中 国 国 家 航 天 局
CHINA NATIONAL SPACE ADMINISTRATION

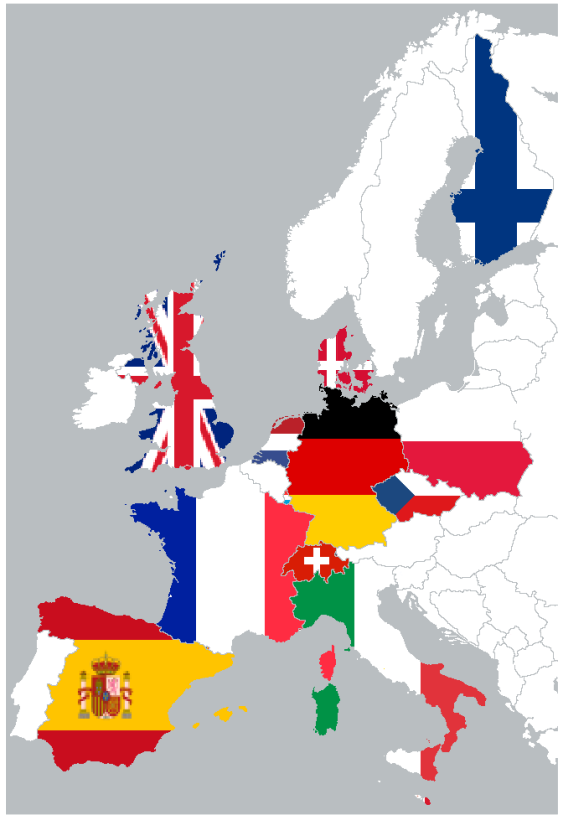
Development and Outlook of China's Space Science Programs Including eXTP

Zhao Jian (赵坚）, CNSA

Feb 6, 2017, Rome, eXTP Science Workshop

eXTP Introduction

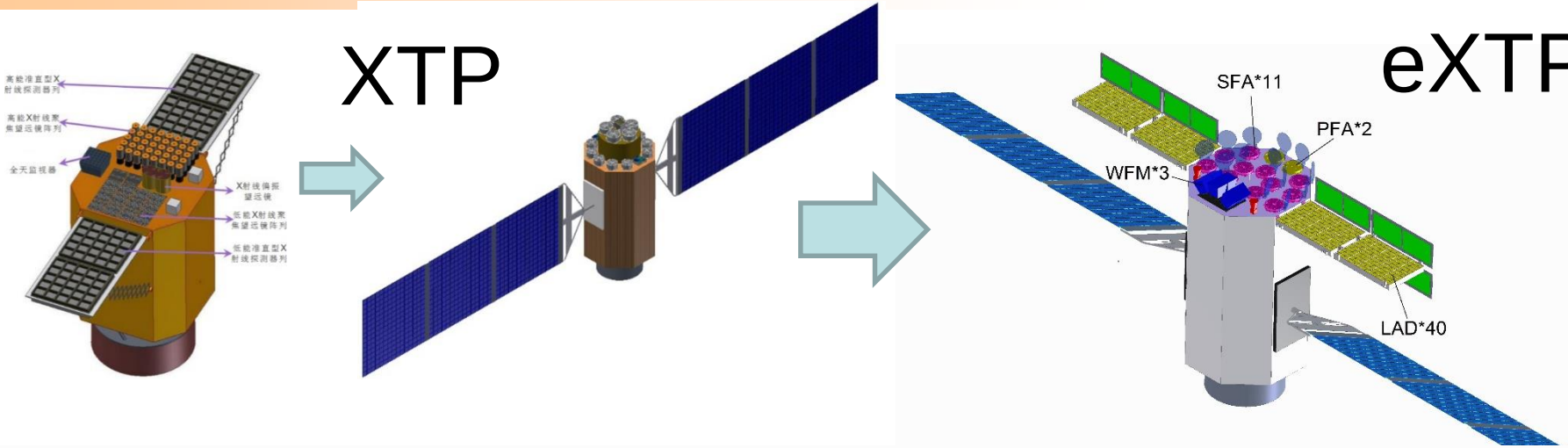
（1）International Cooperation with eXTP Project

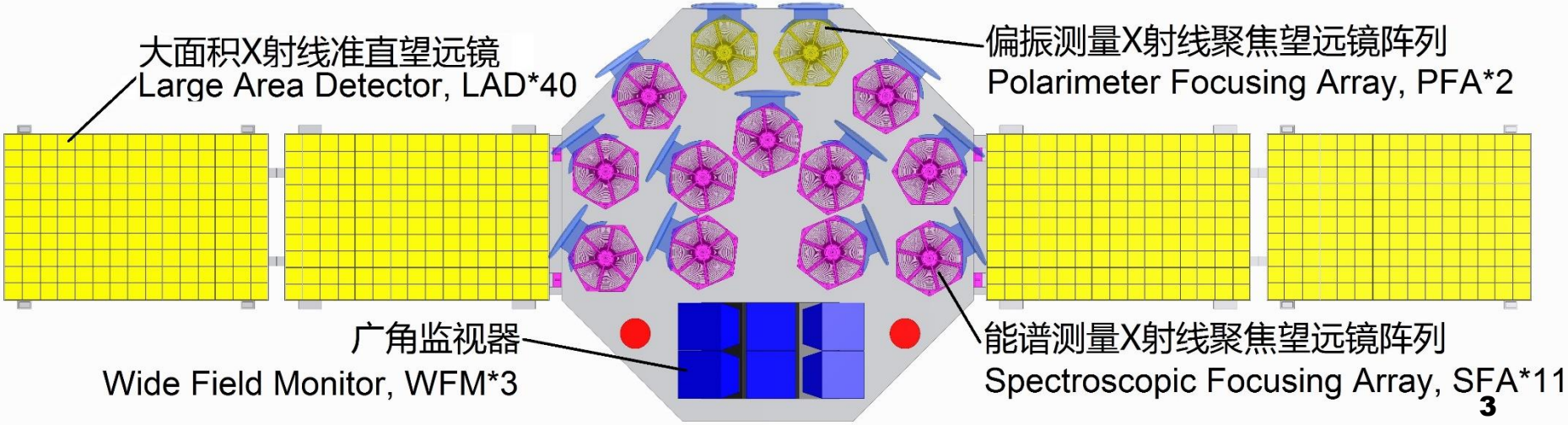


We welcome more international partners, including US, Japan and BRICKS.

eXTP Introduction

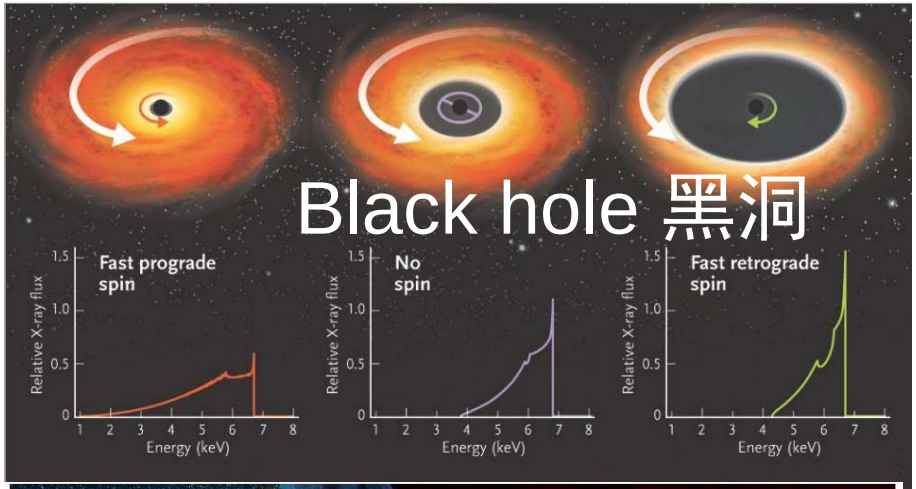
（2）Introduction

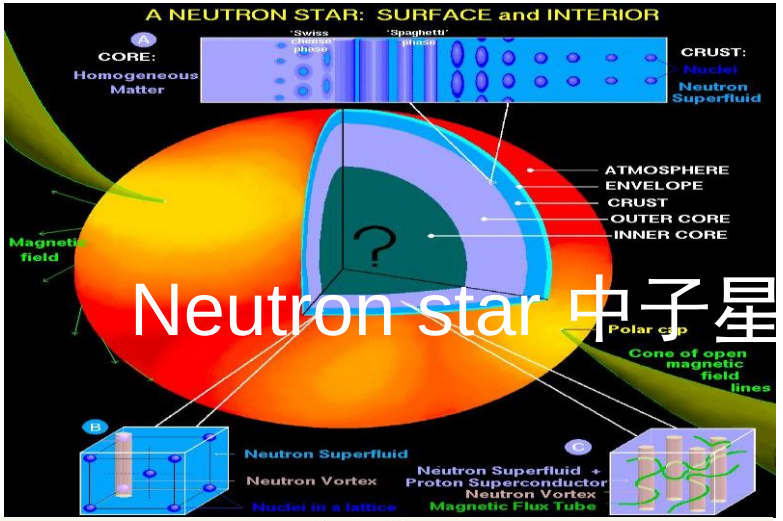


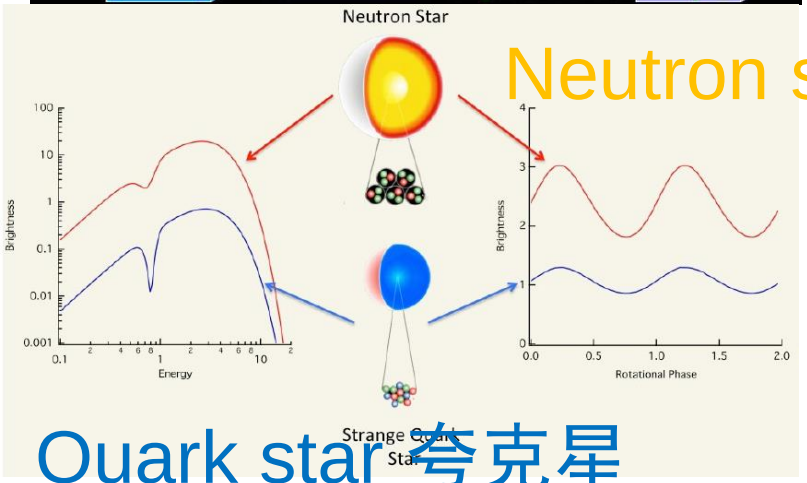


eXTP Introduction

（3）Scientific Themes







I. Strategy for China's Space Science

（1）China's Space Activities

◆Chinese government released the 4th version of the white book “China’s Aerospace” in Dec. 2016.

2016年12月，中国政府发布了第四版《中国的航天》白皮书

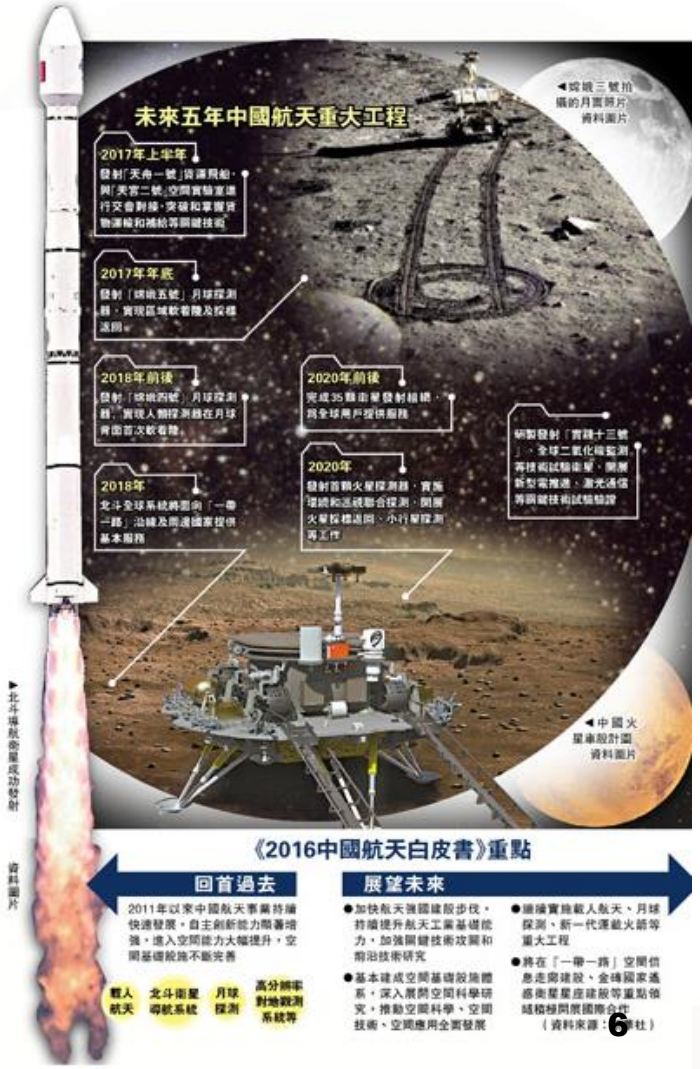
China's Space Activities

I. Strategy for China's Space Science

（1）China's Space Activities

- Outline the main progress of China’s aerospace enterprise over the last five years.
- Presente the developing vision of making China a strong country in aerospace from all aspects.

中国航天白皮书梳理了中国航天事业近5年的主要进展，提出了全面建成航天强国的发展愿景

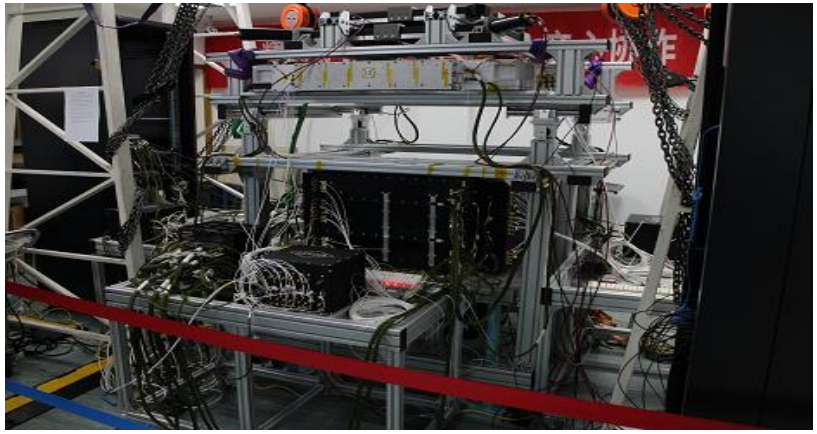


I. Strategy for China's Space Science

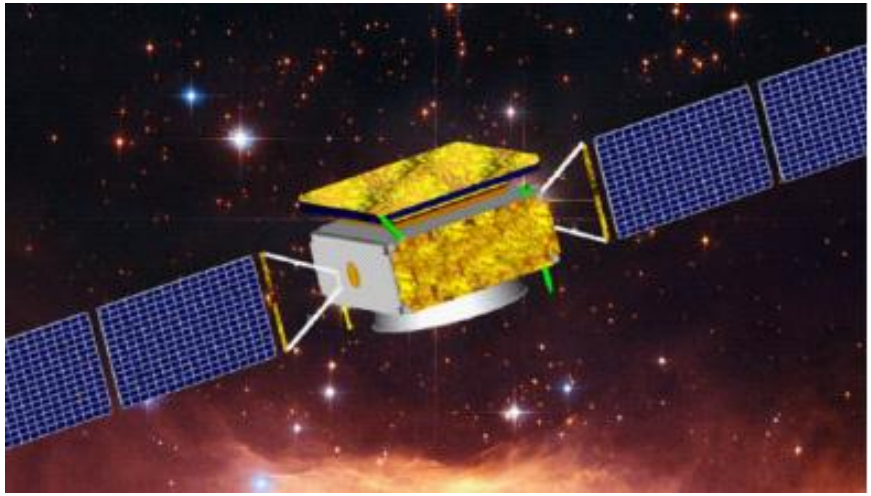
（2）Dark Matter Particle Explorer (DAMPE)

- Detect mainly cosmic high energy electrons and gamma-rays

暗物质粒子探测卫星用于探测宇宙高能电子及高能伽马射线



Payload Qualification Test



DAMPE

I. Strategy for China's Space Science

（3）SJ-10 microgravity recoverable satellite (SJ-10)

- Implement the experiments in microgravity and complex space radiation environment

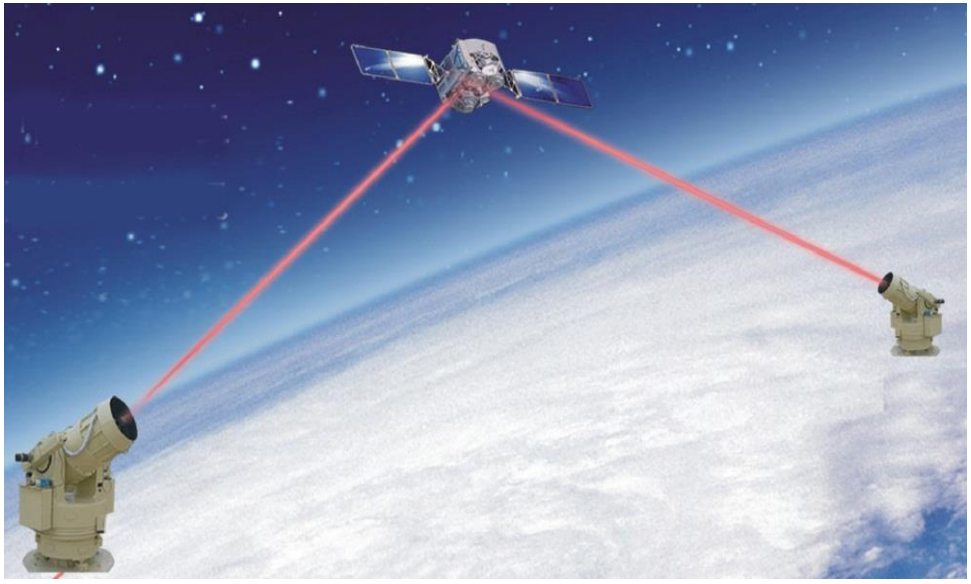
在微重力和复杂空间辐射环境中，实践十号返回式卫星开展相关空间科学实验和研究

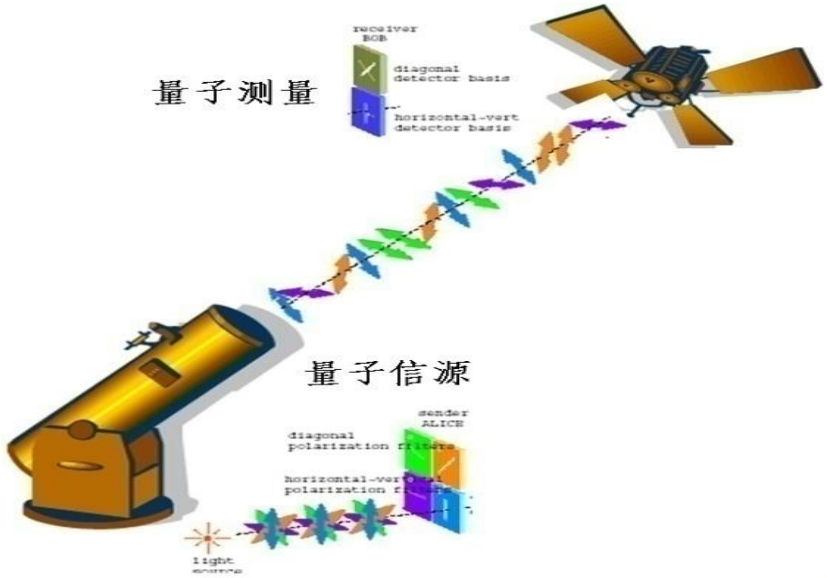
I. Strategy for China's Space Science

（4）Quantum Experiments Scientific Satellite (QUESS)

- Carry out quantum key, entanglement and teleportation experiments at space scale

量子科学实验卫星开展空间尺度上的量子密钥传输、量子纠缠分发及量子隐形传态科学实验和研究





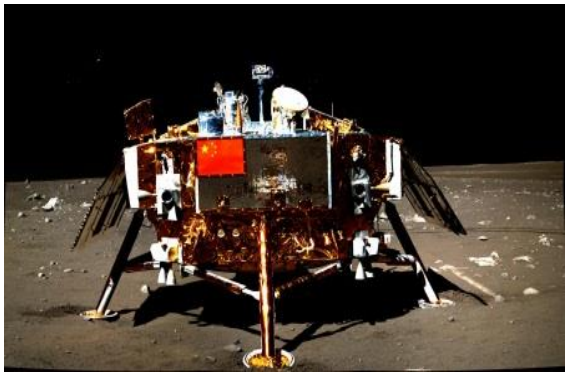
I. Strategy for China's Space Science

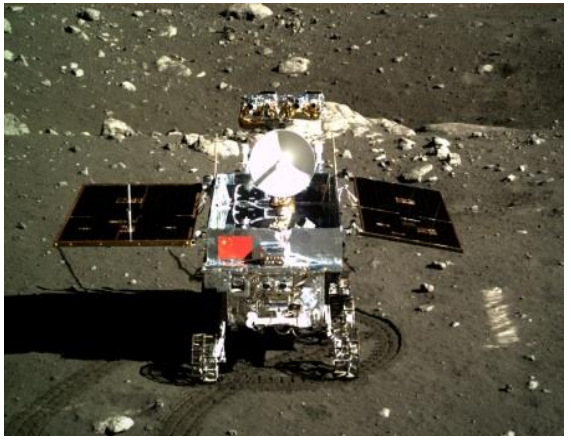
（5）Chang'e Lunar Probe

- Change'e Lunar Probe 3 was launched in Dec. 2rd, 2013, the lunar soft landing was achieved.
- Change'e 5 will be lauched in second half of 2017.

2013年12月2日，嫦娥三号成功发射，首次实现月面软着陆。
嫦娥五号计划于2017年下半年发射，并采样返回。

Chang'e 5



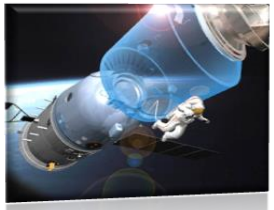


Chang'e 3

I. Strategy for China's Space Science

（6）Shenzhou Spacecraft and TG-1

◆Carry out a series of space science experiments
开展一系列空间科学实验



Chinese Space Station (by 2022)
中国空间站

Spacelab (accomplished)
空间实验室（已完成）

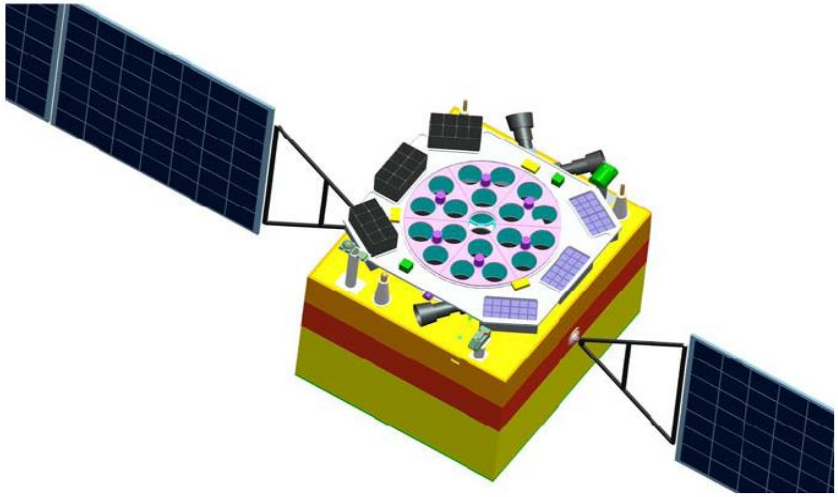
Humanmission (accomplished)
载人航天任务（已完成）

I. Strategy for China's Space Science

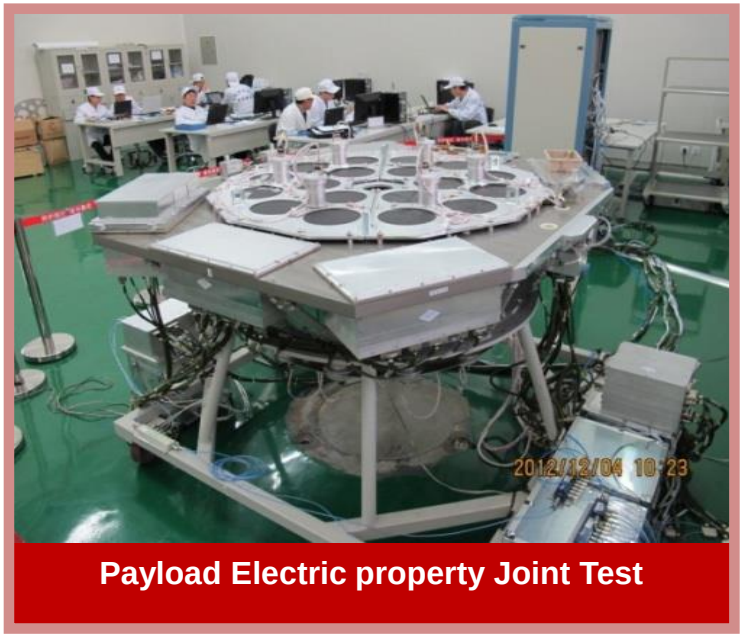
（7）Hard X-ray Modulation Telescope (HXMT)

- Project was started in March 2011
- Go into Phase B in December 2011
- Go into Phase C in Decmber 2013
- To be launched in 2017

- 2011年3月，项目立项
- 2011年12月，进入方案阶段
- 2013年12月，进入初样阶段
- 预计2017年择机发射



HXMT（硬X射线调制望远镜）



Payload Electric property Joint Test

I. Strategy for China's Space Science

（8）China's Space Science Programming

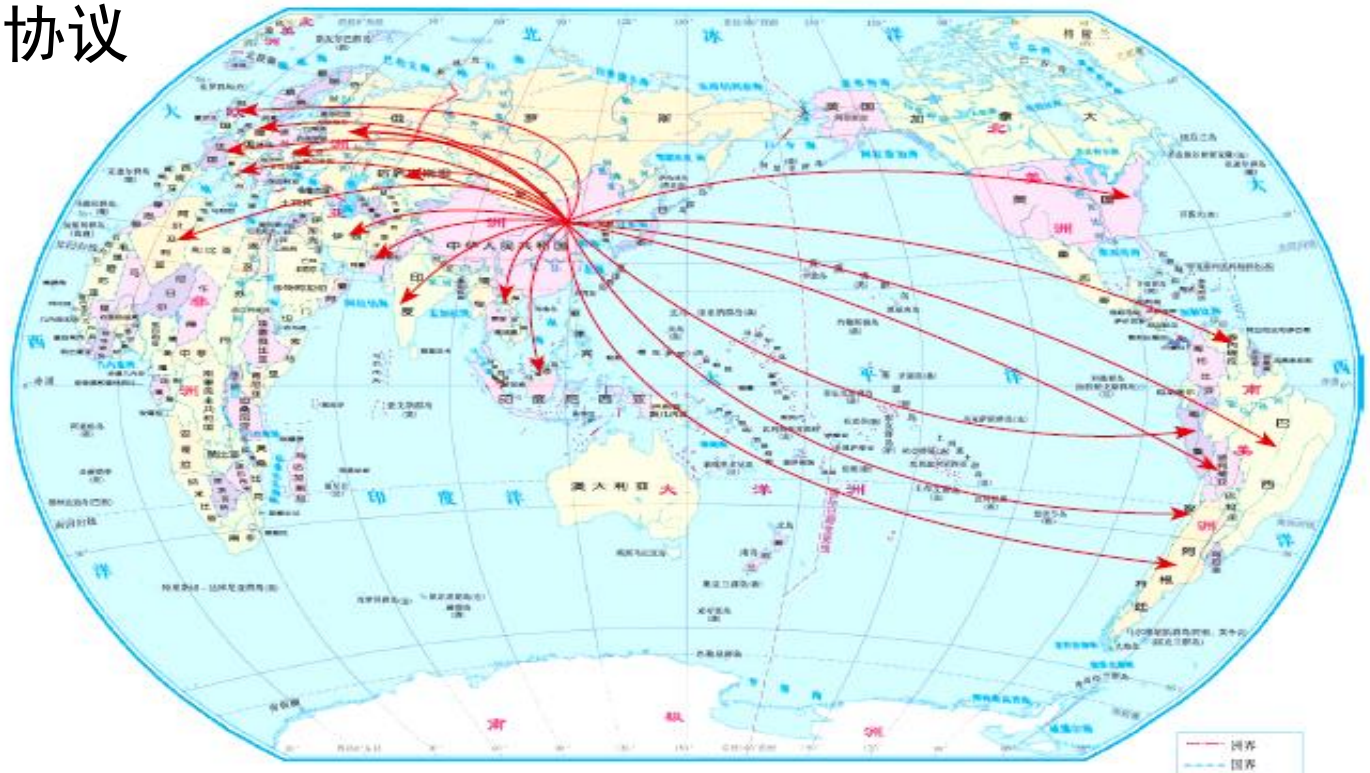
- Select some new space science satellite projects
- Reinforce basic and applied research
- Make important discoveries and breakthroughs in space science frontiers
- To deepen our understanding of the universe

中国空间科学计划将遴选并启动实施一批新的空间科学卫星项目，加强基础应用研究，在空间科学前沿领域取得重大发现和突破，深化人类对宇宙的认识

II. International Cooperation

- China has signed more than 100 space cooperation agreements with 30 countries, space agencies and international organizations.

中国与30个国家、空间机构和国际组织签署了超过100个空间合作协议



国际合作网络

International Cooperation Network

II. International Cooperation

（1）Communication Satellites

LAOSAT-1（老挝一号）

Belarus Sat-1（白俄一号）

- China has successfully launched several communication satellites with international cooperation
- Satellites are delivered and turned-over to European, Asian and African users

成功发射多颗国际合作的通信卫星
向欧、亚和非洲广大用户提供卫星在轨交付服务

II. International Cooperation

（2）China- Brazil Space Cooperation

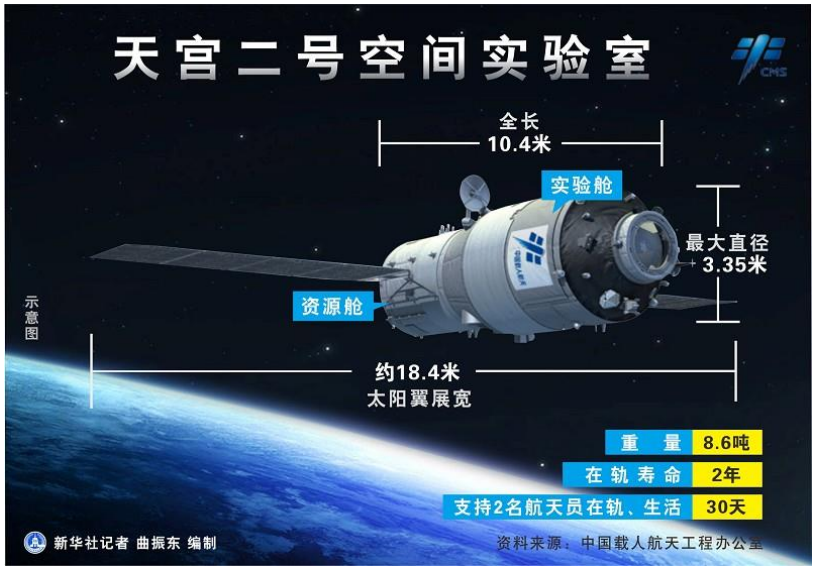
CBERS-04

- Governmental Agreement on CBERS cooperation signed on July, 1988
- 5 CBERS satellites were jointly developed

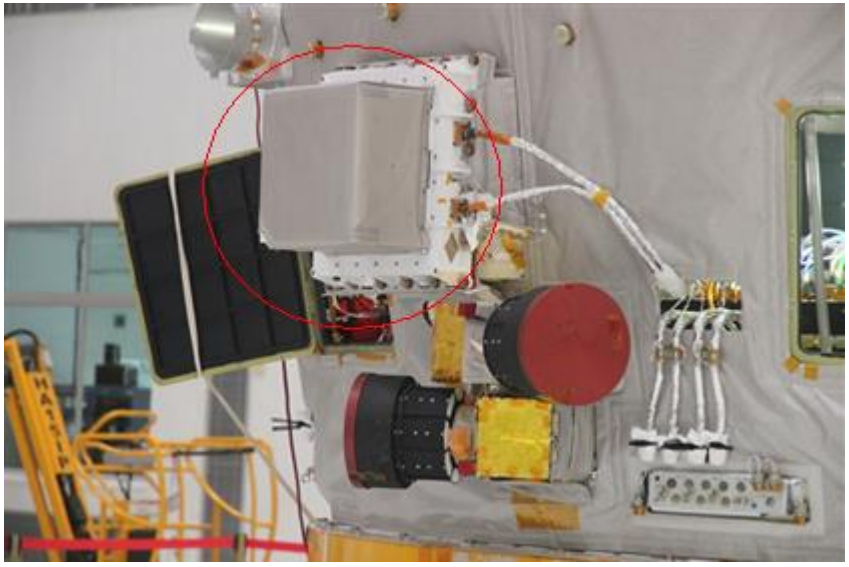
中巴地球资源卫星政府间合作协议于1988年7月签署
规划了5颗资源卫星

II. International Cooperation

（3）TG-2 Space Cooperation



TG-2



POLAR on TG-2

•China-Switzerland gamma-ray burst polarization experiment (POLAR) has been working successfully on China’s TG-2 spacelab, and detected gamma-ray bursts, solar X-ray flares and pulsed signals from the Crab pulsar

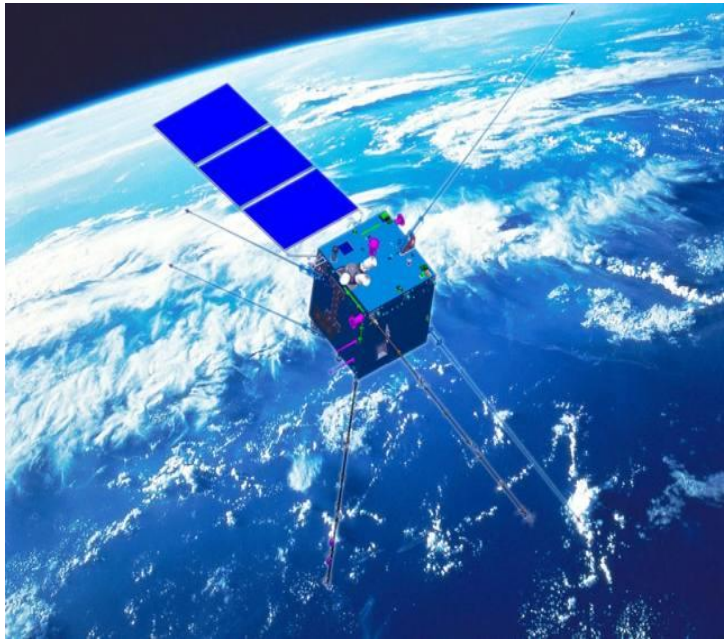
中瑞联合研制的伽玛暴偏振探测仪已成功观测到伽玛暴、太阳X射线暴和蟹状星云脉冲星的脉冲信号

II. International Cooperation

（4）China-Italy electro-magnetic monitoring experiment satellite (CSES/Limadou)

- Provide important observational data to the electro-magnetic field of the earth
- To be launched in the second half of 2017

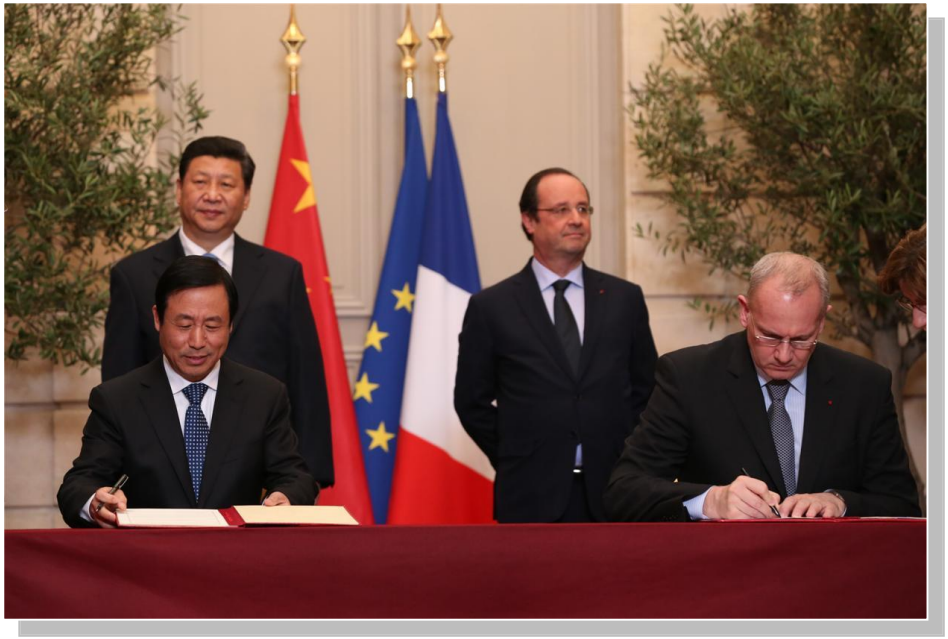
中意电磁监测试验卫星计划于今年下半年实施发射，为地球电磁场的研究提供重要观测数据

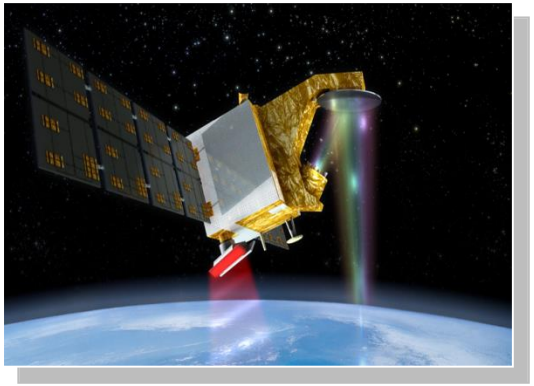


CSES/Limadou to be lauched in 2017

II. International Cooperation

（5）China-France Cooperation





CFOSAT, to be launched in 2018 中法海洋卫星

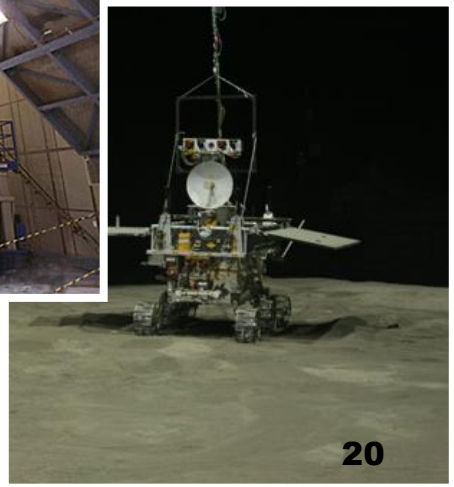
SVOM, to be launched in 2021 中法天文卫星

II. International Cooperation

（6）Lunar Exploration

- Breakout key technologies for lunar exploration；obtain the full moon map and basic data of moon environment; Construct the basic facilities for research;
- Master the key technologies for sampling automaticly;

通过月球探测工程，突破了一些月球探测的关键技术；获得全月图和月球环境基本数据，掌握自动采样的关键技术。

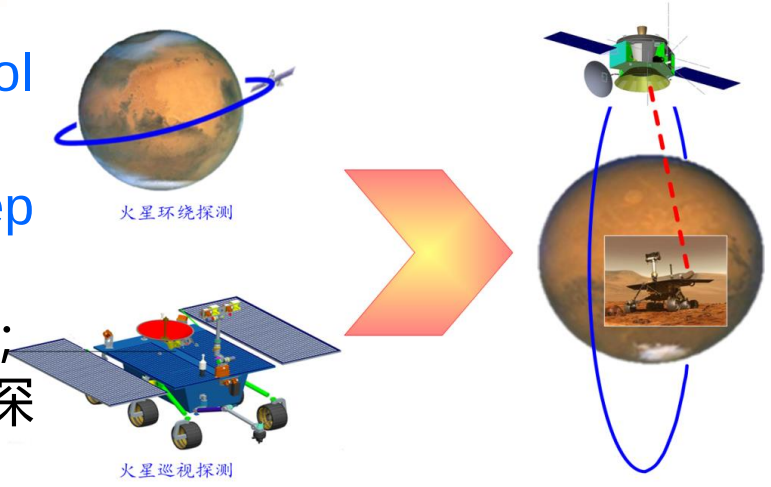


II. International Cooperation

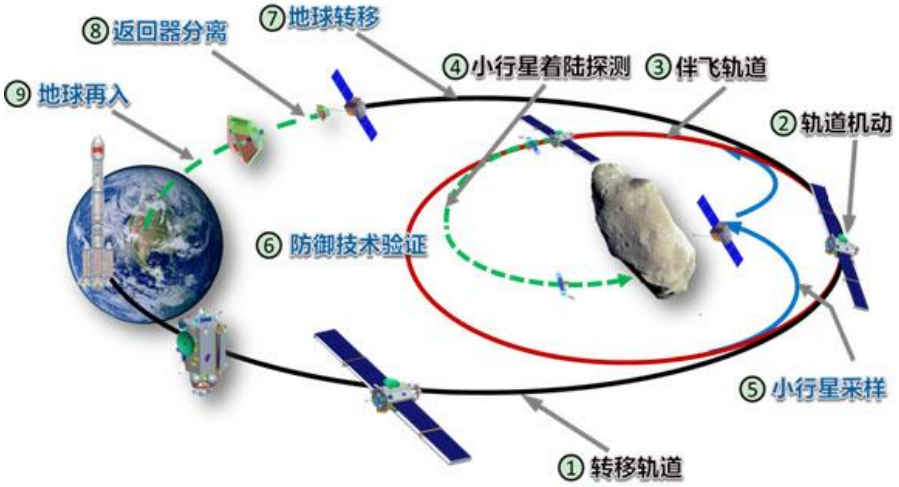
（7）MARS and Deep Space Exploration

- Implement the MARS surround and patrol missions around 2020.
- Carrying out the demonstration work for deep space exploration

在2020年，实施首次火星探测器发射任务；2021年，完成火星环绕和巡视任务；正在开展深空探测的论证工作。



Exploration of MARS



Exploration of Asteroid

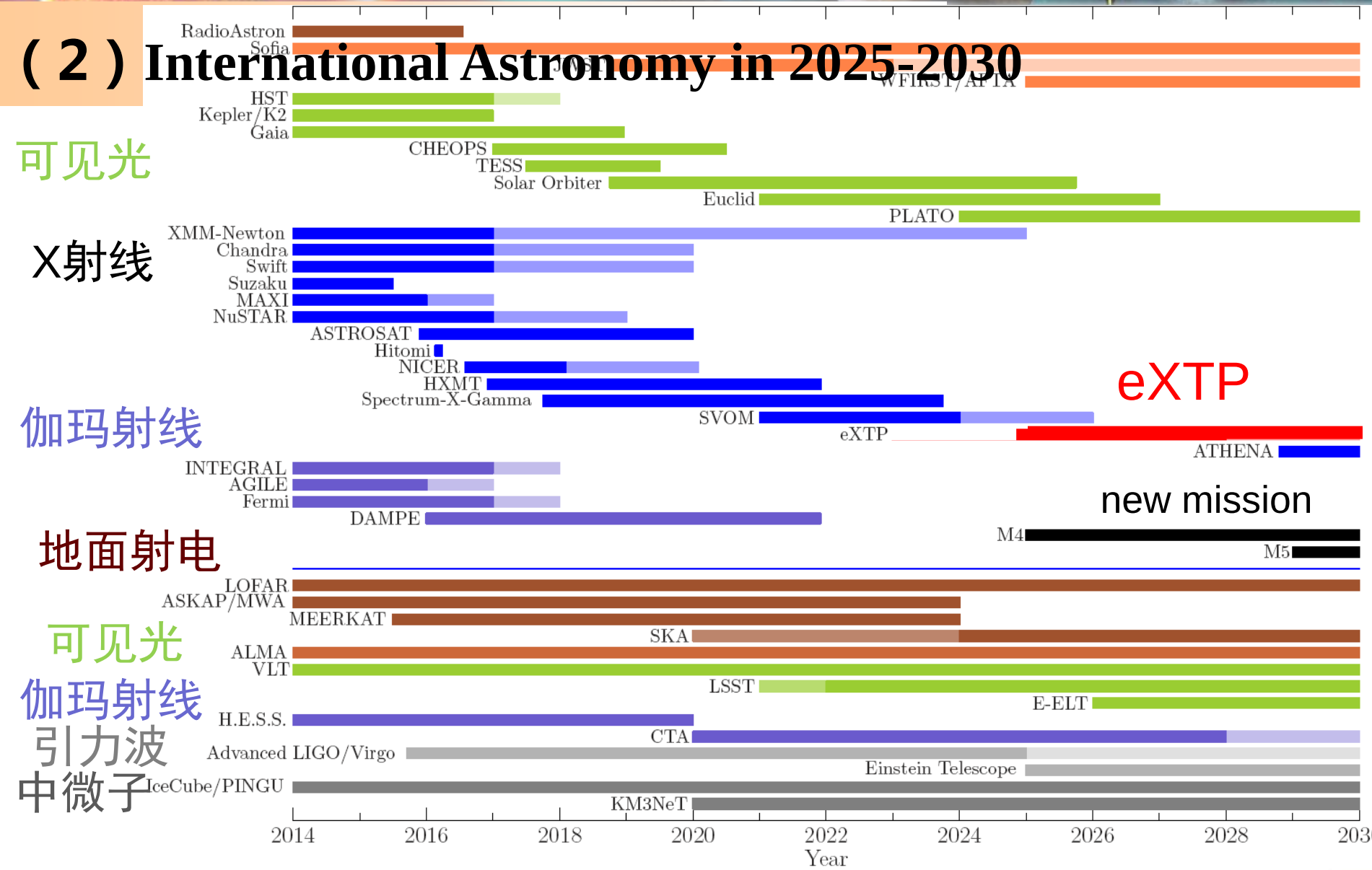
III. The Outlook for future eXTP

(1) eXTP status & preliminary schedule

- 2011-2016: background study (Phase 0/A1)
  - XTP+LOFT → eXTP
- 2017.1-2017.12: international coordination and preliminary design (Phase A2)
  - China-Europe Joint Steering Committee, Joint Science Committee and Joint Mission Study Team
  - Formal approval in CNSA and ESA (and member states)
- 2018.1-2018.12: Detailed design (Phase B)
- 2019.1-2021.12: Space qualification model (Phase C)
- 2022.1-2023.12: flight model (Phase D)
- 2024: launch; 2025-2035: science observation

III. The Outlook for future eXTP

（2）International Astronomy in 2025-2030



III. The Outlook for future eXTP

（3）Wenchang Satellite Launch Center (WSLC)

- First coastal launch center
- Builded in 2014
- Long March-5, Long March-7 were launched here in 2016

首个滨海发射场，于2014年完成建设；2016年，长征五号、长征七号运载火箭在这里完成首飞任务。

Long March-5

谢谢

Thank You!