

Astronomy and Space Science as Tools for Tertiary Education

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FAST telescope, Guizhou, China

五百米口径球面射电望远镜 (天眼)



Astronomy for Development

Building from the IYA2009

Strategic Plan 2010–2020

with 2012 update on implementation



East-Asia Office of
Astronomy for Development
EA-ROAD @ XJTU

- ★ General public & Media
- ★ Schools & Children
- ★ Research & Universities





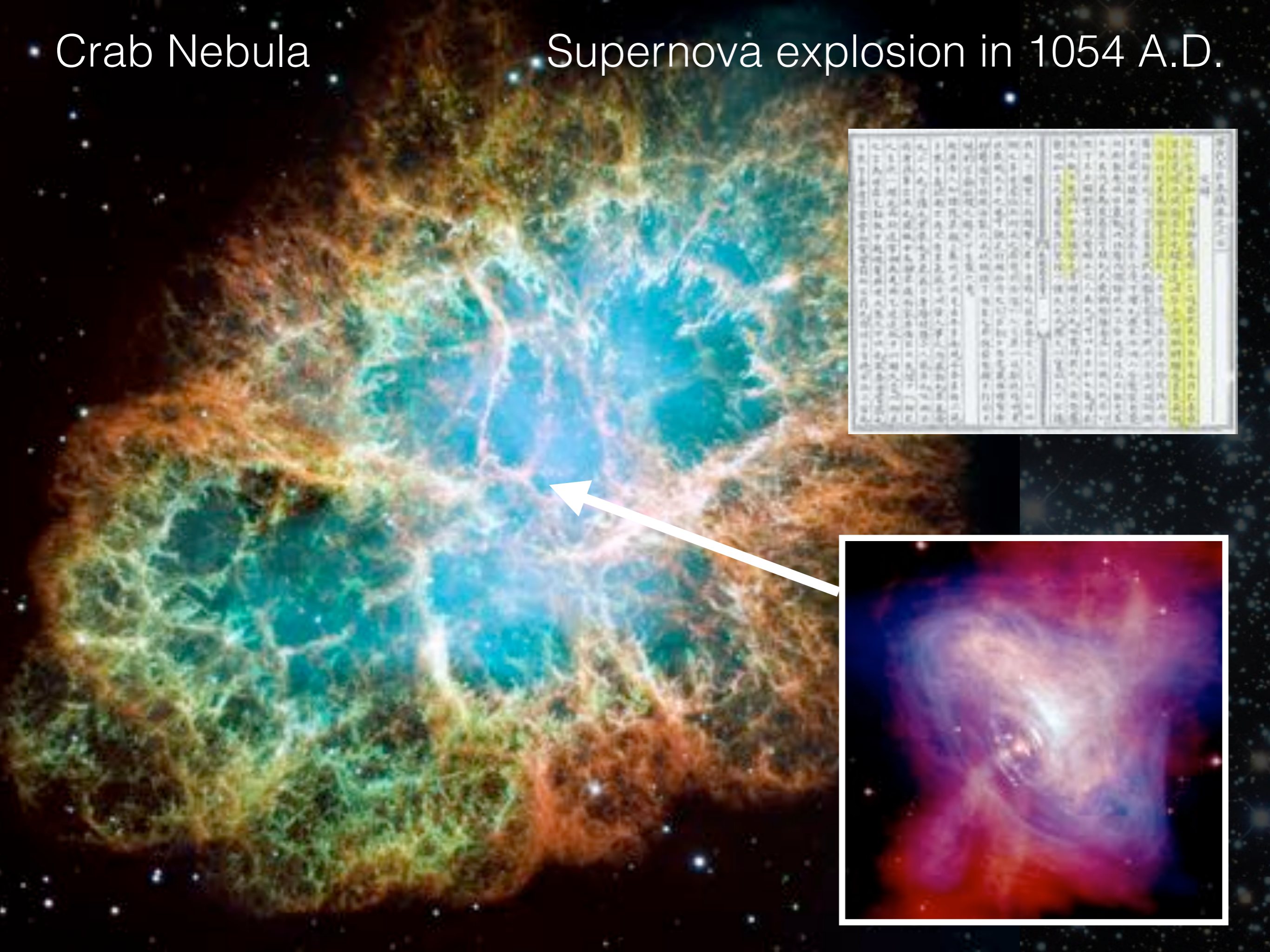
中医阴阳五行图



五行	方位	季节	颜色	天干	地支	卦象	脏腑	五官	形体	情志	声音	味道	气味
木	东	春	青	甲乙	卯辰	巽	肝	目	筋	怒	酸	臊	臊
火	南	夏	赤	丙丁	巳午	离	心	舌	脉	喜	苦	焦	焦
土	中	长夏	黄	戊己	未申	坤	脾	口	肉	思	甘	湿	湿
金	西	秋	白	庚辛	酉戌	兑	肺	鼻	皮毛	悲	辛	燥	燥
水	北	冬	黑	壬癸	亥子	坎	肾	耳	骨	恐	咸	寒	寒

Crab Nebula

Supernova explosion in 1054 A.D.



蘇州石刻天文圖



Suzhou star chart
蘇州石刻天文圖
淳祐天文圖

Song Dynasty
(1193)

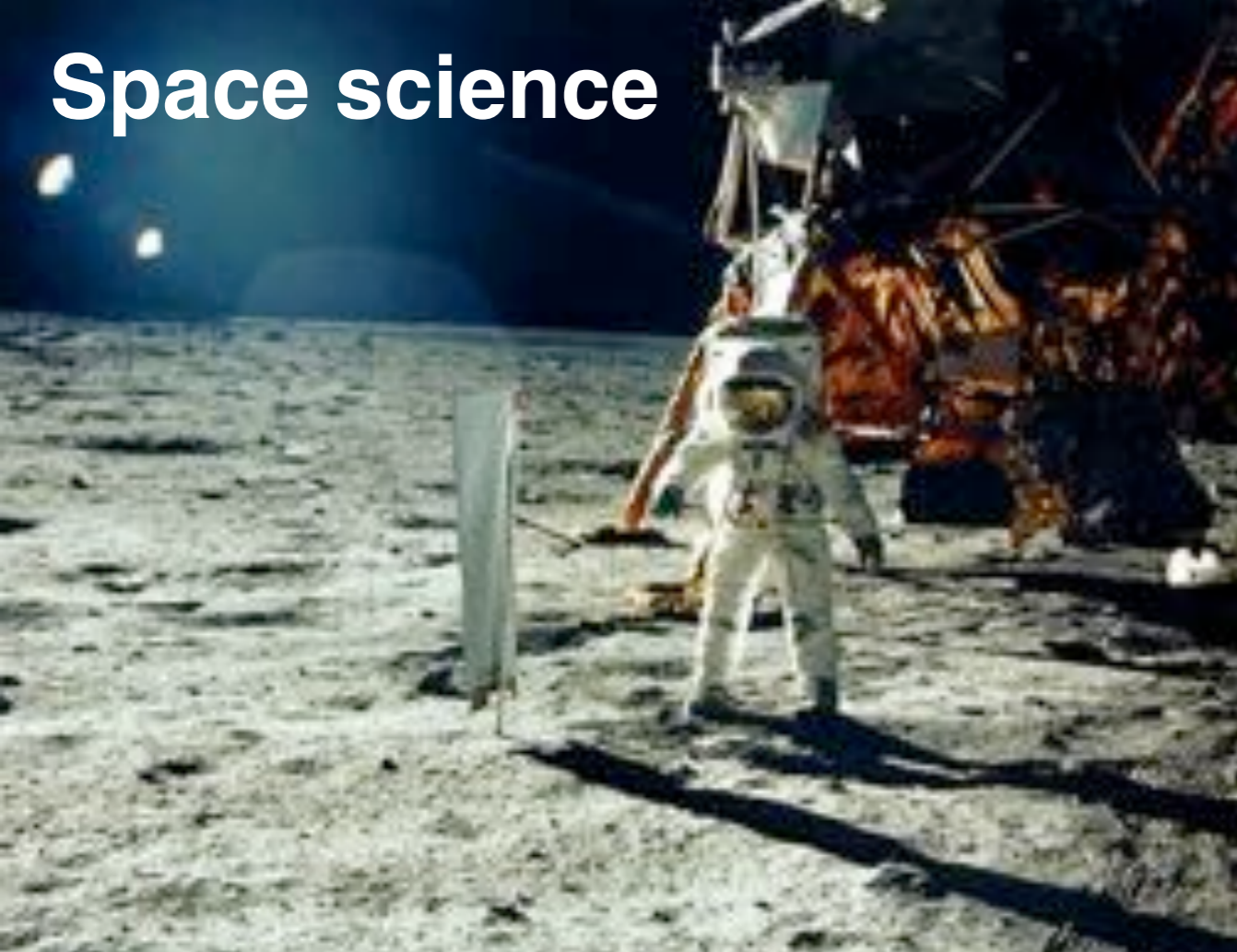
Huang Shang 黃裳

(in Suzhou Museum)

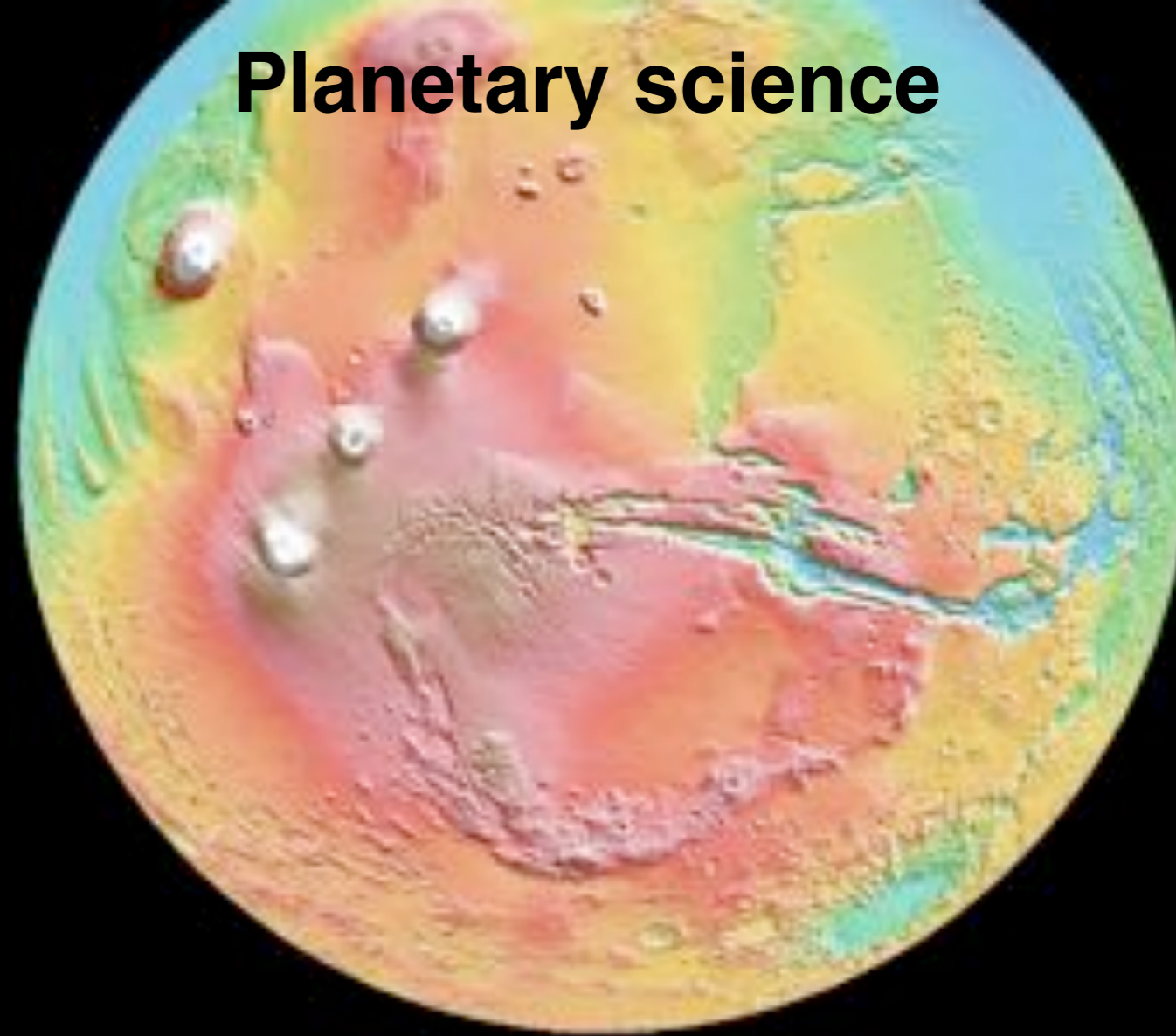
The Big Questions

- ★ Where does the Universe come from? Why does it exist at all?
- ★ What is the origin and fate of planet Earth?
- ★ Are we alone in the Universe? If yes/no, why?

Space science



Planetary science



Astrophysics



Cosmology



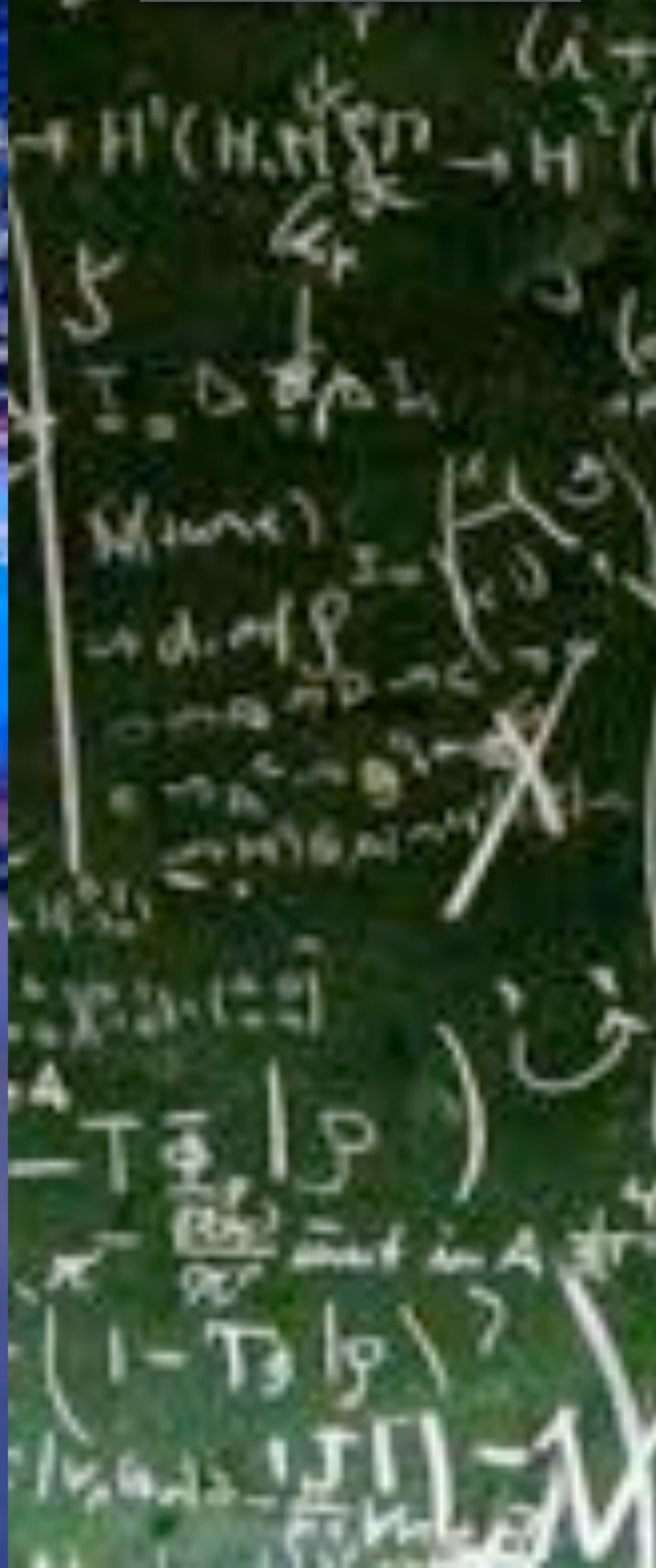
**observations
(measurements)**



**simulations
(experiments)**

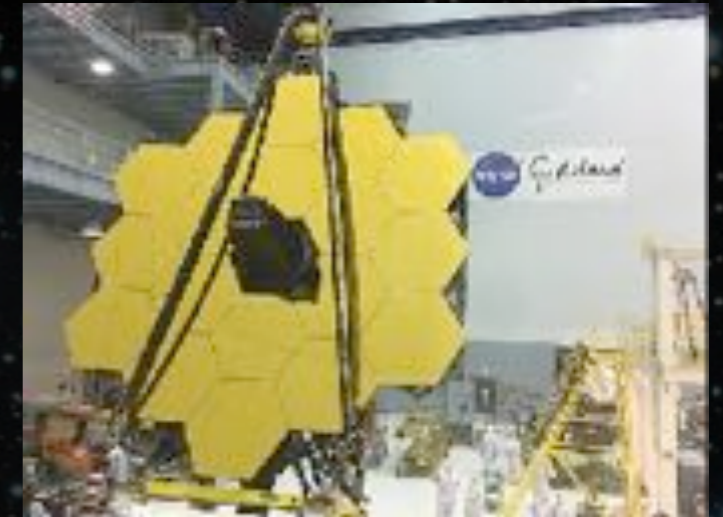
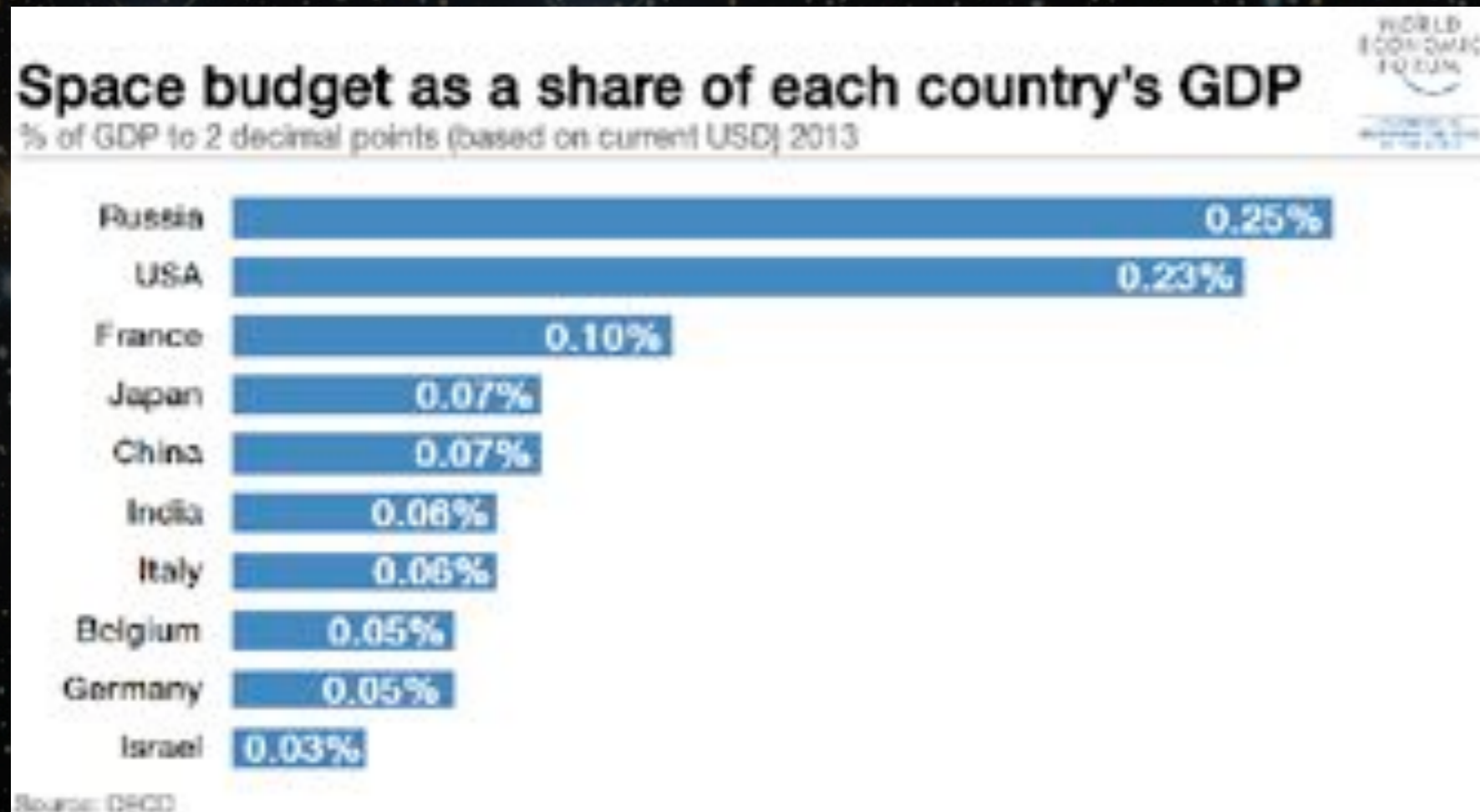


**theory
(models)**

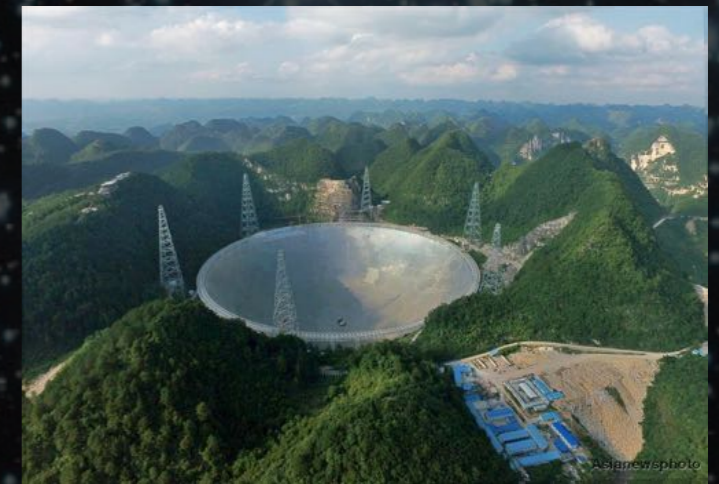


Funding

World space & astronomy budget in 2017
approx. US\$ 50 billion



JWST telescope
US\$ > 10 billion



FAST telescope
RMB > 1.2 billion

Almost all the world's facilities are (freely)
accessible to XJTLU staff and students

Why astronomy?

- ★ Knowledge and scientific breakthroughs
- ★ The Universe as an extreme laboratory
- ★ Technological applications and discoveries
- ★ Science diplomacy
- ★ Understanding planet Earth, and humanity's place in the Universe
- ★ Inspires and motivates potential science and engineering students; accessible science

Astronomy and Society

- ★ Engages the public in science
- ★ Improves science literacy in the classroom
- ★ A gateway to new technology
- ★ Develops a workforce for the 21st century



Astronomy education

In the United Kingdom
50 universities offer astronomy courses,
25 offer astronomy PhD degrees

- ★ Research Department (MSc/PhD)
- ★ Astrophysics BSc programme
- ★ Astronomy compulsory/optional modules
- ★ Extra-curricular activities / student organisations

Research-led teaching

- ★ Analytic and technical skills transferrable to all segments of society
- ★ Independent, abstract, critical, and out-of-the-box thinking
- ★ Ability to carry out publishable frontier science
- ★ Free access to almost all of the world's telescopes, data archives, journal articles



EXOPLANET EXPLORERS



PLANET FOUR: RIDGES

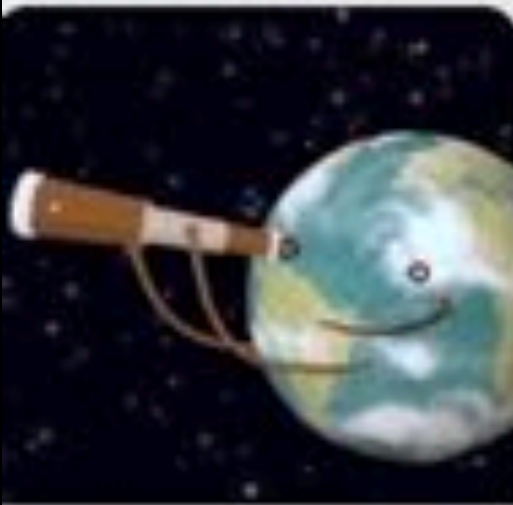


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MOON HUNTER

citizen science projects
e.g. www.zooniverse.org



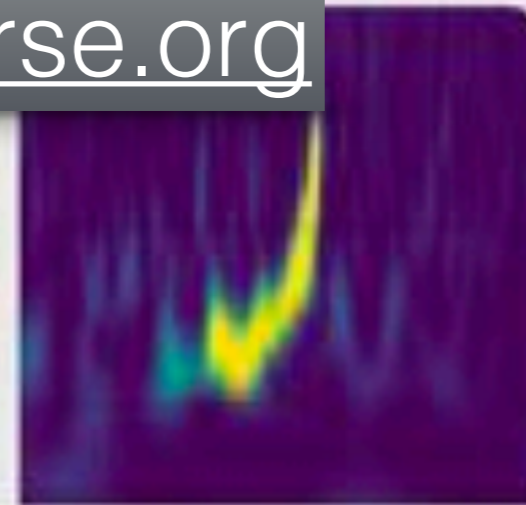
BACKYARD WORLDS:
PLANET 9



PLANET FOUR: RIDGES



HUBBLE'S HOT STARE



GRAVITY SPY



MILKY WAY PROJECT



RADIO METEOR ZOO



SUPERNOVA HUNTERS



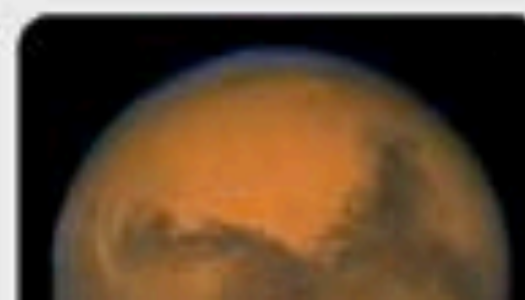
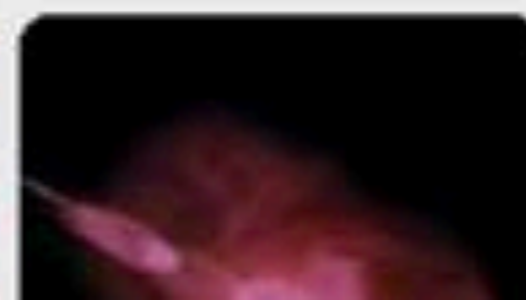
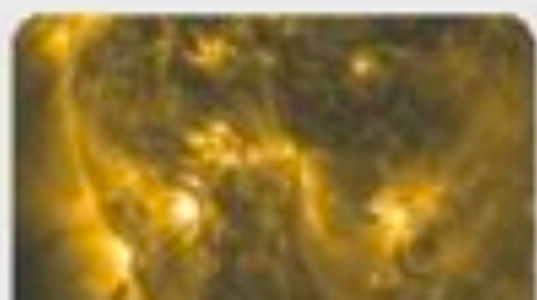
POPPIN' GALAXY



COMET HUNTERS



PLANET FOUR: TERRAINS



[Science & Environment](#)

Star's seven Earth-sized worlds set record

By Paul Rincon
Science editor, BBC News website

© 22 February 2017 | [Science & Environment](#)



TRAPPIST-1 System



Illustration

All seven planets are thought to have Earth-like characteristics (Photo credit: NASA)

Astronomers have detected a record seven Earth-sized planets orbiting a single star.

Research(-led teaching)

Citizen science research projects

Remote observing with professional telescopes

Data mining (telescope archives)

High-performance computing (numerical experiments)

Transferrable skills

- ★ **Executing projects (often to tight deadlines)**
- ★ **Cooperating in international teams**
- ★ **Working with junior members of the team (teaching)**
- ★ **Preparing operational plans (e.g. observing runs) and proposals (incl. budgets)**
- ★ **Optimising the use of resources (e.g. large computer calculations)**
- ★ **Numeracy and scientific literacy**
- ★ **Computing and modelling**
- ★ **Handling incomplete data sets**
- ★ **Presenting an account of work to colleagues and to broader audiences**

XJTLU Astrophysics

At present

- ★ Research: focus on the formation and evolution of galaxies
- ★ Final Year Project: Astrophysics
- ★ XJTLU Astrophysics Society

PHYSICS WITH ASTRONOMY BSC (HONS)



Offers study abroad opportunities



Accredited



Offers a Year In China

Course length: 3 years

UCAS code: F3F5

Year of entry: 2017

Typical offer: A-level : ABB / IB : 33 / BTEC : Applications considered

[See full entry requirements](#)

In the near future...?

- ★ Optional Module: Astronomy and Space Science

“We are all in the gutter, but some of us are looking at the stars”

“我们都在贫民窟中,但我们中有一些人正仰望着星星”

— Oscar Wilde





