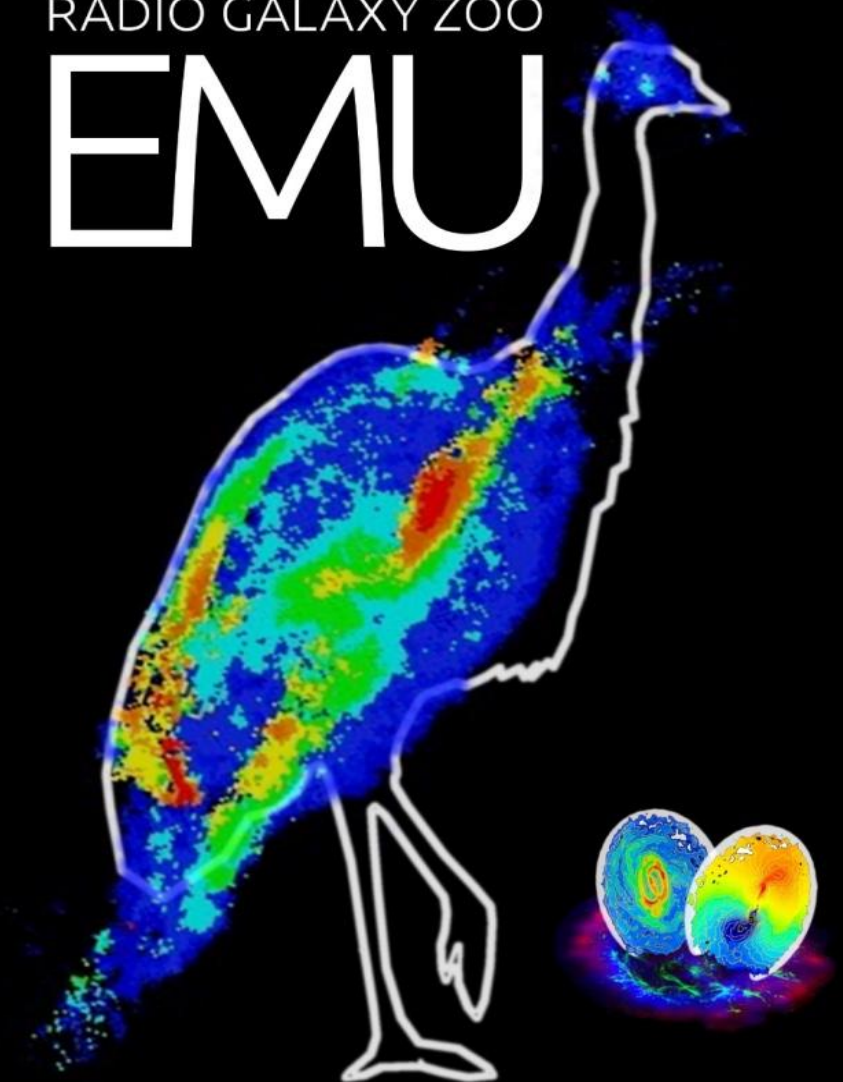


RADIO GALAXY ZOO

EMU



EVOLUTIONARY MAP OF
THE UNIVERSE

射电星系动物园-宇宙演化路径图

唐弘铭

西安交通-利物浦大学 物理系

项目共同PI: *Eleni Vardoulaki*

团队中方成员/合作者 (A-Z; 暂): 曹晨、陈若颖、樊东卫、郭铨、贾鹏、李楠、李瑞、李雨珊、骆彦、梁志成、欧阳希昶、盛馨月、施韡、隋元、于斌、杨小龙、喻业钊

Email: Hongming.Tang@xjtlu.edu.cn



射电星系



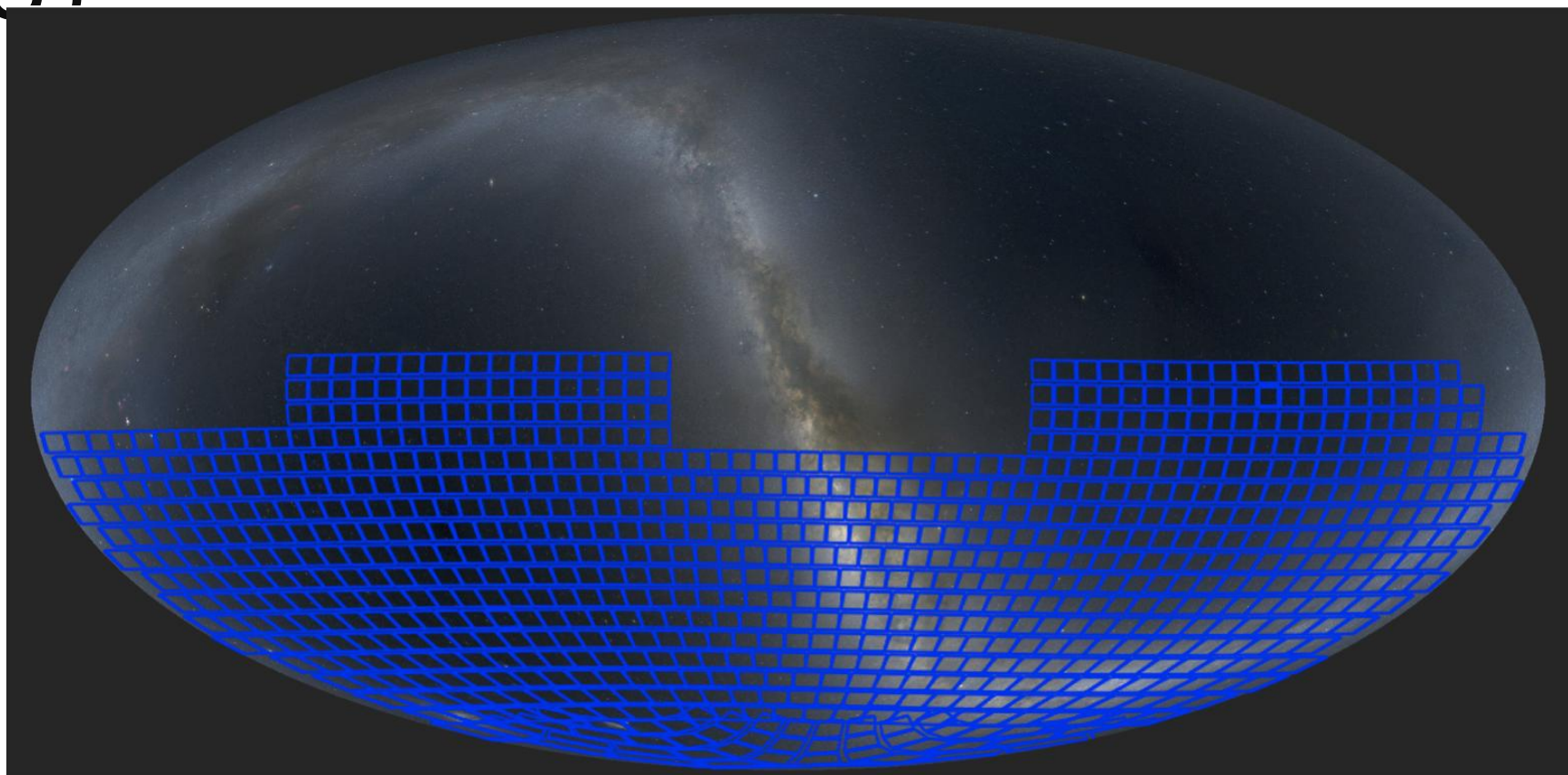
OEI ET AL 2024

宇宙演化路 径图(EMU)

新一代全南天
射电连续谱巡天

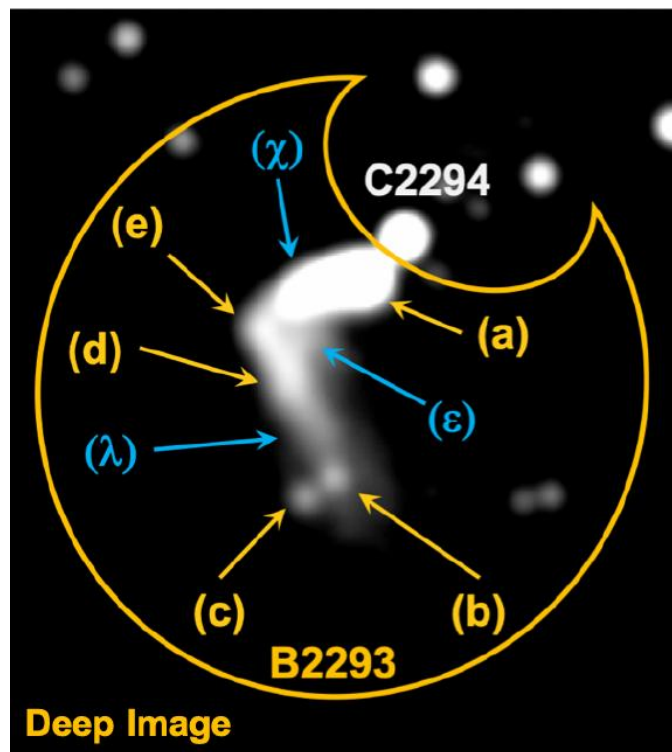
由澳大利亚平
方公里阵探路者
望远镜开展

预计到2028年
完成观测

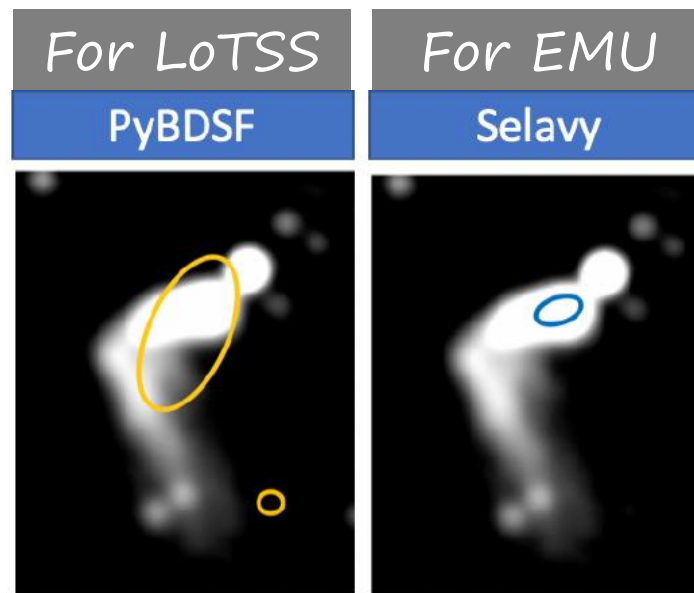


Hopkins et al. 2025

公众科学：巡天科学的需求



Boyce et al. 2023a,b



一般来说，射电连续谱巡天中 5-20% 的目标无法通过上述简单的多椭圆高斯拟合完成搜寻

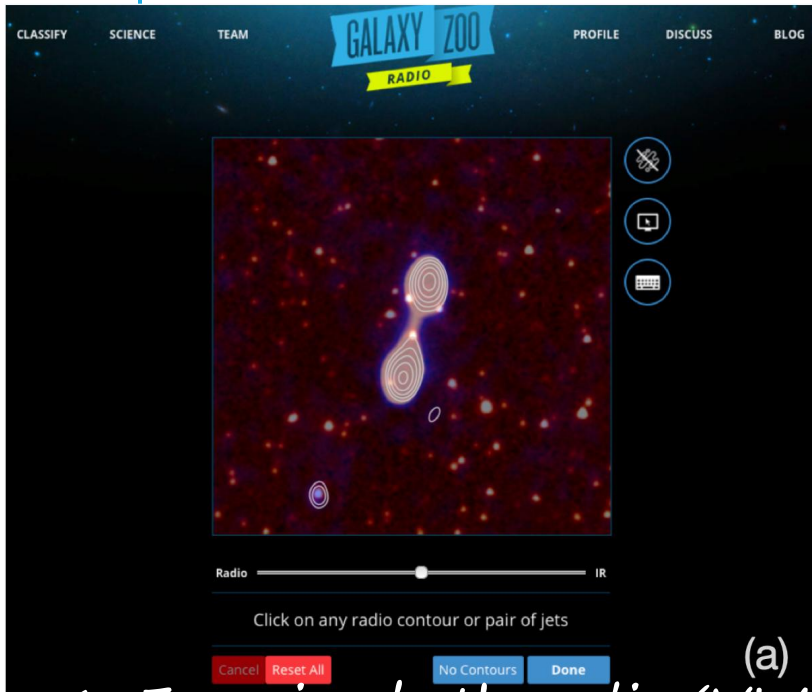
对于 EMU 巡天, 这意味着200万个天体需要目视检验

解决方案之一>公众科学

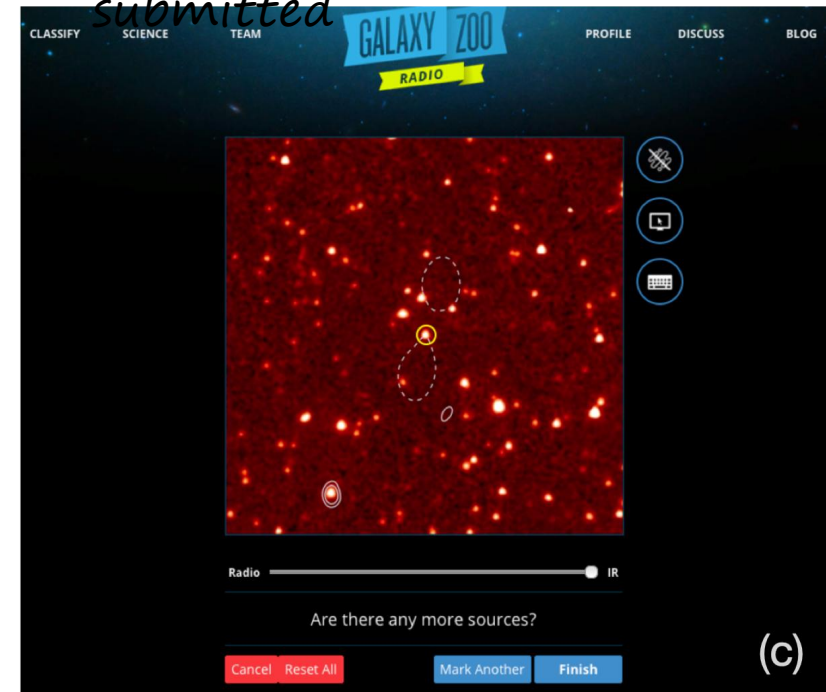
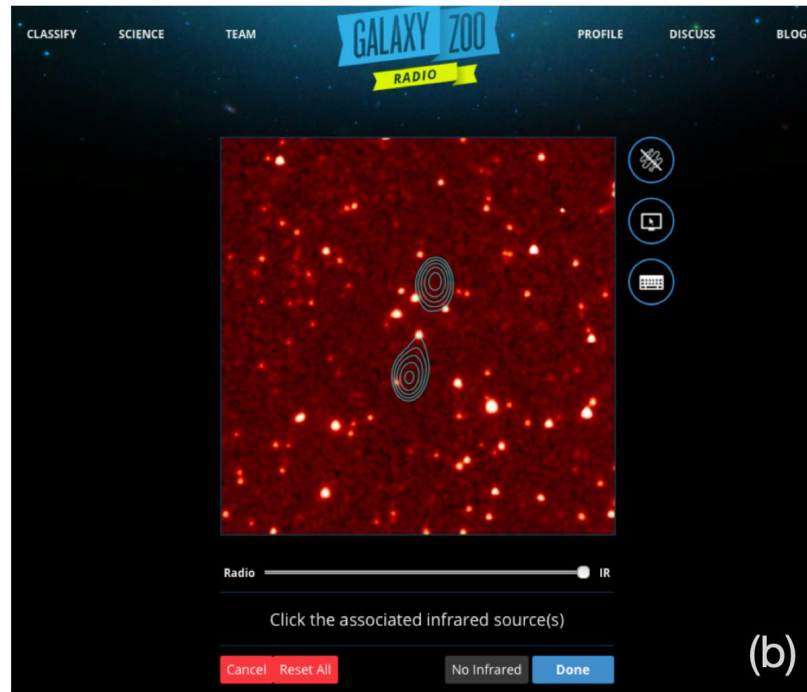
初代 RGZ 流程

2. Mark radio emission regions that are interconnected to the same hosting galaxy

Banfield+2015; Wong et al. submitted



1. Examine both radio (VLA FIRST) and IR (WISE) identity location of radio emission regions w.r.t. galaxy



3. Identify its infrared hosting galaxy

4. More radio galaxy?

Optional: Comment/Discuss

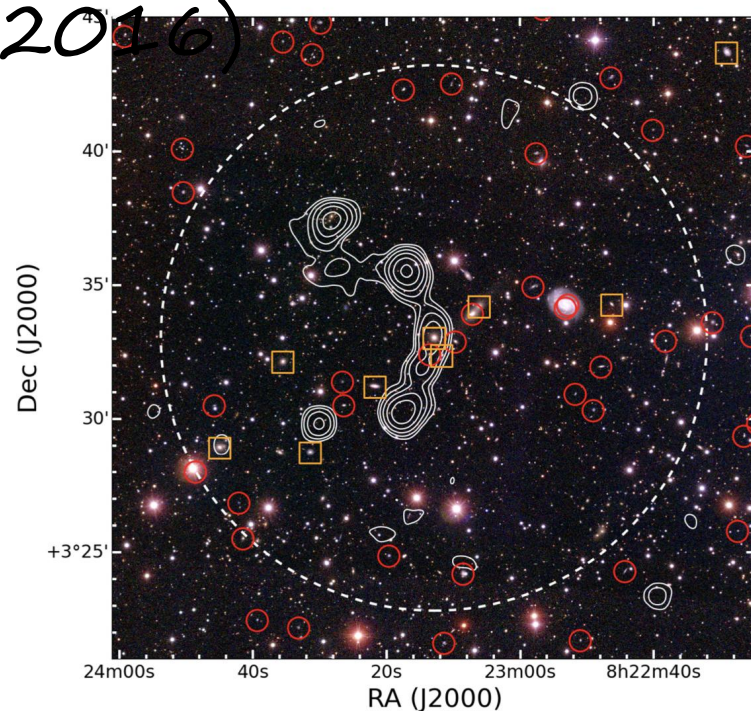
yes

11年, 100,586 个确认目标
7 篇科学文章+ 10 篇ML应用文章

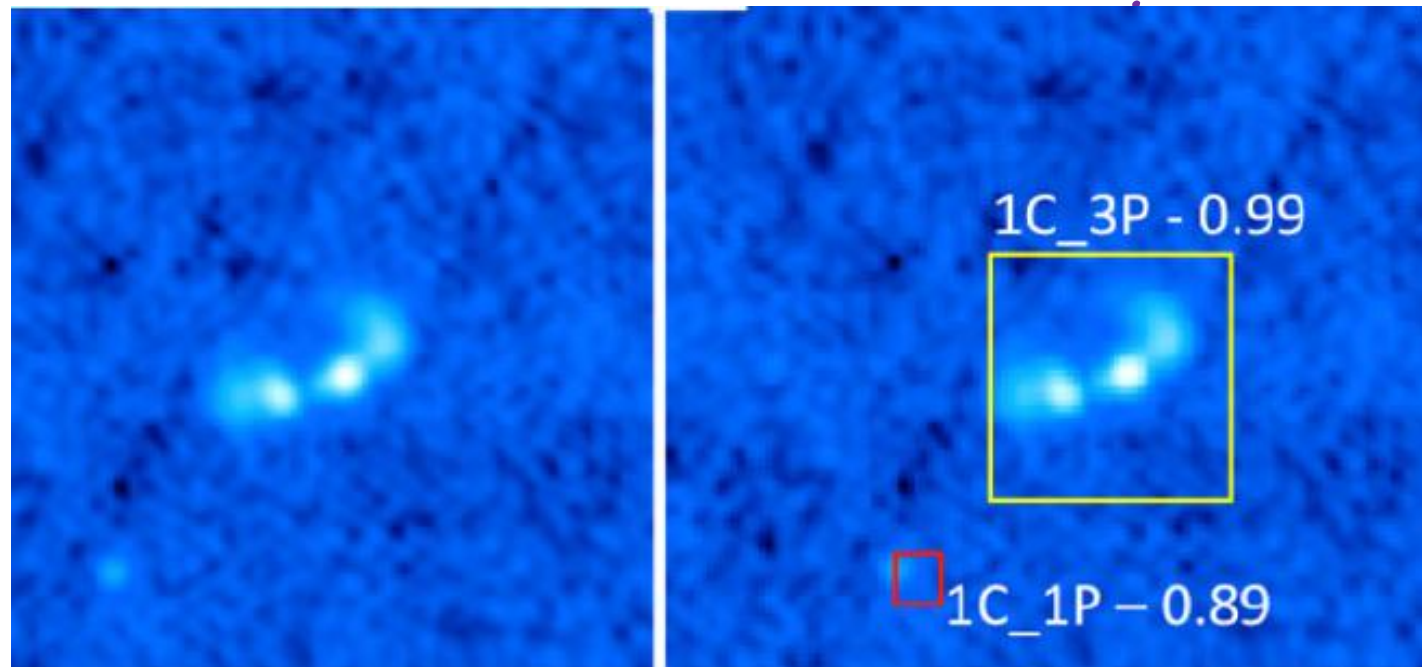


Publication

稀有形态/性质天体识别
(i.e., Banfield et al.
2016)



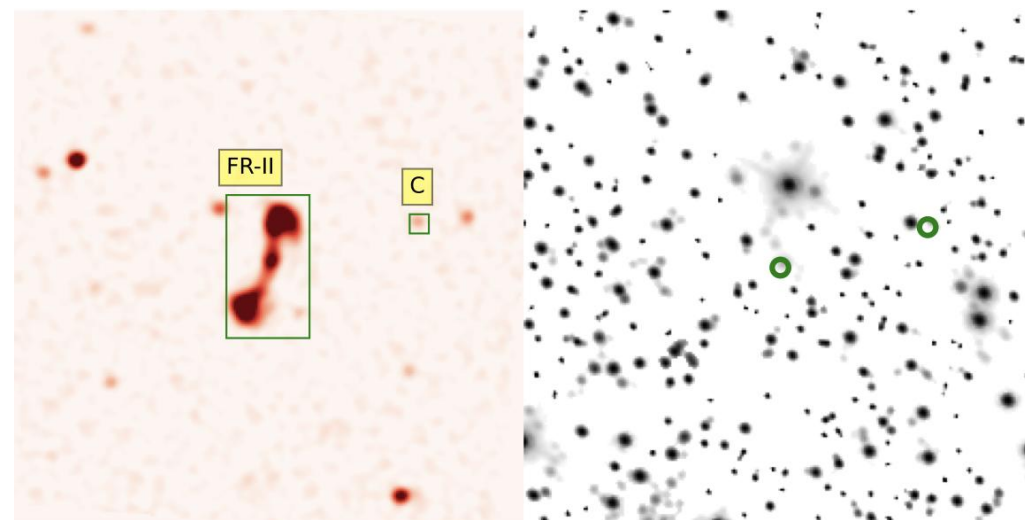
射电辐射区+宿主星系识别
(i.e., Wu et al. 19)



RQZ DR1: Wong et al., 2025

EMU先导巡天目前技术路线

1. 公众科学提供初步射电星系样本
2. 专家目视检验高价值目标提供对比样本
3. 通过对比样本检验的射电星系样本
供应机器学习算法开发，迭代，优化
4. 生成高科学价值的巡天星表 (*EMUCAT+*)

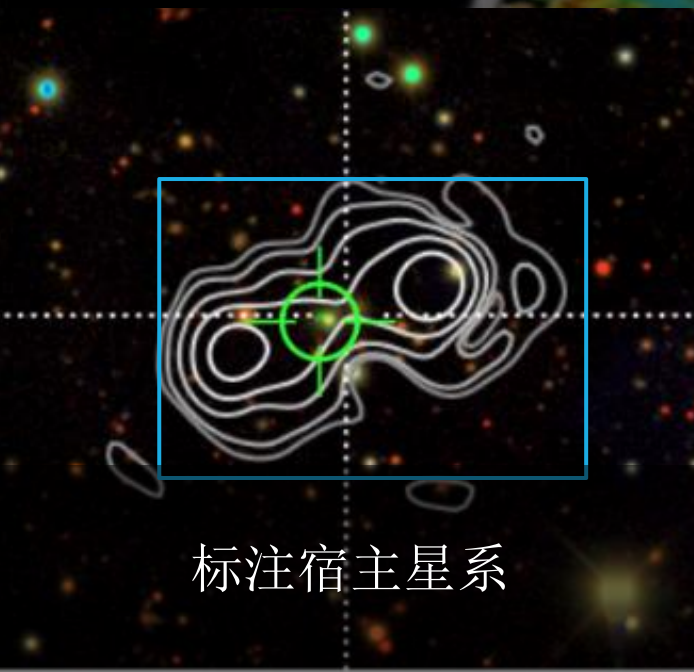


Credit: Gupta et al. 2024

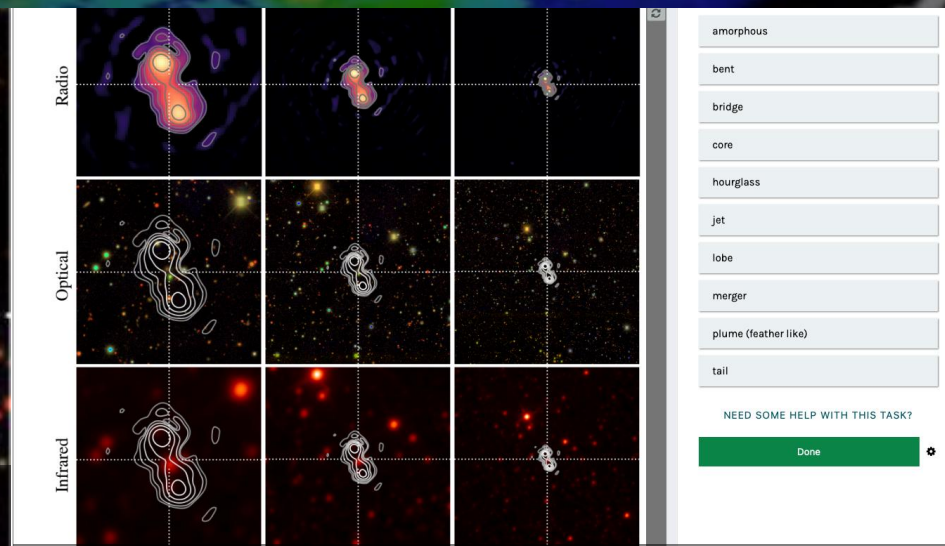


Hunt supermassive black holes,
star forming galaxies, and
discover the unknown!

Learn more



标注宿主星系



描述射电星系形态

Hunting the unknown

This is a discussion board if you see any object with unusual radio morphology or physical properties. Let's make discovery together!

Subscribe: Subscribe to receive notifications for new discussions in this board (daily email)

Moderator Controls

New Discussion

Comment with your own tags!

Hongming-Teng 22 hours ago Please comment with your customized hashtags if none of the others suit you!

Peculiar Radio Source (#peculiar)

Hongming-Teng 18 hours ago Peculiar radio sources are generally radio objects with complex morphology th...

Triplet radio source (#triple)

Hongming-Teng 18 hours ago A double source (pair of components), with an additional centrally located com...

blended (#blended)

Hongming-Teng 18 hours ago A source with more than one IR host associated with a radio peak.

Core jet Structure (#core-jet)

Hongming-Teng 18 hours ago While the majority of radio galaxies beam collimated jets, some radio sources...

Radio emission from normal galaxies (#traces_host_galaxy)

Hongming-Teng 18 hours ago The radio emission of a normal galaxy, including our Galaxy, is mainly synchr...

Wide/Narrow Angle Tailed (#wat-nat)

Hongming-Teng 18 hours ago Radio galaxies with their jets bent and formed either a C shape (Wide-Angle T...

Double-Double radio galaxy (#double-double)

Hongming-Teng 18 hours ago Double-Double Radio galaxies are radio galaxies with two pairs of aligned radi...

Spiral host DRAGN (#spiral_host_dragn)

Hongming-Teng 18 hours ago Also known as SDRAGN. While gravitationally elliptical galaxies host most radio...

Odd Radio Circles (#orc)

Hongming-Teng 18 hours ago Odd Radio Circles are radio galaxies with two pairs of aligned radi...

1 Participant

1 Comment

1 Participant

1 Comment

1 Participant

1 Comment

1 Participant

1 Comment

1 Participant

1 Comment

1 Participant

1 Comment

1 Participant

1 Comment

1 Participant

1 Comment

1 Participant

1 Comment

1 Participant

1 Comment

Recent Comments

Popular Tags:

double
circular
compact
bent
core-dominant
cusp
filamentary
hourglass
oval
slf
tail

1 Active Participants:

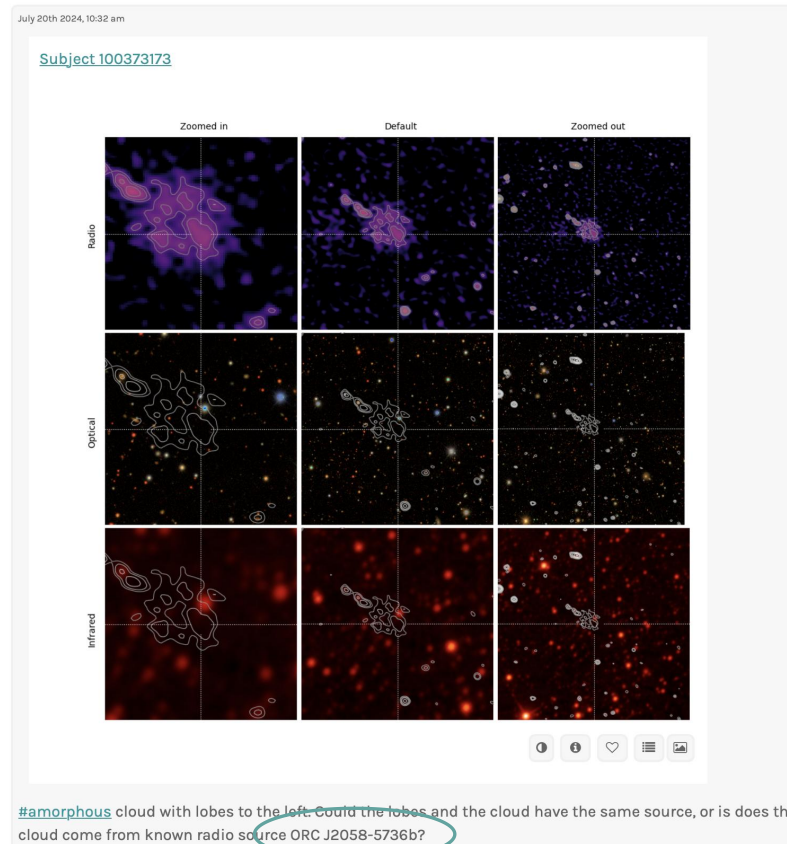
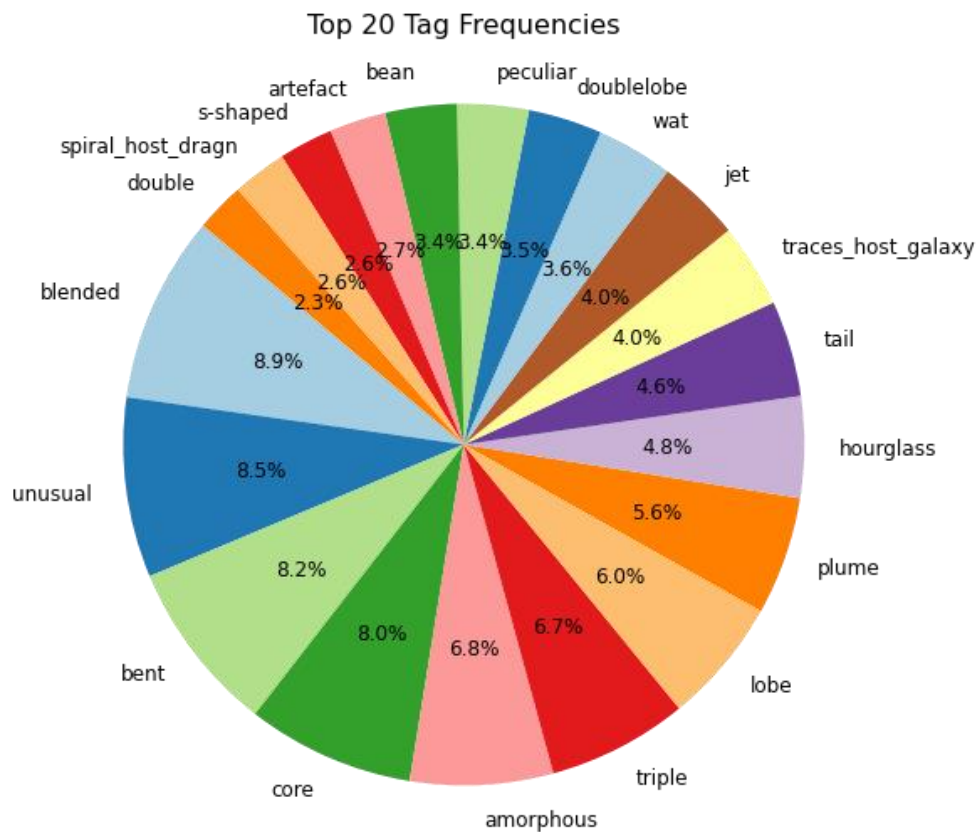
Hongming-Teng

Projects:

ZooGalaxyTalk
Dark Matter Shredder
Notes from Nature...An Investigative
Pandora's Box
Grime Scene Investigation - Student
or Crab Watch

和团队成员讨论你的发现

标注结果与罕见天体发现



已发现的一个奇异射电圈

“引进来，走出去”

其他项目 Other Project

射电星系动物园

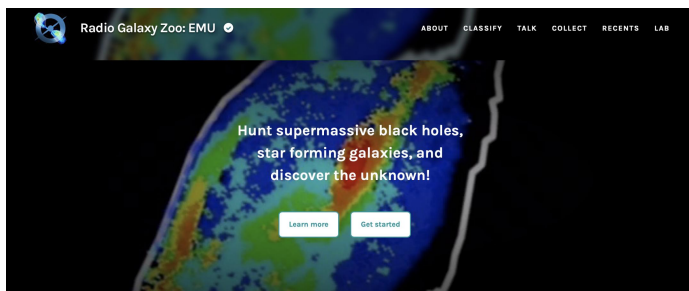
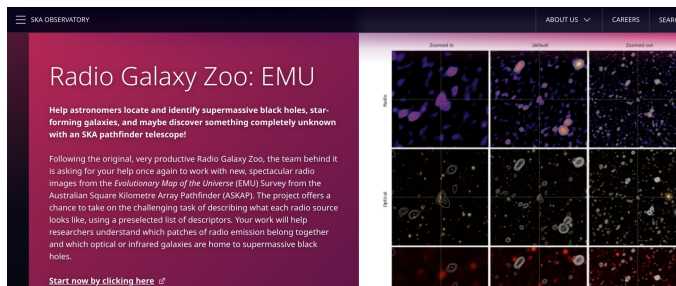
Radio Galaxy Zoo: EMU

项目状态: 运行中

上线时间: 2024年11月6日

项目简介: 射电星系动物园: 宇宙演化路径图 (RGZ EMU) 是一个新兴的全民科学项目, 专注于研究强电发射星系。它基于世界知名的全民科学平台 Zooniverse, 且由中国首次作为共同牵头方参与。RGZ EMU 由瑞典国家天文台和清华大学的研究人员联合领导, 由全球十多位天体物理学家、数据科学家和人工智能专家, 以及虚拟天文台学者共同开发。

立即参与



GALAXY CRUISE NAOJ
@Galaxy_Cruise_e

Here comes the new “Citizen Astronomy” project!

Galaxies shine not only in visible light, but also in radio waves. Which of them holds the supermassive black holes that eject powerful jets?
"Radio Galaxy Zoo: EMU" starts language support in Japanese.



zooniverse.org
Zooniverse

The Zooniverse is the world's largest and most popular platform for people-powered research.



2,295

Volunteers

91,529

Classifications

科学之外：联合国可持续发展目标

1 NO
POVERTY



2 ZERO
HUNGER



3 GOOD HEALTH
AND WELL-BEING



4 QUALITY
EDUCATION



5 GENDER
EQUALITY



6 CLEAN WATER
AND SANITATION



7 AFFORDABLE AND
CLEAN ENERGY



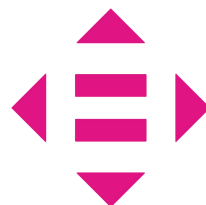
8 DECENT WORK AND
ECONOMIC GROWTH



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



10 REDUCED
INEQUALITIES



11 SUSTAINABLE CITIES
AND COMMUNITIES



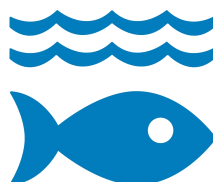
12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



13 CLIMATE
ACTION



14 LIFE
BELOW WATER



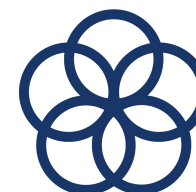
15 LIFE
ON LAND



16 PEACE, JUSTICE
AND STRONG
INSTITUTIONS



17 PARTNERSHIPS
FOR THE GOALS



IAU OAD 2023 推荐



1. 国际 天文-机器学习 讲习班

↑巴基斯坦，卡拉奇

↑吸引来自六大洲的超过150名本科生/研究生参加



IAU OAD 2023 推荐



2. 科研实习指导

向女性本科生倾斜的暑期实习项目；向女性高中生倾斜的项目式学习项目 (i.e. 广州市执信中学-许可馨，中山大学录取)



3. 职业规划咨询

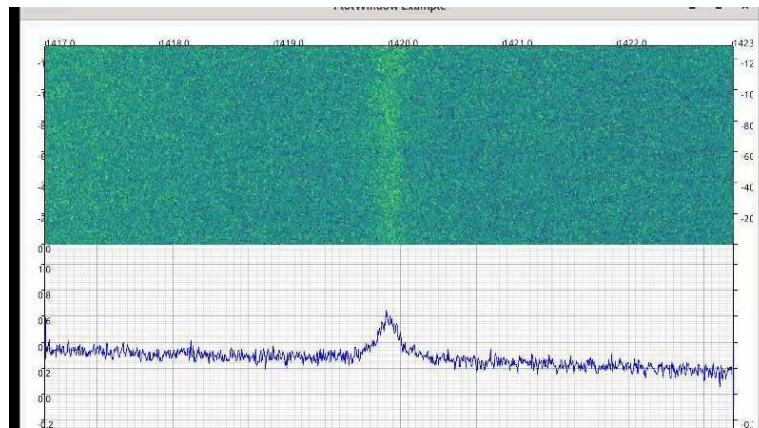
与妍星计划合作，为中学-研究生阶段的女性学生提供线上职业咨询。已覆盖 > 100人



RADIIO: IAU OAD 2025



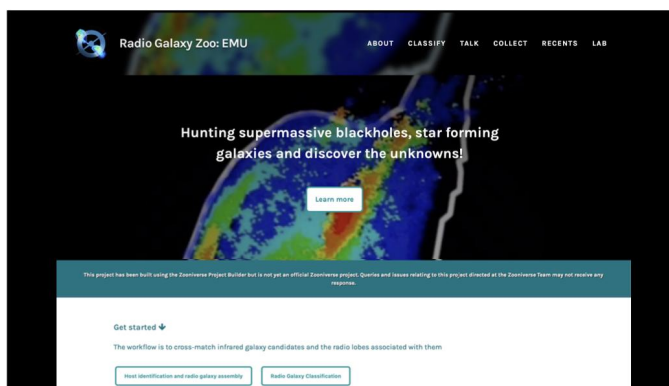
4 QUALITY
EDUCATION



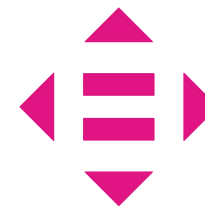
❖ 面向中国，巴基斯坦，希腊三国
中小学学生/教师

❖ 接触公众科学，提升科学素养及
科学数据素养

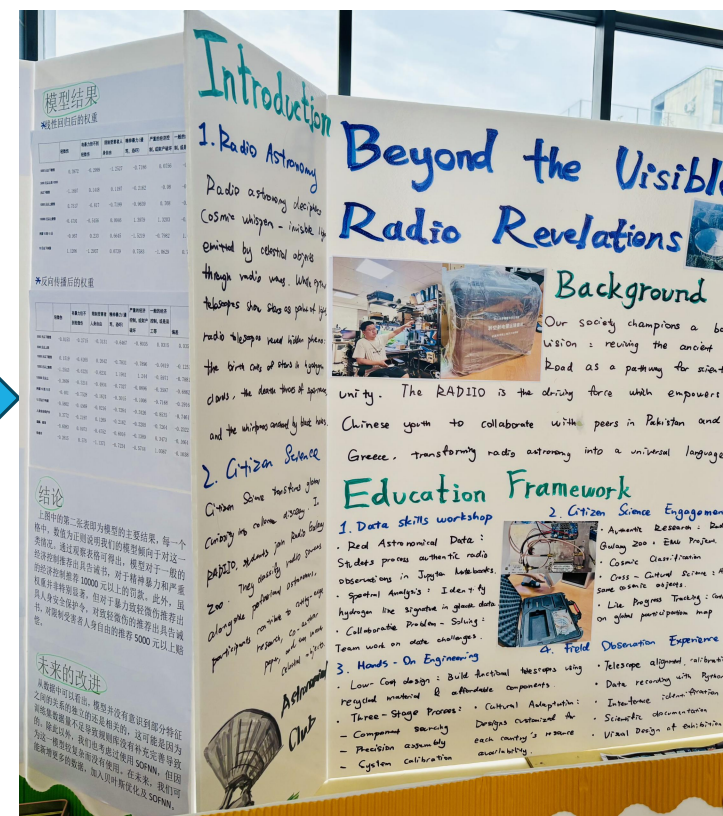
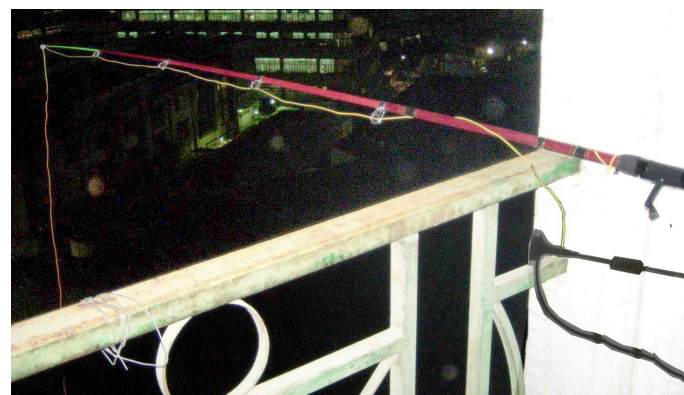
❖ 中方合作单位（暂）：上海天文
馆、上海天文台、上海诺美高级中
学，广州市执信中学、东莞松山湖
未来学校，孙吉元宏博学校（乡村
培训试点学校）



10 REDUCED INEQUALITIES



消除不平等：先把价格打下来



10^4

\rightarrow

10^2

\rightarrow

我们期望

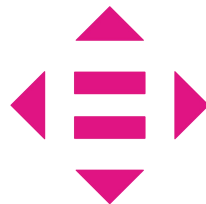
4 QUALITY
EDUCATION



5 GENDER
EQUALITY



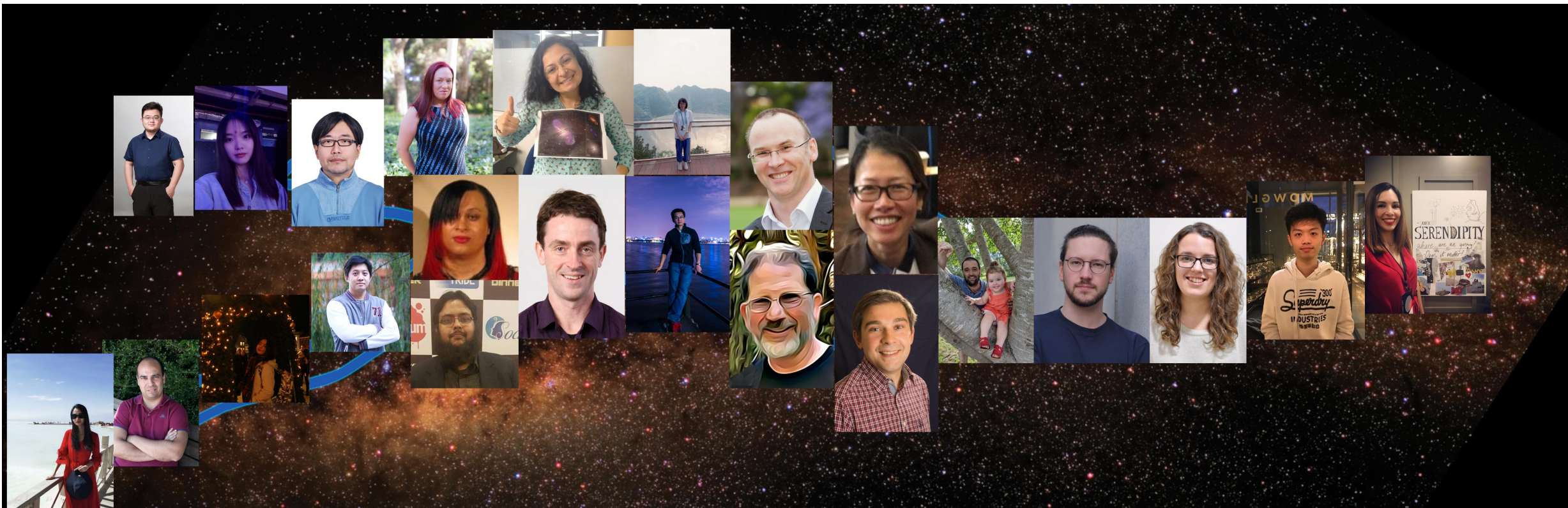
10 REDUCED
INEQUALITIES



1. 和职业天文学家，公众科学家，教育工作者，科普工作者一道，推动更多公众科学项目引进来，走出去

2. 让基于公众科学的科普，教育活动既有深度，也有宽度

3. 通过长期努力，为实现可持续发展目标作出微小的贡献



谢谢大家
射电星系动物园期待您的到来！