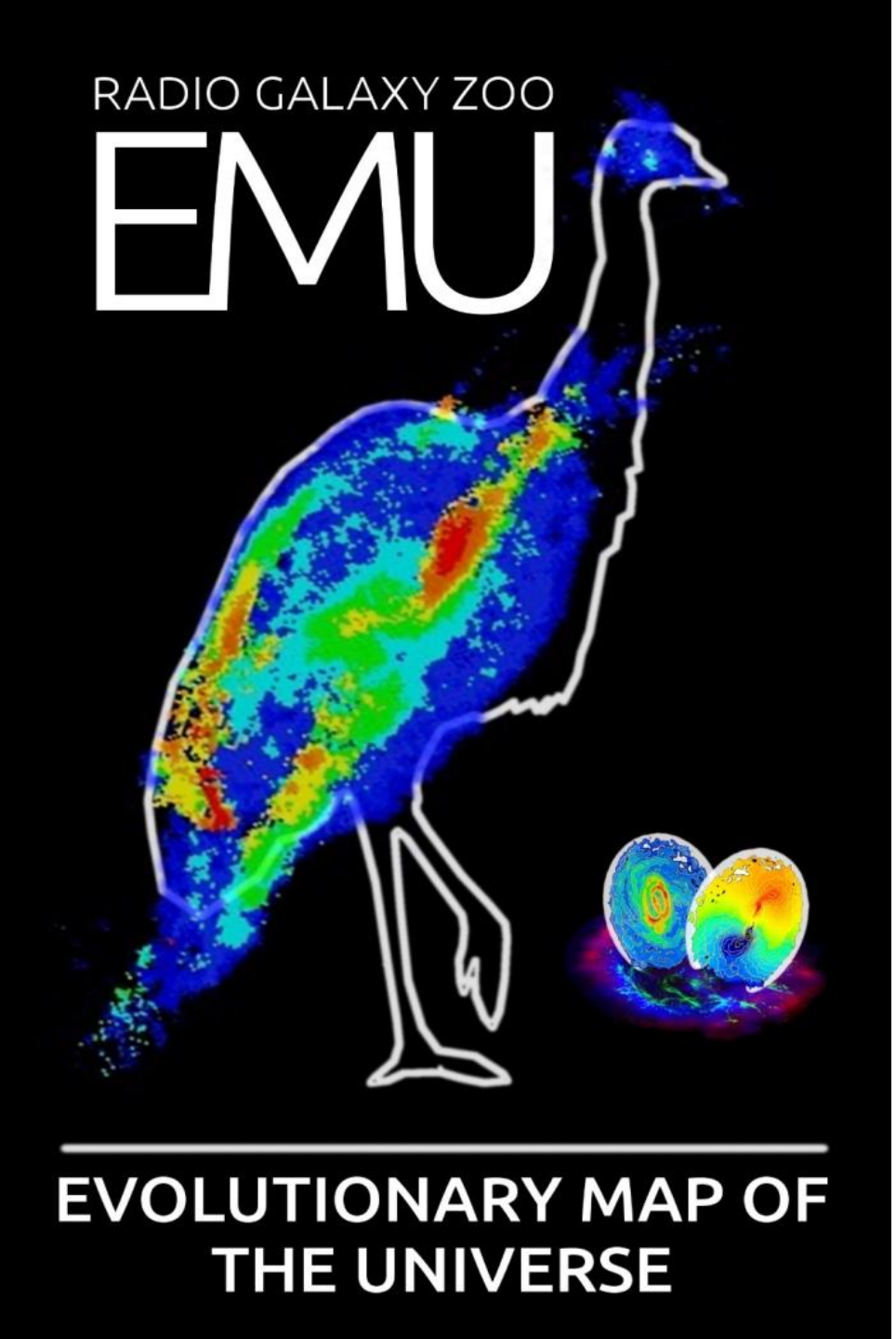


# 射电星系动物园-宇宙演化路径图

唐弘铭
西安交通-利物浦大学 物理系

项目共同PI: *Eleni Vardoulaki*

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*Email: Hongming.Tang@xjtlu.edu.cn*

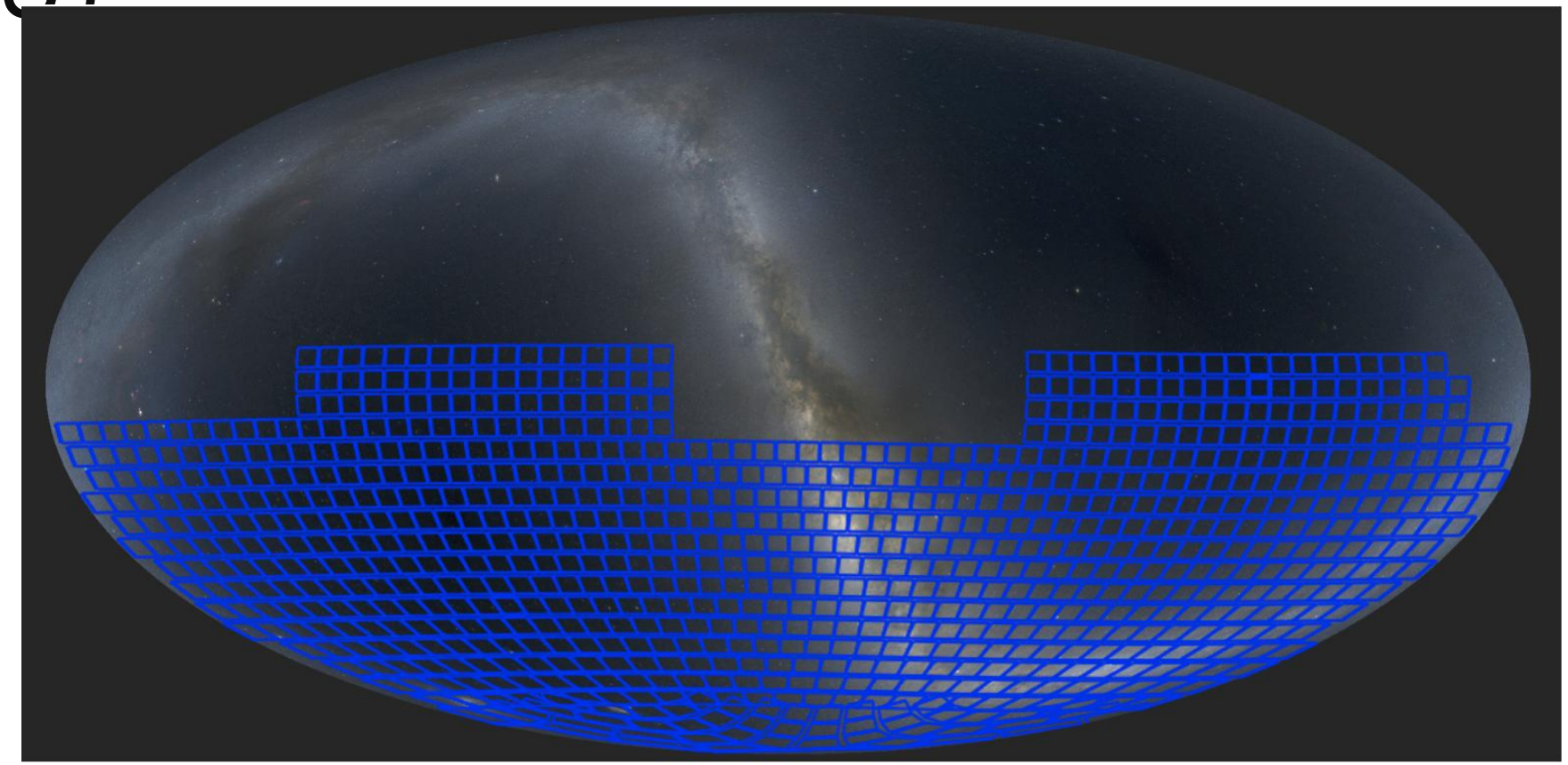
射电星系
OEI ET AL 2024

# 宇宙演化路径图(EMU)

新一代全南天射电连续谱巡天

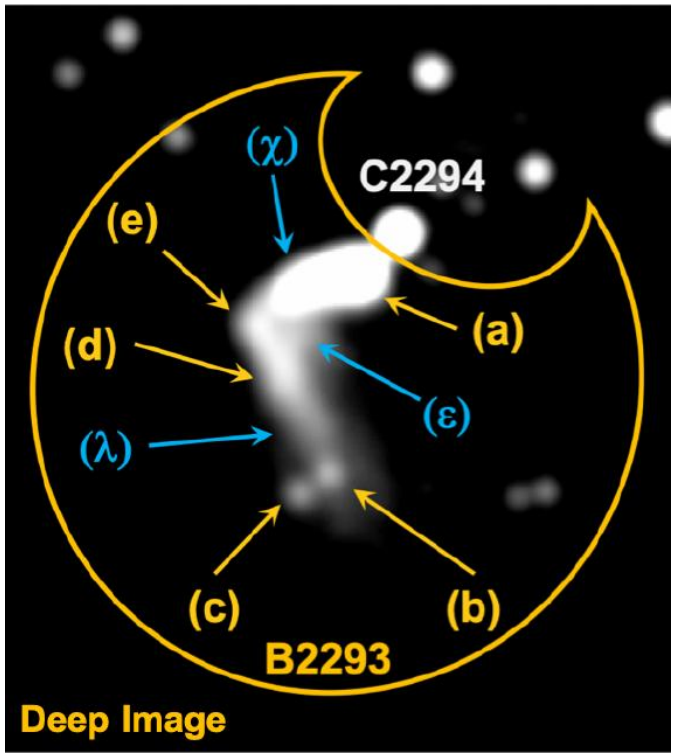
由澳大利亚平方公里阵探路者望远镜开展

预计到2028年完成观测

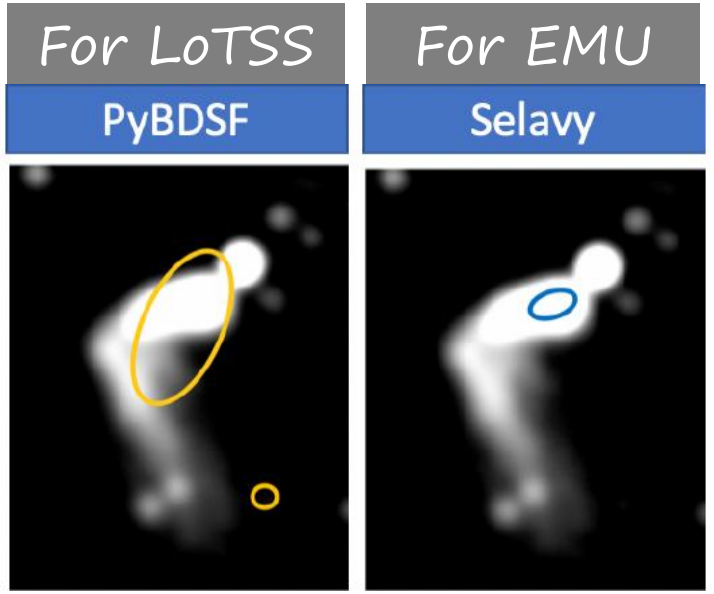


Hopkins et al. 2025

# 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

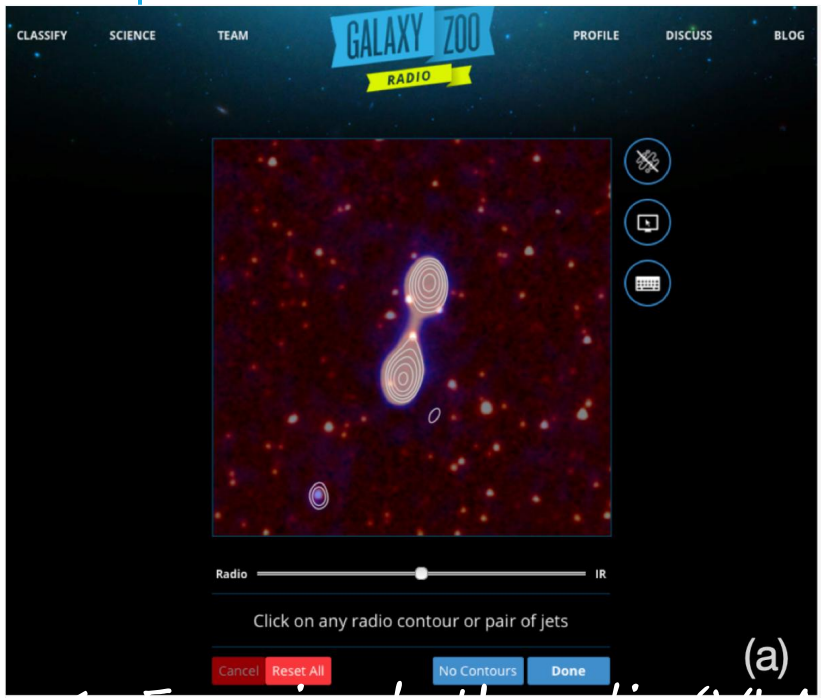
对于 EMU 巡天，这意味着200万个天体需要目视检验

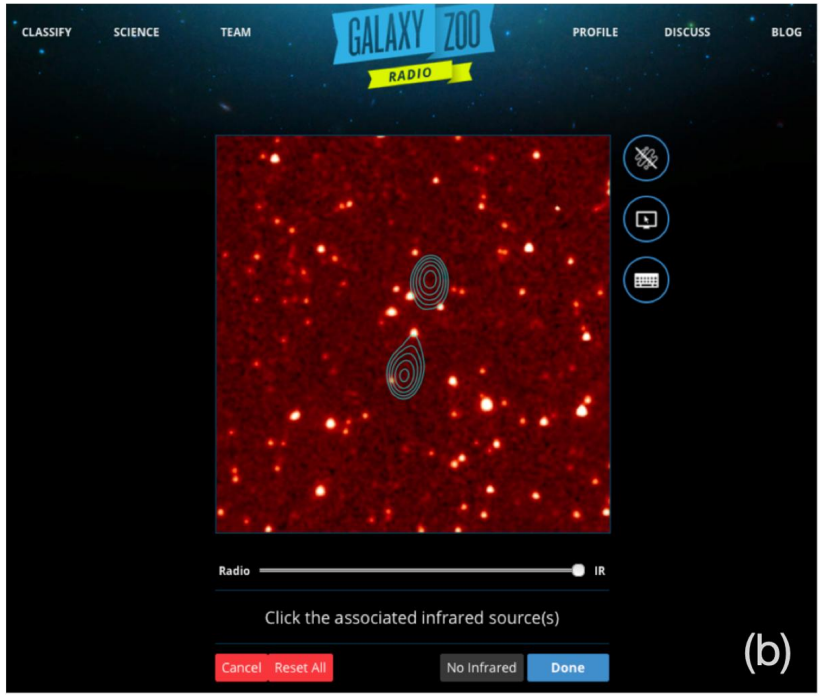
解决方案之一>公众科学

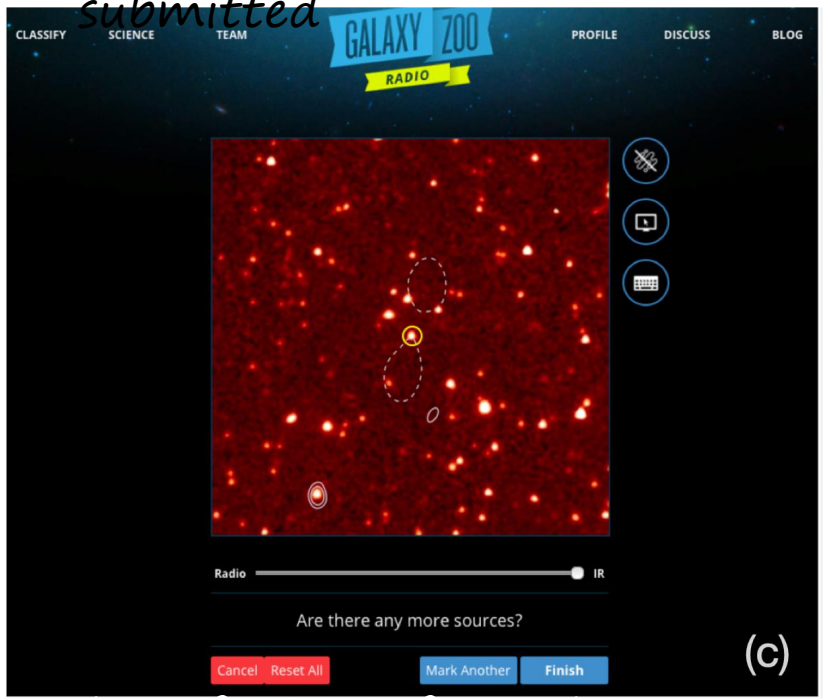
# 初代 RGZ 流程

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

yes

3. Identify its infrared hosting galaxy

4. More radio galaxy?

Optional: Comment/Discuss

XJTLU

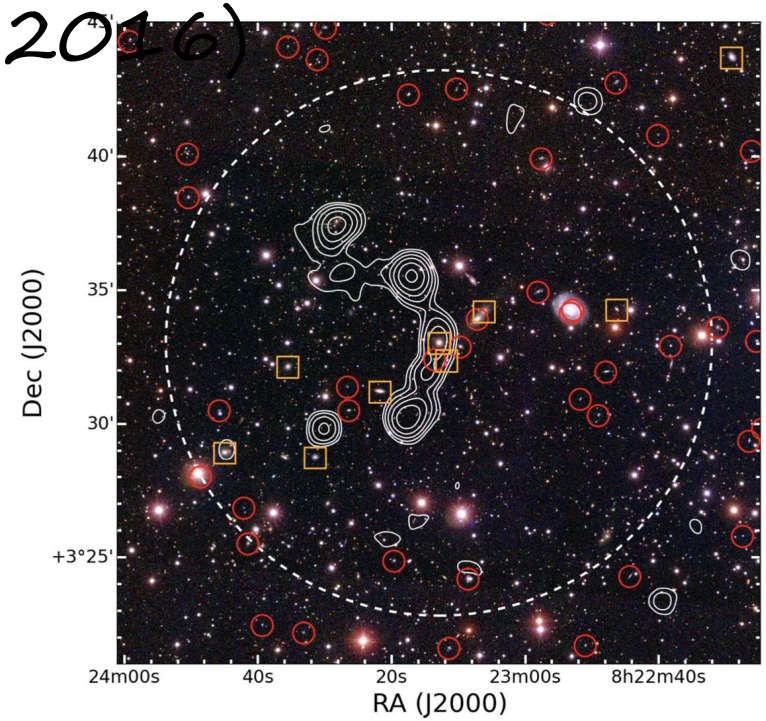
EMU

Evolutionary Map of the Universe

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

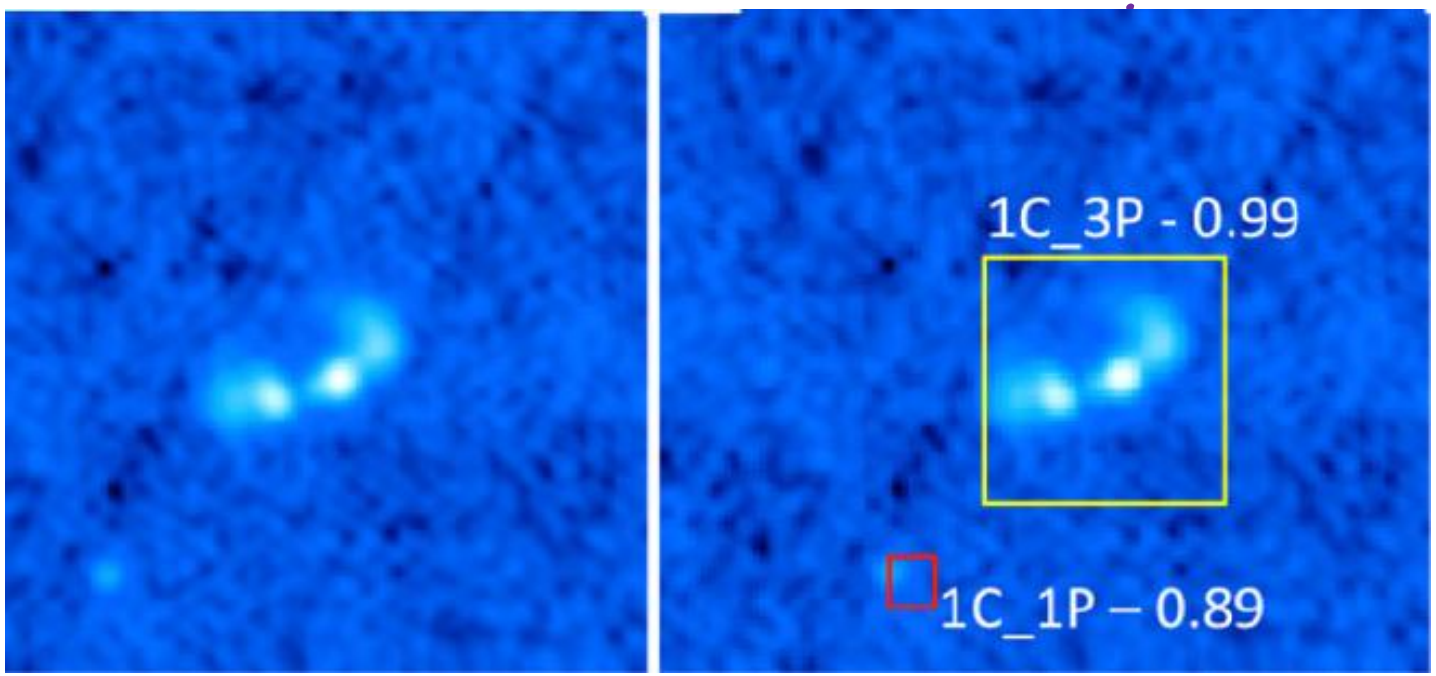
稀有形态/性质天体识别

(I.e., Banfield et al. 2016)




射电辐射区+宿主星系识别

(I.e., Wu et al. 19)




RGZ DR1: Wong et al., 2025

Publication

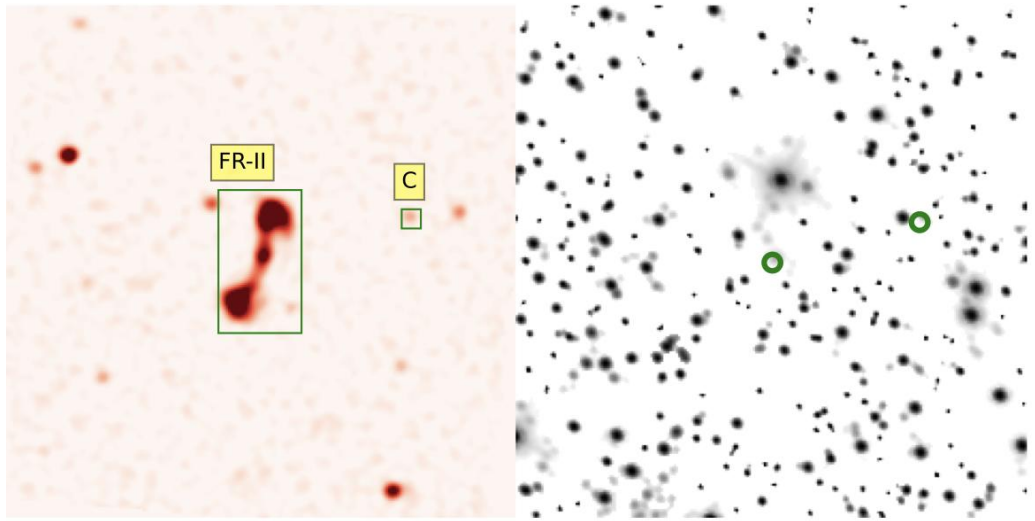
# EMU先导巡天目前技术路线

1. 公众科学提供初步射电星系样本

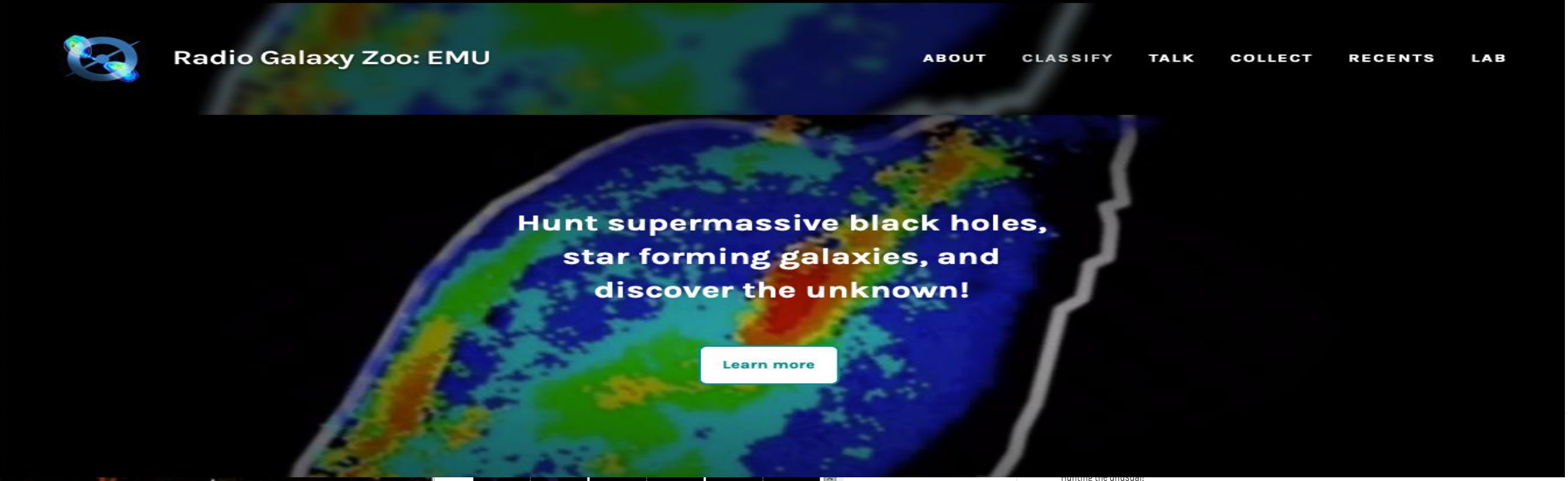
2. 专家目视检验高价值目标提供对比样本

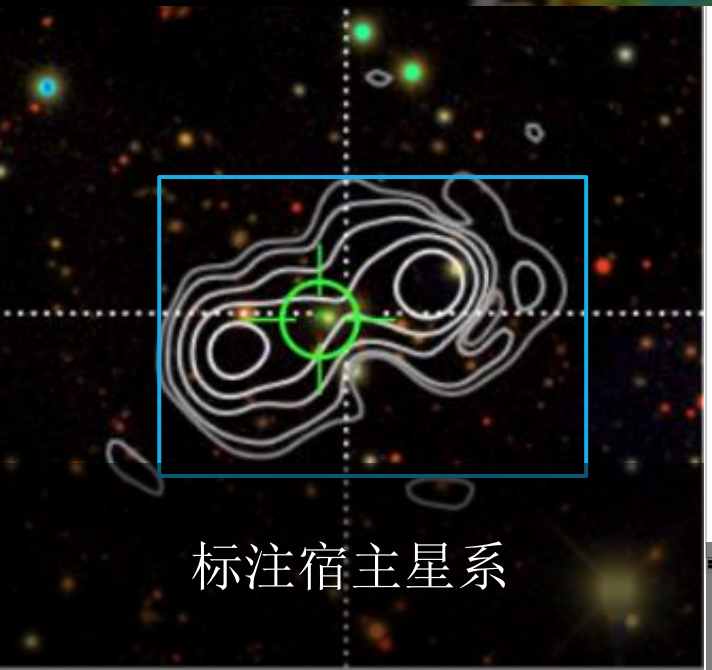
3. 通过对比样本检验的射电星系样本
   供应机器学习算法开发，迭代，优化

4. 生成高科学价值的巡天星表 （EMUCAT+)

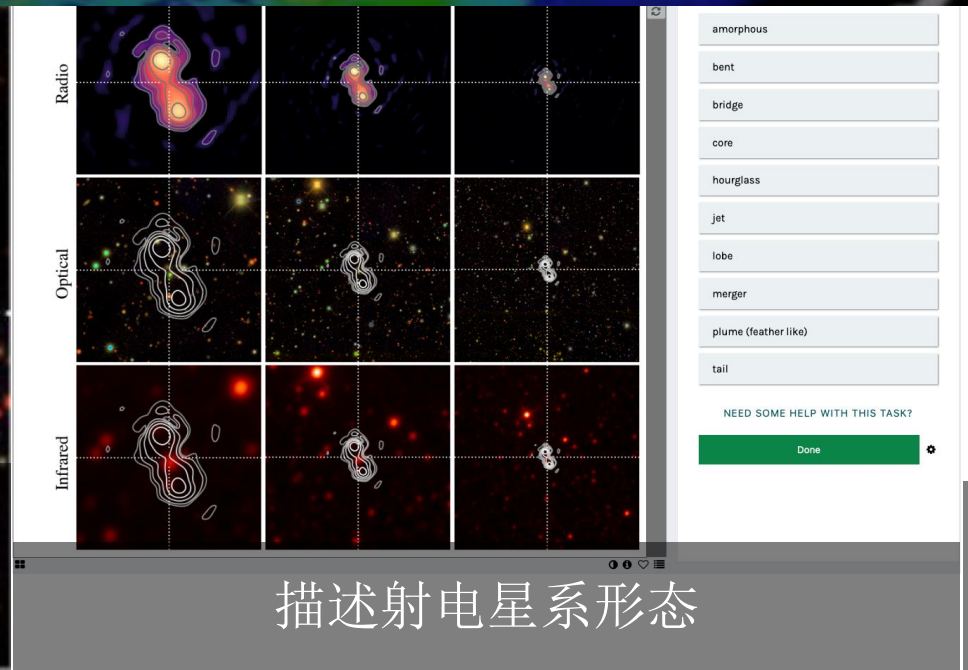



Credit: Gupta et al. 2024

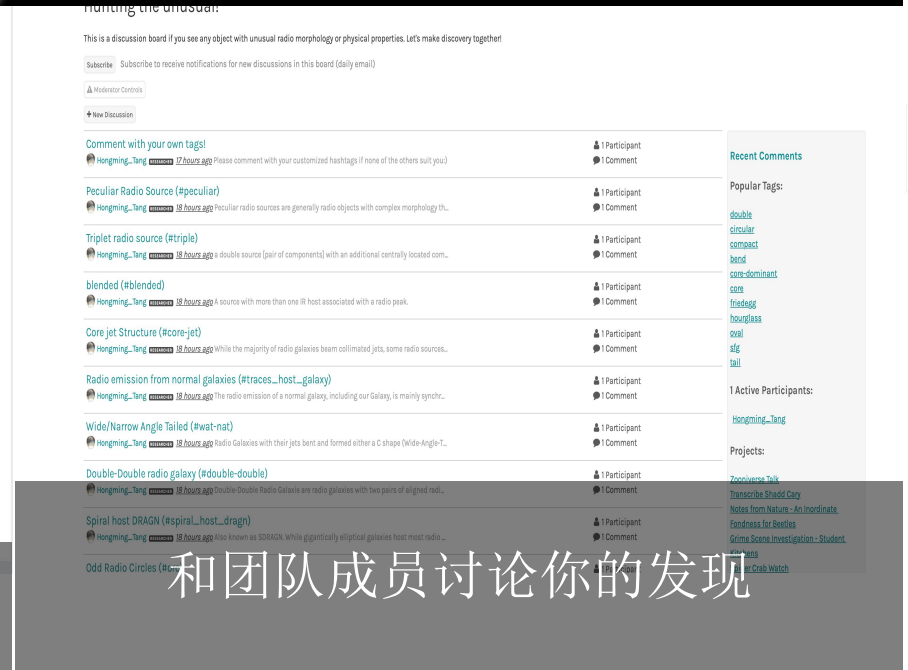


标注宿主星系

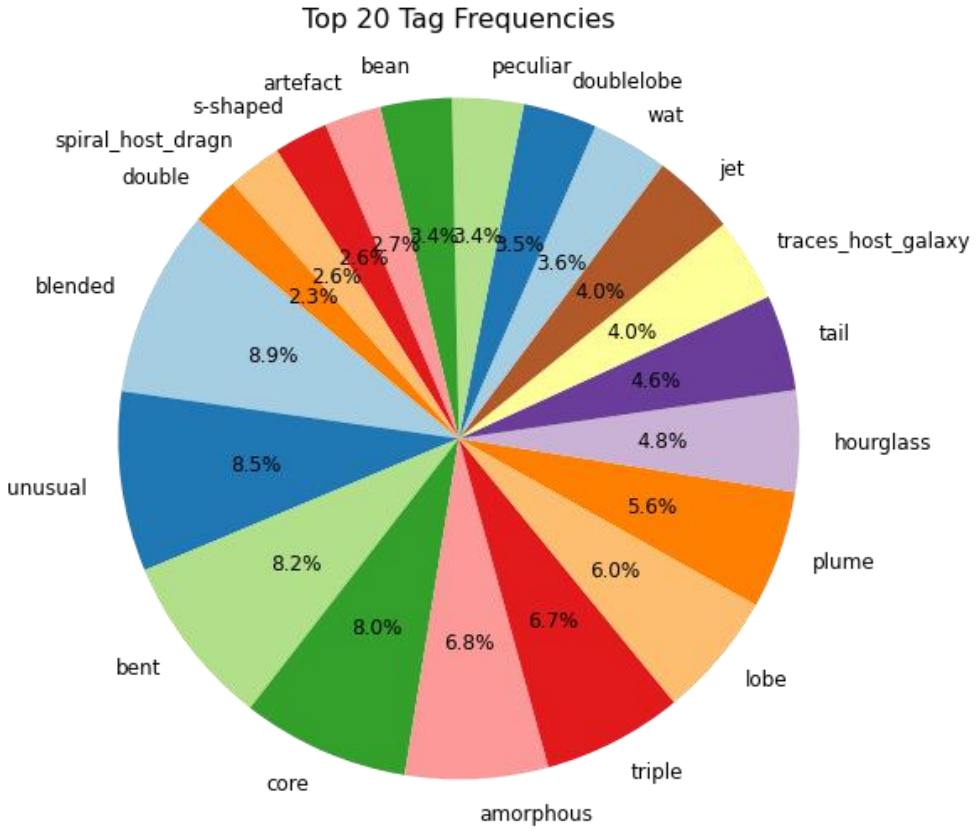


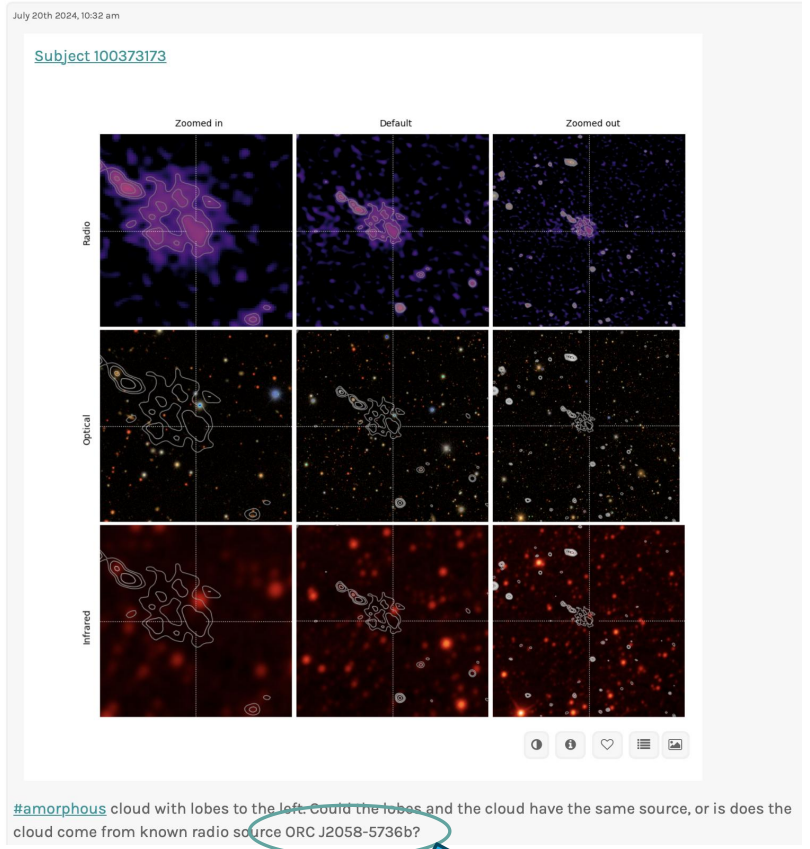

描述射电星系形态




和团队成员讨论你的发现

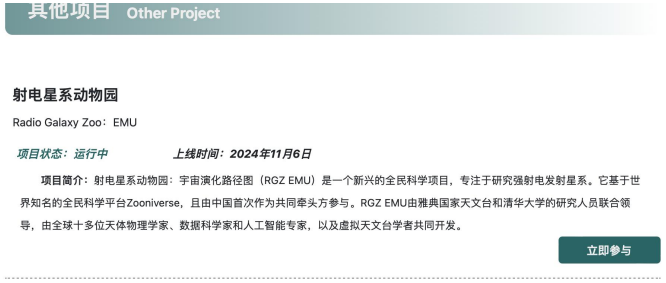
# 标注结果与罕见天体发现

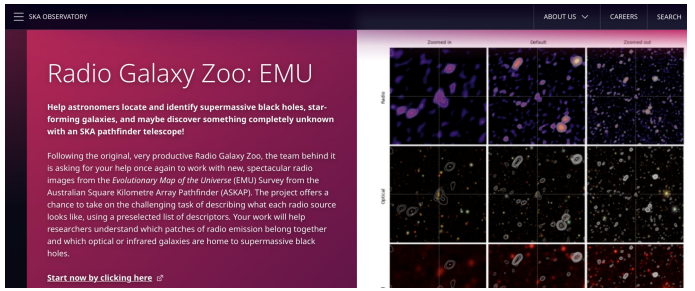


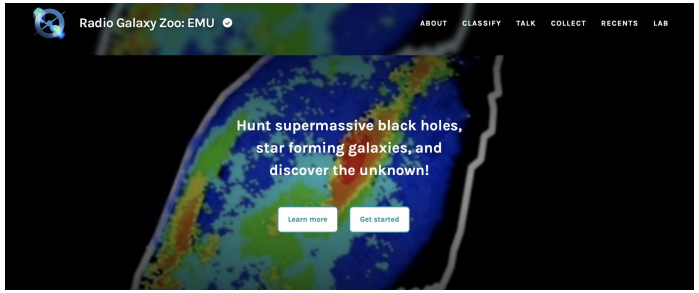

已发现的一个奇异射电圈

# “引进来，走出去”

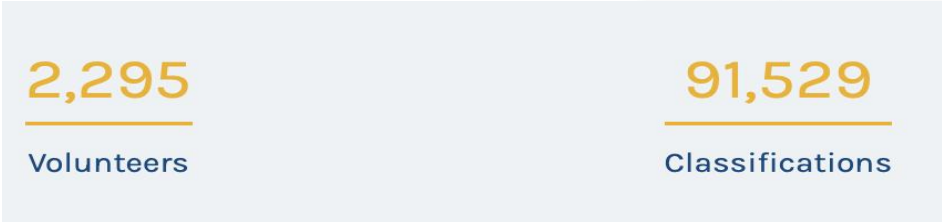

其他项目 Other Project
射电星系动物园
Radio Galaxy Zoo：EMU
项目状态：运行中
上线时间：2024年11月6日
项目简介：射电星系动物园：宇宙演化路径图（RGZ EMU）是一个新兴的全民科学项目，专注于研究强射电发射星系。它基于世界知名的全民科学平台Zooniverse，且由中国首次作为共同牵头方参与。RGZ EMU由雅典国家天文台和清华大学的研究人员联合领导，由全球十多位天体物理学家、数据科学家和人工智能专家，以及虚拟天文台学者共同开发。
立即参与


SKA OBSERVATORY
ABOUT US
CAREERS
SEARCH
Radio Galaxy Zoo: EMU
Help astronomers locate and identify supermassive black holes, star-forming galaxies, and maybe discover something completely unknown with an SKA pathfinder telescope!
Following the original, very productive Radio Galaxy Zoo, the team behind it is asking for your help once again to work with new, spectacular radio images from the Evolutionary Map of the Universe (EMU) Survey from the Australian Square Kilometre Array Pathfinder (ASKAP). The project offers a chance to take on the challenging task of describing what each radio source looks like, using a preselected list of descriptors. Your work will help researchers understand which patches of radio emission belong together and which optical or infrared galaxies are home to supermassive black holes.
Start now by clicking here

#CITIZENSCIENCE
RADIO GALAXY ZOO
EMU
AVAILABLE IN
ENGLISH
GREEK
CHINESE
URDU
AND
JAPANESE
ZOONIVERSE.ORG
我的小红书号：


Radio Galaxy Zoo: EMU
ABOUT
CLASSIFY
TALK
COLLECT
RECENTS
LAB
Hunt supermassive black holes, star forming galaxies, and discover the unknown!
Learn more
Get started

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

# 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

5 GENDER EQUALITY

## 2. 科研实习指导

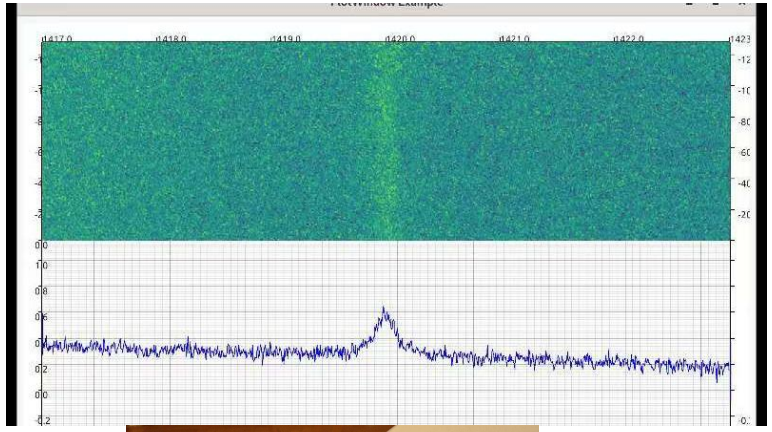
向女性本科生倾斜的暑期实习项目；向女性高中生倾斜的项目式学习项目 (i.e. 广州市执信中学-许可馨，中山大学录取)

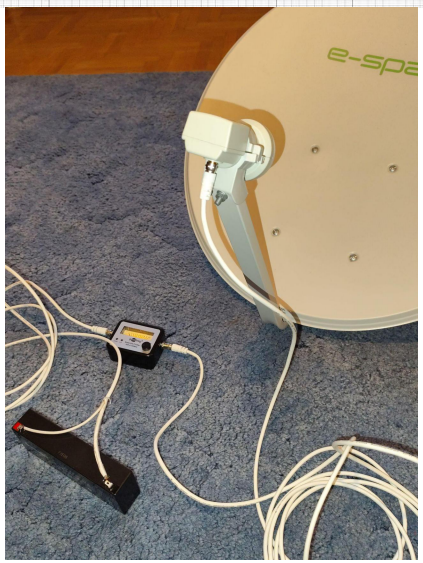
## 3. 职业规划咨询

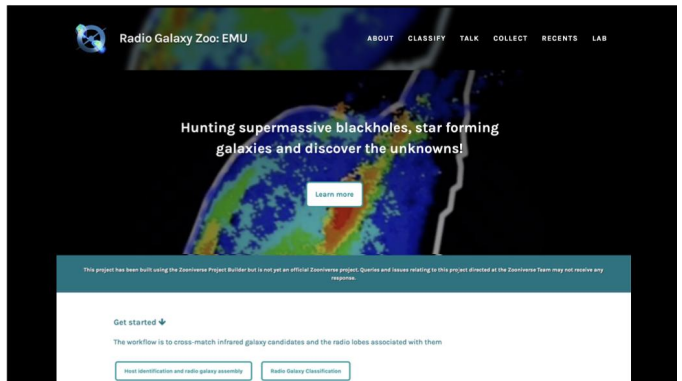
与妍星计划合作，为中学-研究生阶段的女性学生提供线上职业咨询。已覆盖＞100人

# RADIIO: IAU OAD 2025

4 QUALITY EDUCATION



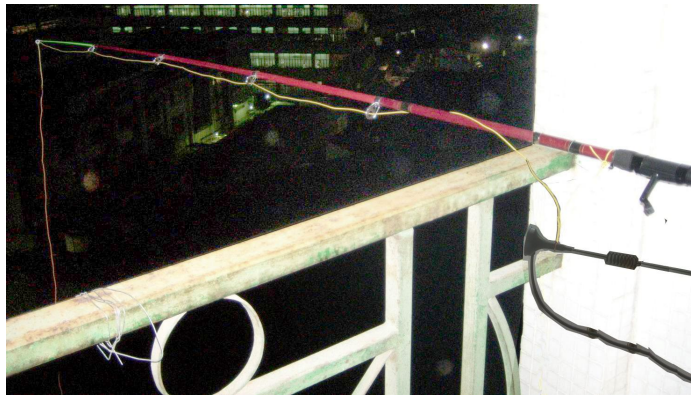


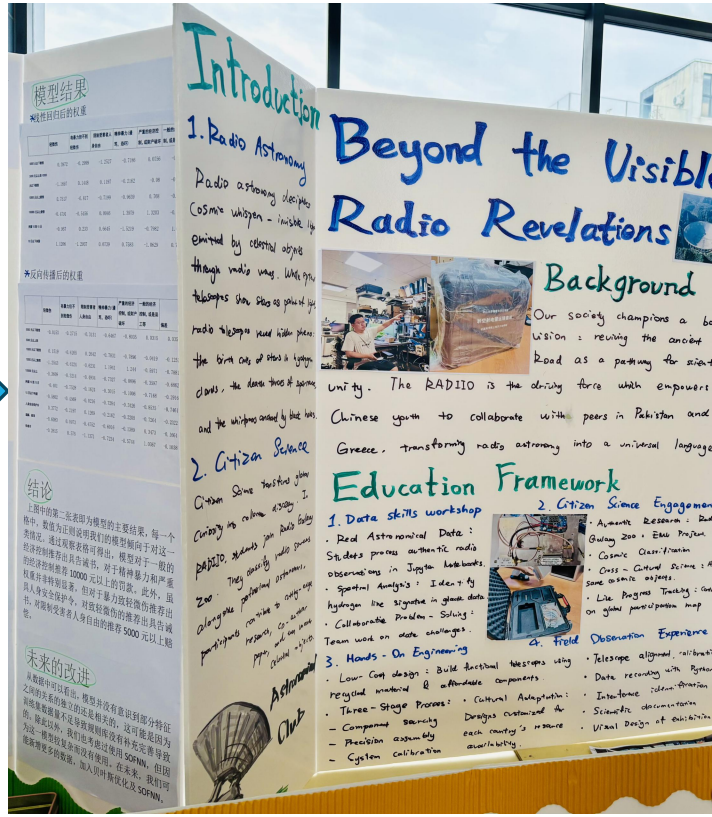



- 面向中国，巴基斯坦，希腊三国中小学学生/教师
- 接触公众科学，提升科学素养及科学数据素养
- 中方合作单位（暂）：上海天文馆、上海天文台、上海诺美高级中学，广州市执信中学、东莞松山湖未来学校，孙吉元宏博学校（乡村培训试点学校）

# 消除不平等：先把价格打下来

10 REDUCED INEQUALITIES





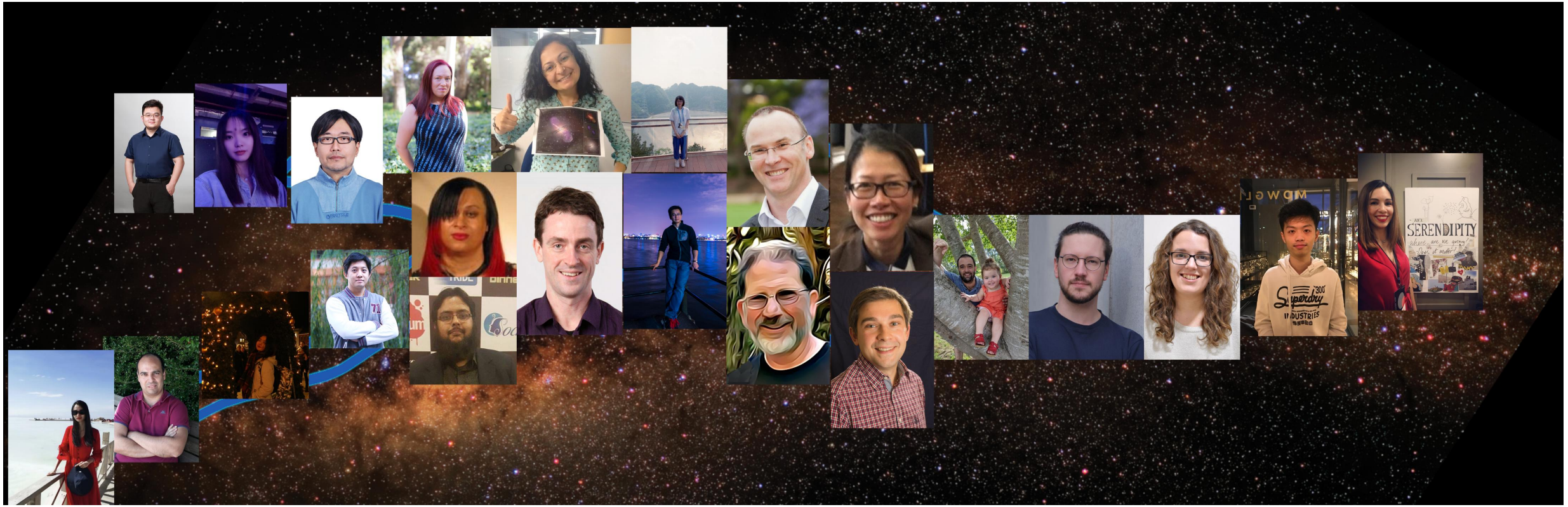

$10^4$ -> $10^2$ ->

# 我们期望

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！