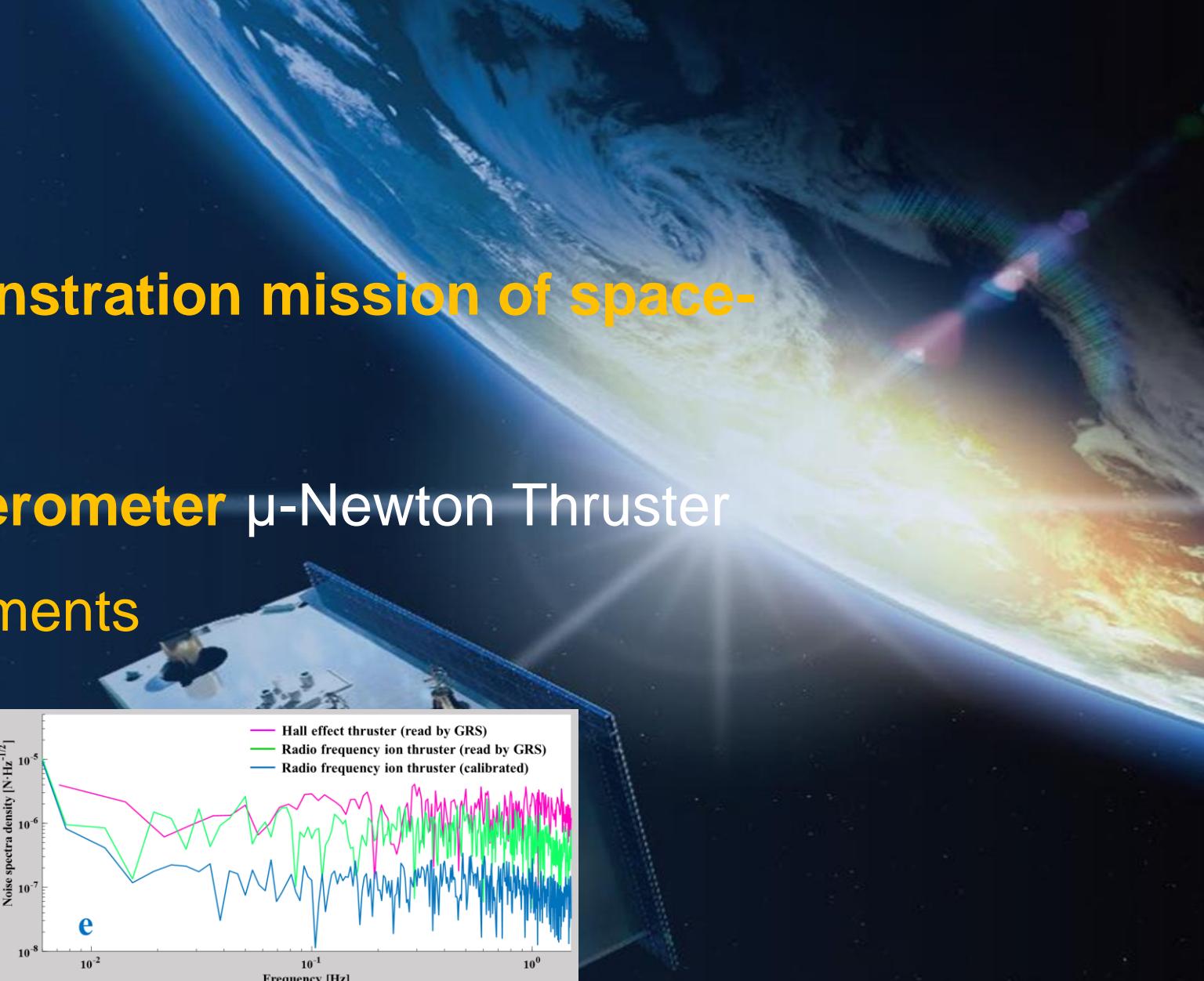
- First technology demonstration mission of space-borne GW detection
- Payloads: Laser interferometer  $\mu$ -Newton Thruster
- Drag-free control experiments



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

Nsce



## 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:  $1 \sim 5 \text{ } \mu\text{g g}^{-1}$

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



02

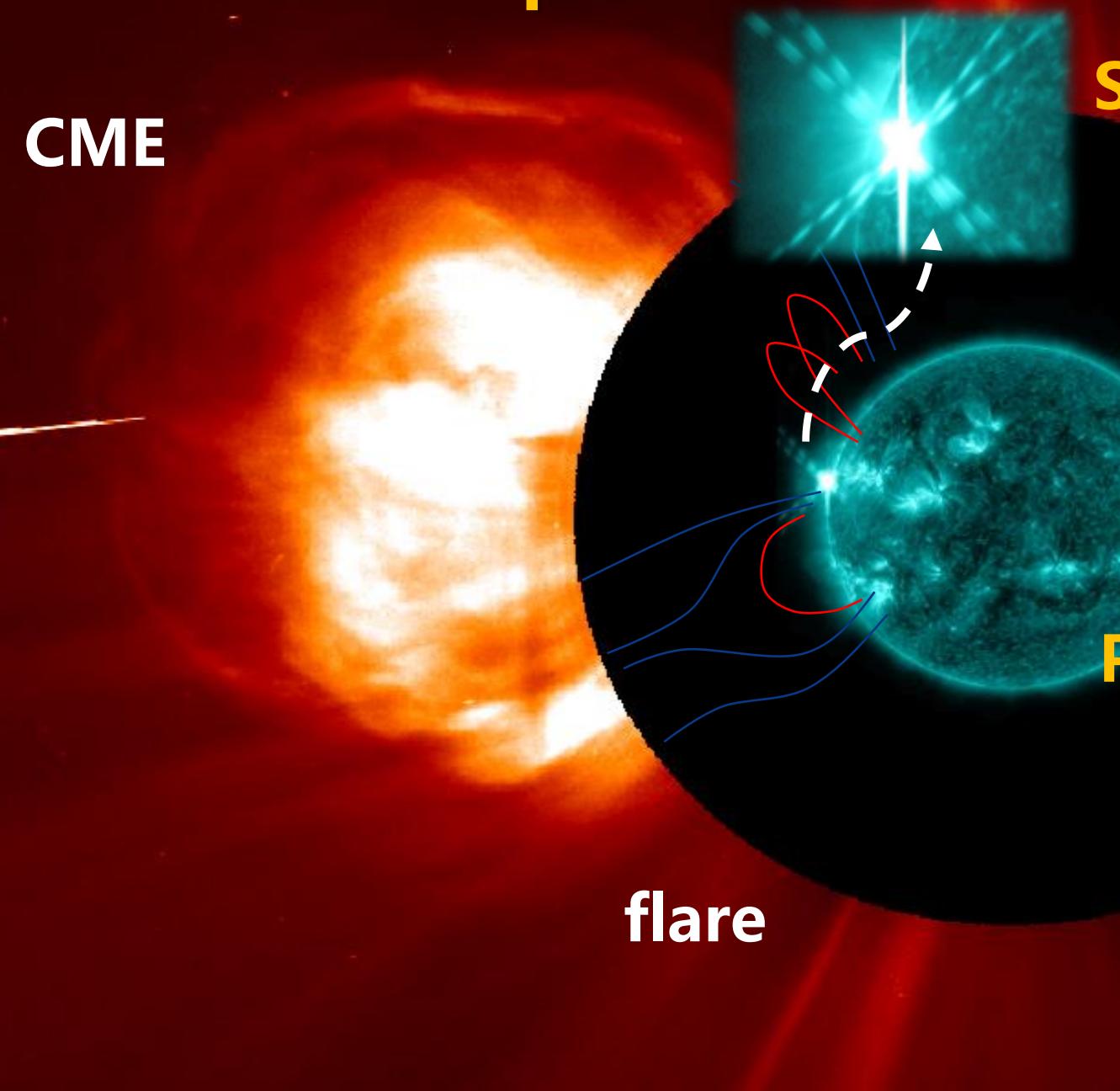
**SPP II in Development**

# 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

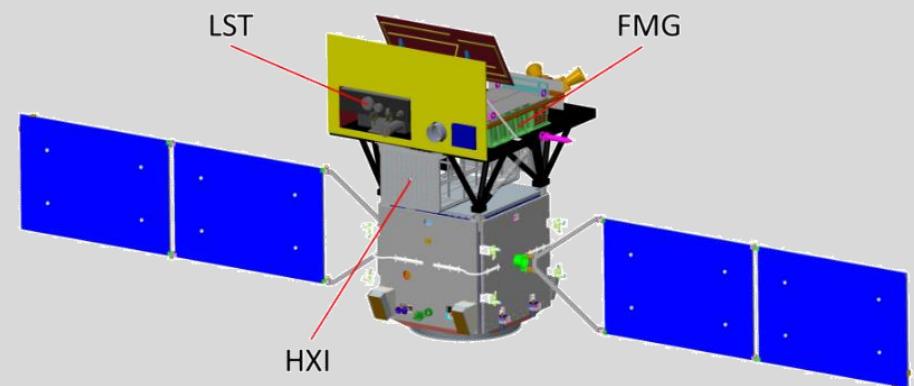
- Full-Disc Vector Magnetograph (FMG): solar magnetic field
- Hard X-ray Imager (HXI): solar flare
- Lyman-alpha Solar Telescope(LST): CME



# ASO-S Progress

Nsce

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



HXI



FMG



LST



# Einstein Probe (EP)

Nsse

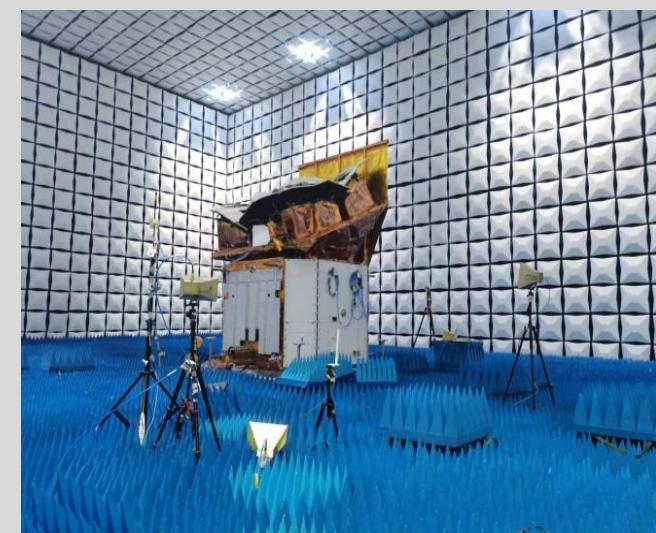
- explore the dynamic X-ray universe
- carry out systematic survey of soft X-ray transients and variability of X-ray sources at unprecedented sensitivity and high cadence



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



Thermal Vacuum Test

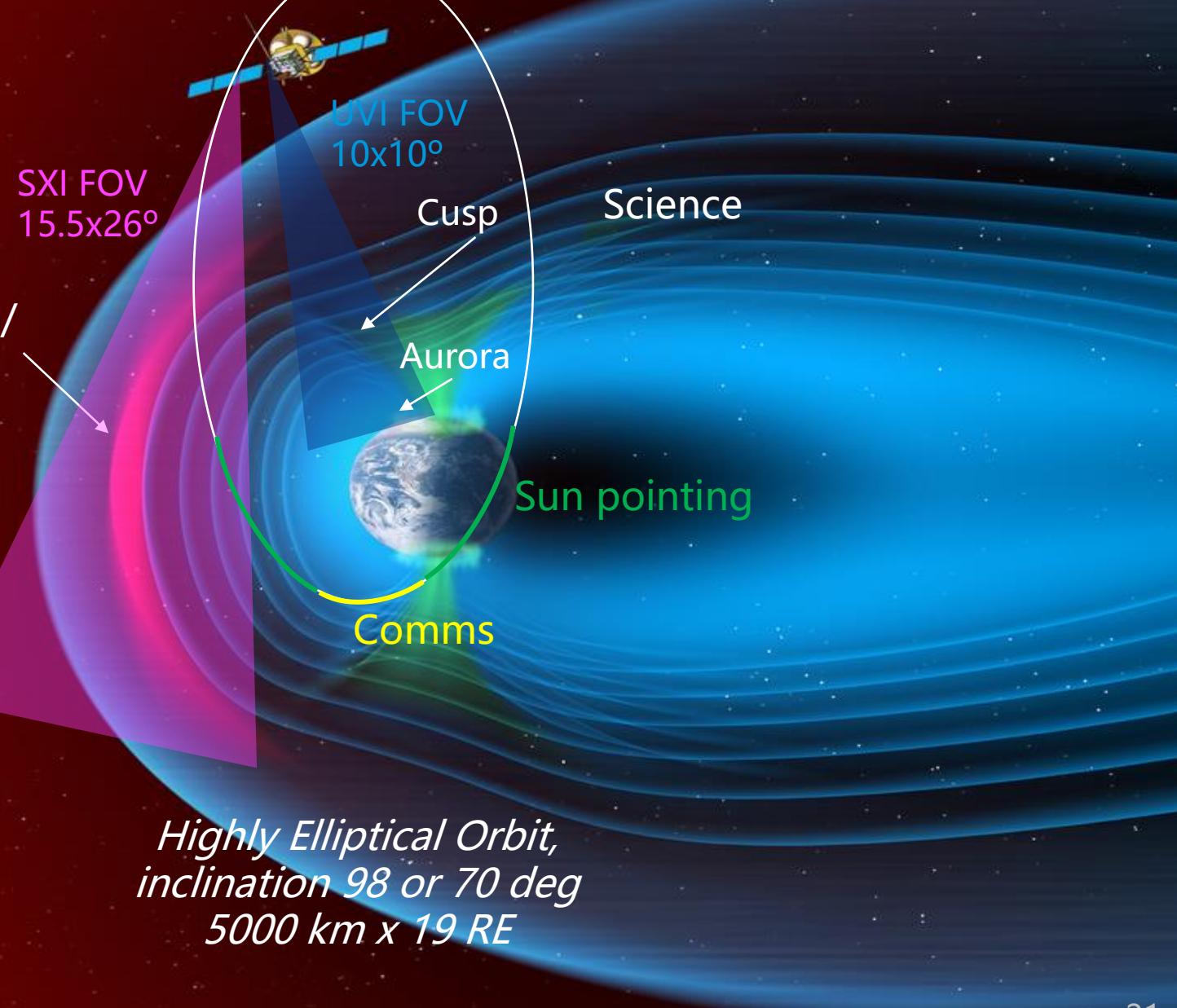


EMC Test

# Solar wind Magnetosphere Ionosphere Link Explorer (SMILE)

## ESA-China Joint Mission

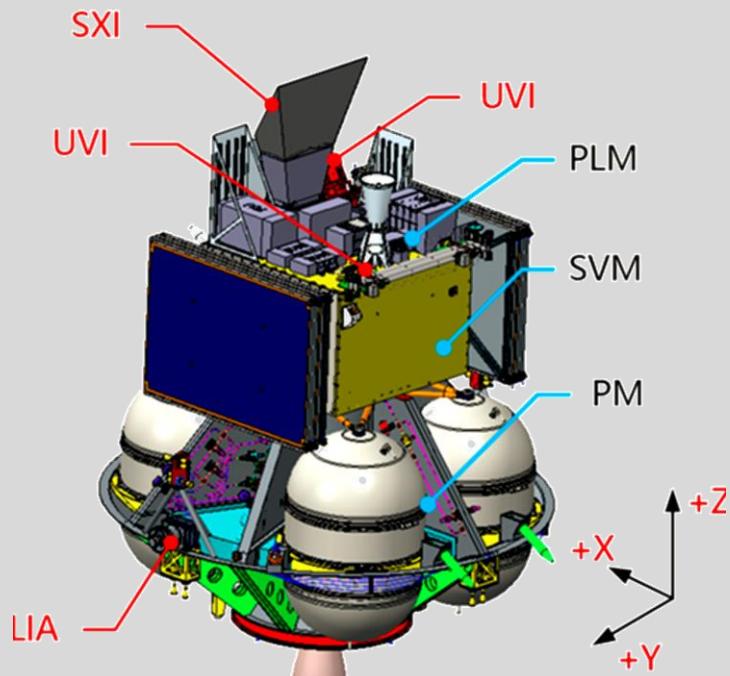
Investigate the dynamic response of the Earth's magnetosphere to the solar wind impact in a unique and global manner





# Current Situation

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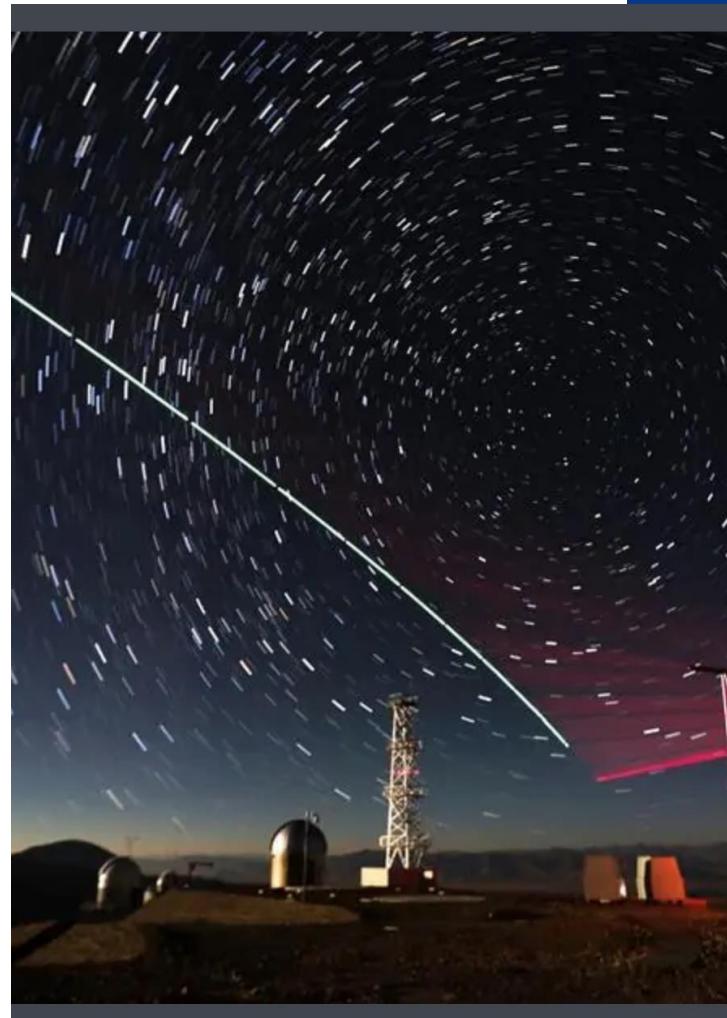
- Phase C study
- CDR: Jan 2023
- Launch: before 2024



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

Call for proposal  
2021.09

Proposal Due  
2021.12

International Assessment  
2022.04

Comprehensive Review  
2022. 06

Mission Adoption  
End of 2022



# Candidate Missions

Nsse

## Astronomy and Astrophysics

DSL

eTXP

DAMPE-2

## Heliophysics

SOR

EOSE-L2

CHIME

SPO

## Planetary and Earth Science

ASR

OSCOM

VOICE

CACES

## Exoplanets

ET

CHES



What we expect in New Horizon:  
Science and Cooperation