



早期科研经历分享

杨锐祺

2021级强基班

Dec 9. 2023

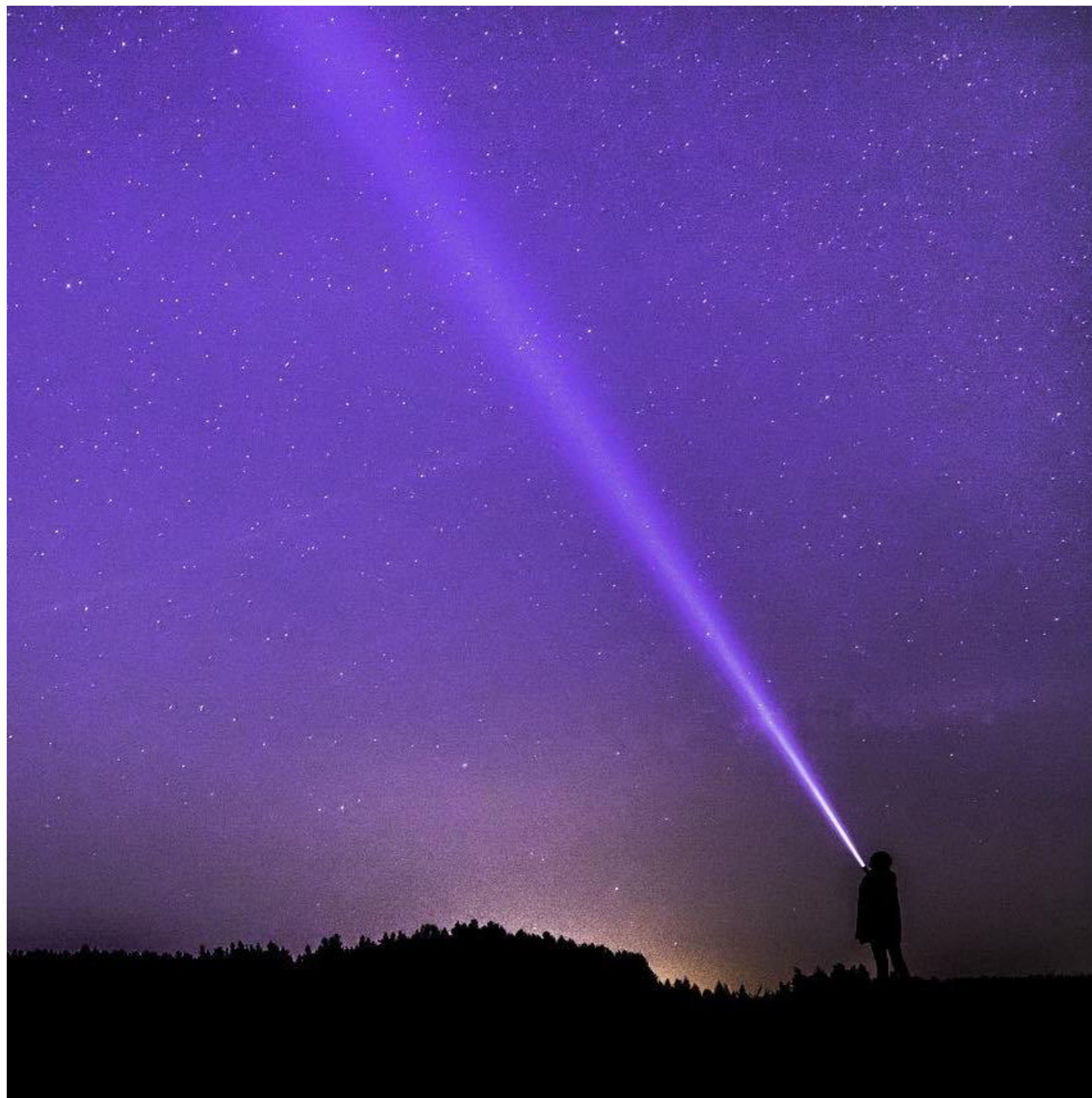
目录



- 我的经历
 - 如何开始?
 - 学会调节



我的经历



我的经历



为什么选择天文学？

梦想、热爱

理解、支持

越学越觉得自己渺小，但越对宇宙充满着敬畏



我的经历

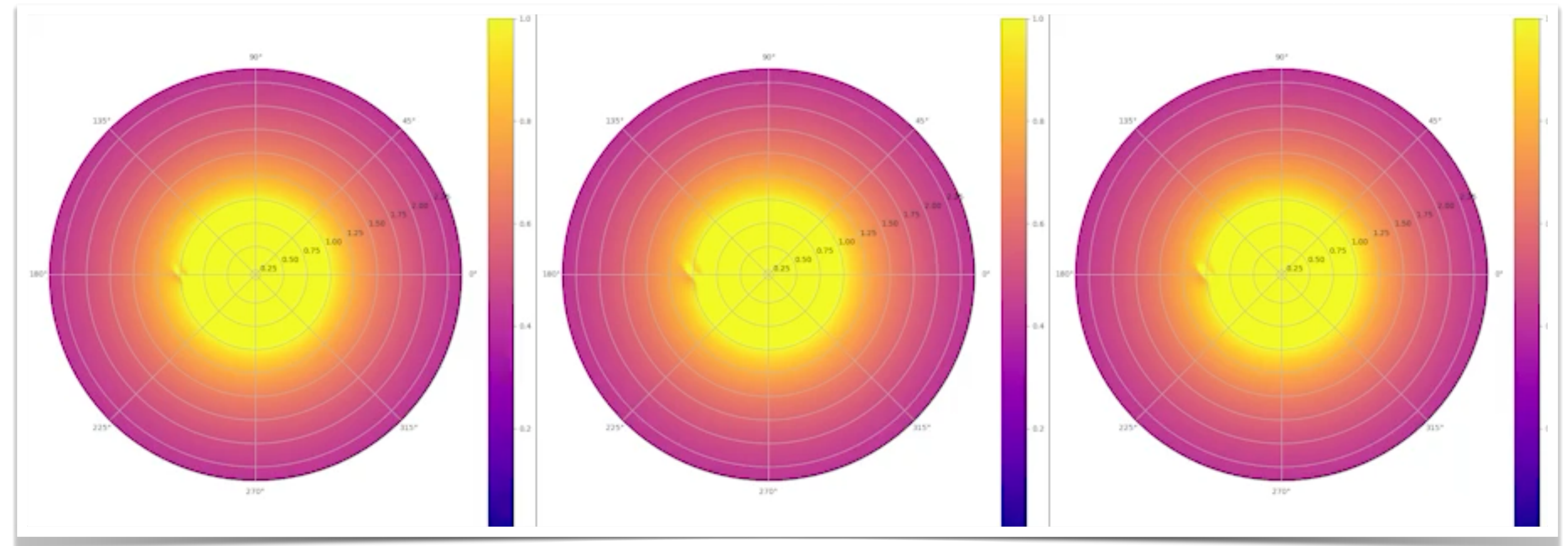
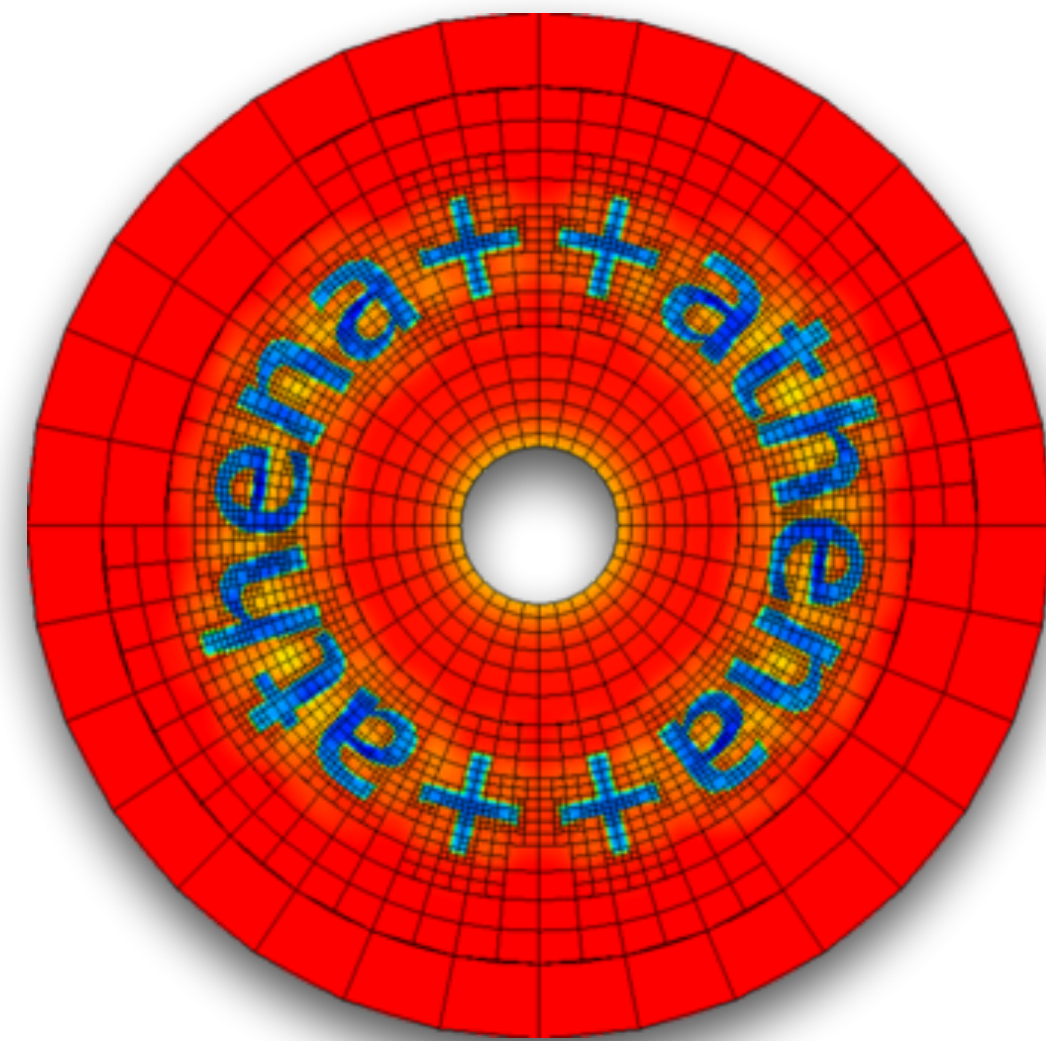
大一

美其名曰
“探索适应阶段”

大二

寻找自己的节奏
挑战一下？

我的经历

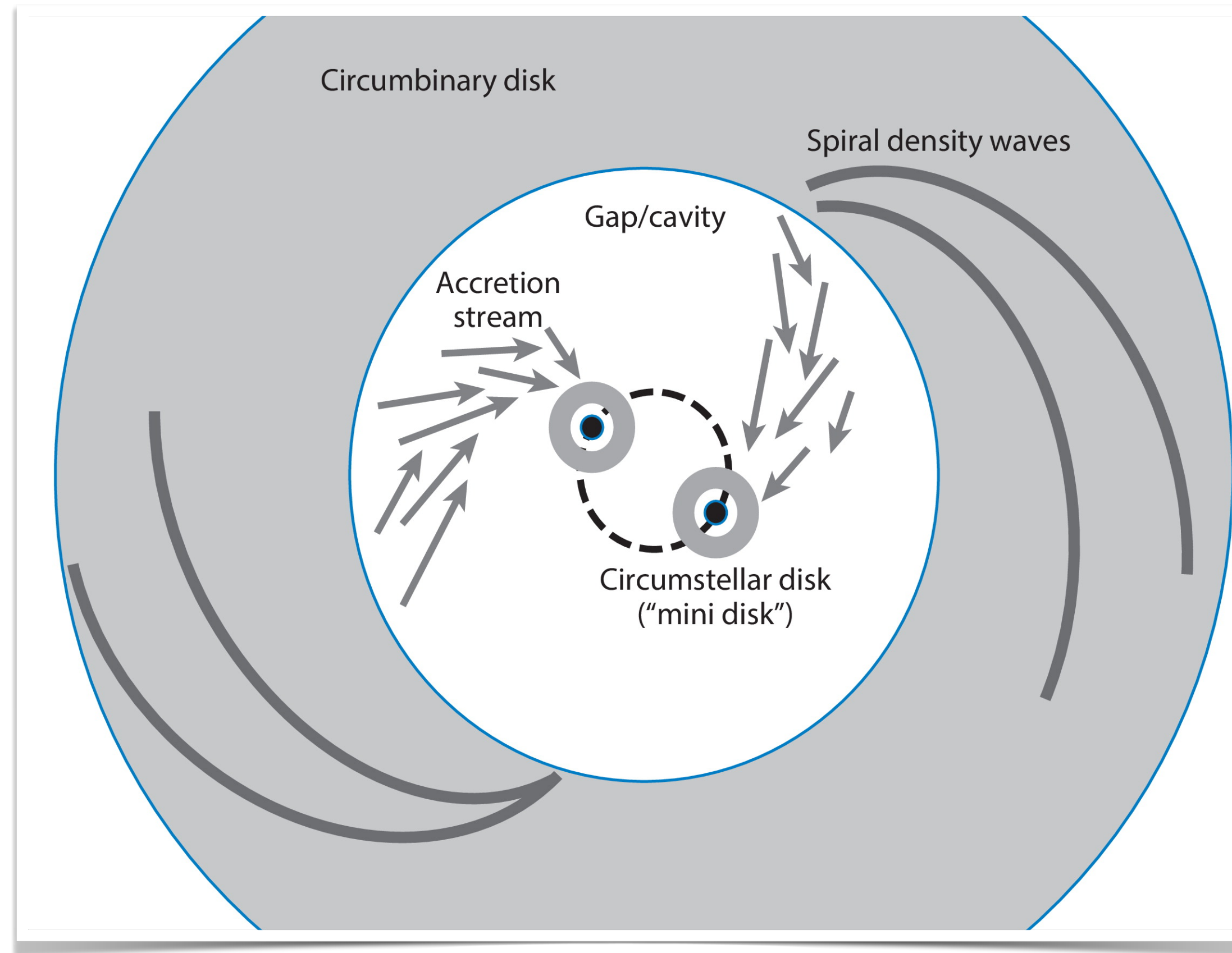


原行星盘的流体力学数值模拟

ATHENA++

Protoplanetary disks

我的经历



Lai, Muñoz . 2023

ATHENA++

环双星盘的流体力学数值模拟

Circumbinary disks

我的经历



综合性强
知识“活”了起来

如何开始?





方向选择

兴趣为导向

- 通过学院主页了解不同老师的方向，和老师约时间线下面对面交流
- 参加组会，听学术报告，问学长学姐
- 从综述文献出发，找出想做的小方向



方向选择

- **星系宇宙学**（宇宙大尺度结构、星系形成与演化、暗物质与暗能量、早期宇宙、原初黑洞、原初引力波等）
- **恒星与行星科学**（恒星物理、天体化学、星际介质、行星科学等）
- **高能天体物理**（致密星物理、宇宙射线、引力波多信使天文学等）
- **天文技术方法**（天文仪器、南极天文、空间科学、天体力学和天体测量学等）
- **观测**：数据获取，数据处理，科学信息，验证模型
- **理论**：建立模型，数值模拟
- **技术与仪器**：科学仪器等

科研方式

- 参加比赛（大创、各种学术竞赛）
- 做课题，发论文（保研、出国）

适当的难度

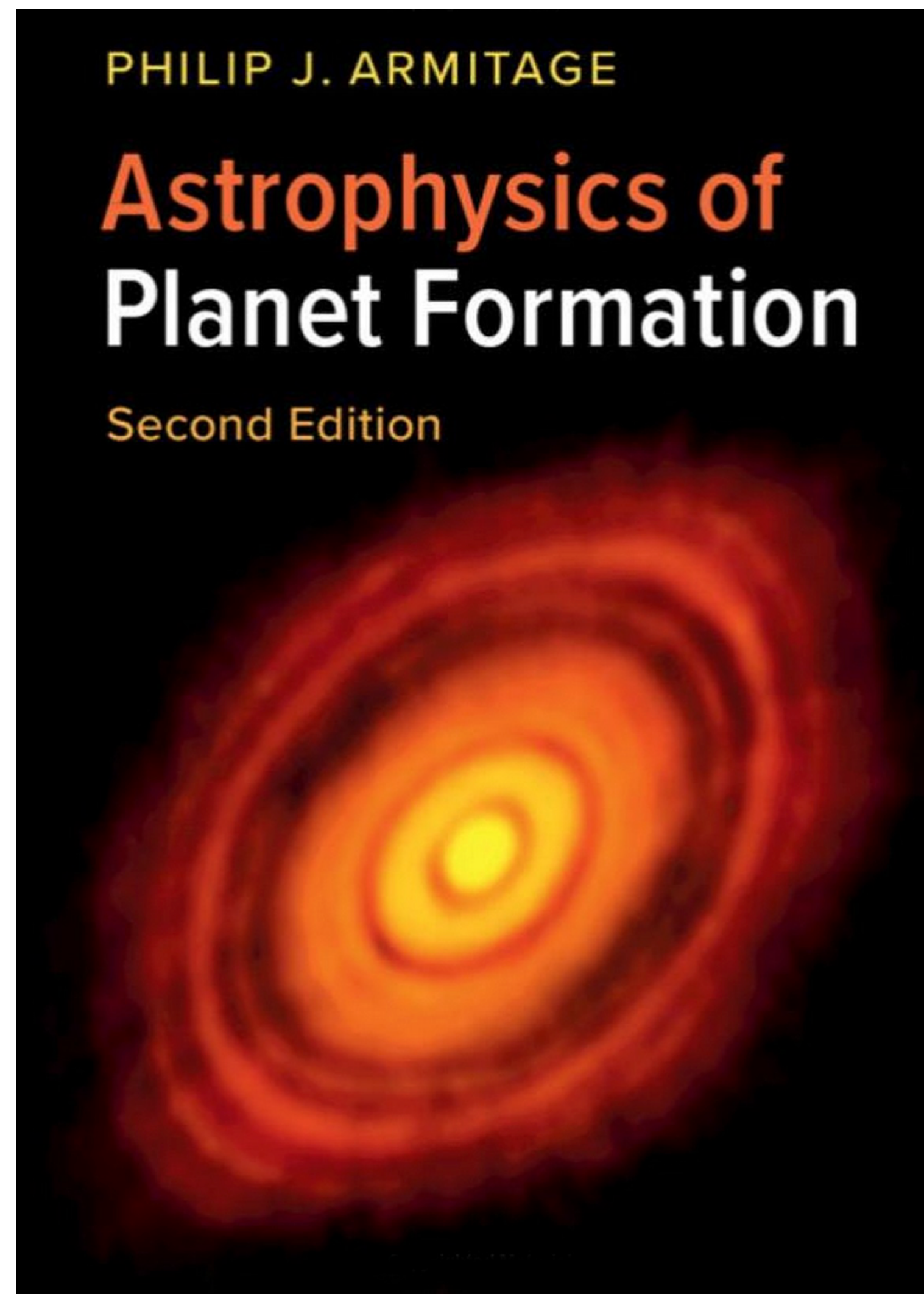
复现⇒创新





基础知识

- 以问题为导向
- 专著
- 图书馆，电子书
- 重点围绕关于自己方向的几篇论文，争取啃透



英语学习



文献阅读

论文撰写

报告分享

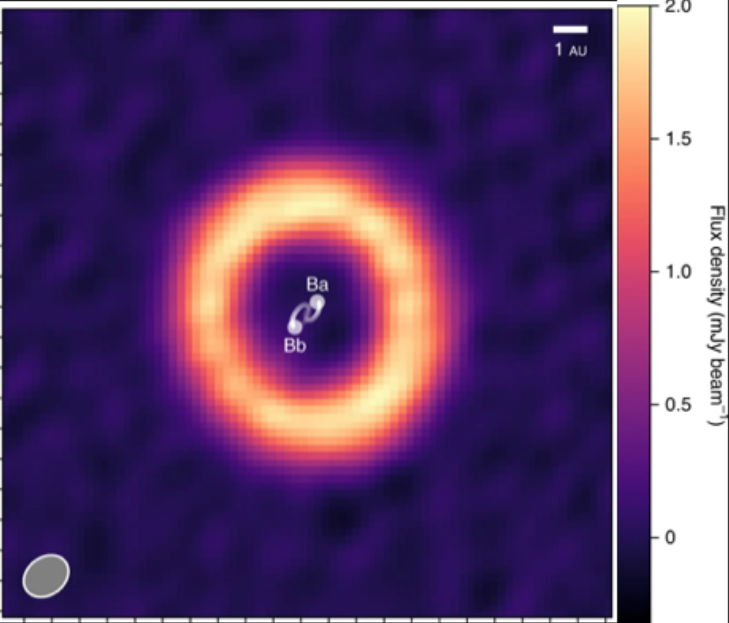
英语学习



Cicumbinary_Disks_CN.key

ViewAdd SlidePlayTableChartTextShapeMediaShareFormatAnimateDocument

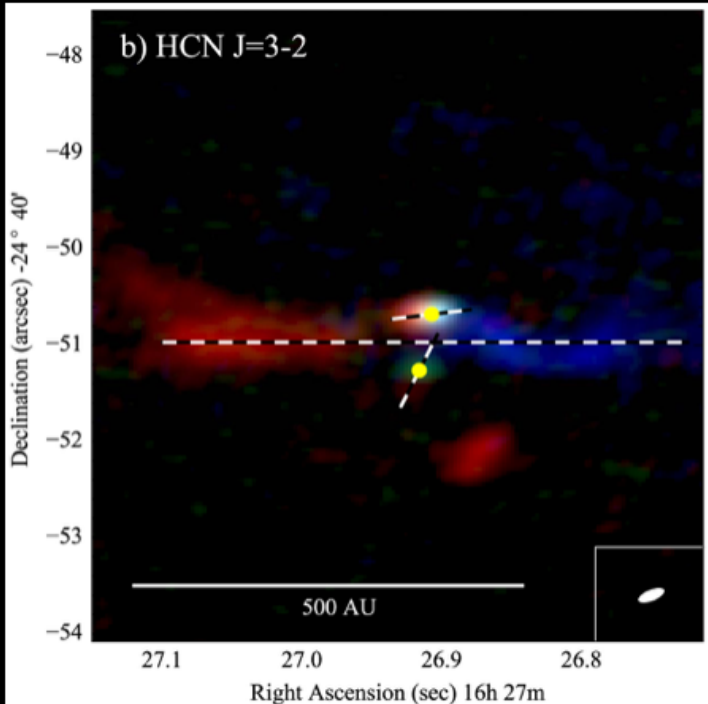
简介



原行星盘

HD 98800

Kennedy et al. 2019/ALMA



原恒星盘

IRS 43

Brinch et al. 2016/ALMA



星系合并
(超) 大质量黑洞

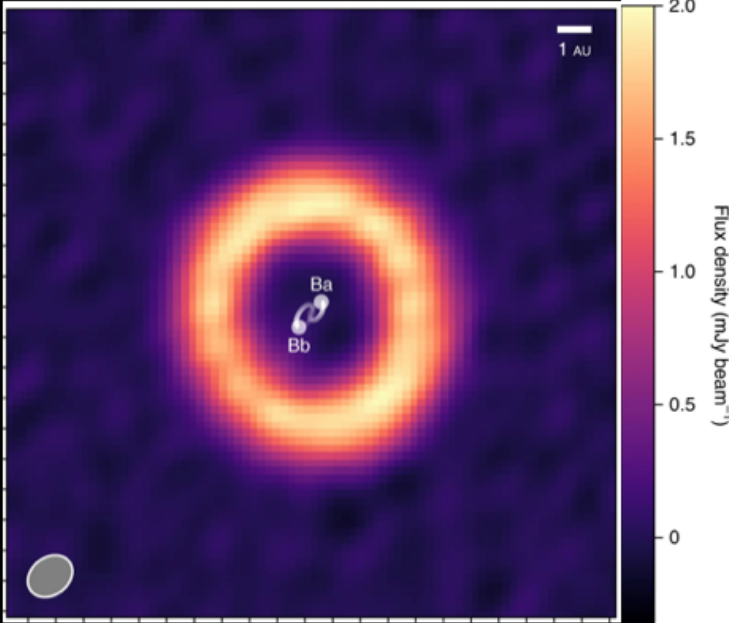
NGC 4676

HST

Circumbinary_Disks_EN.key — Edited

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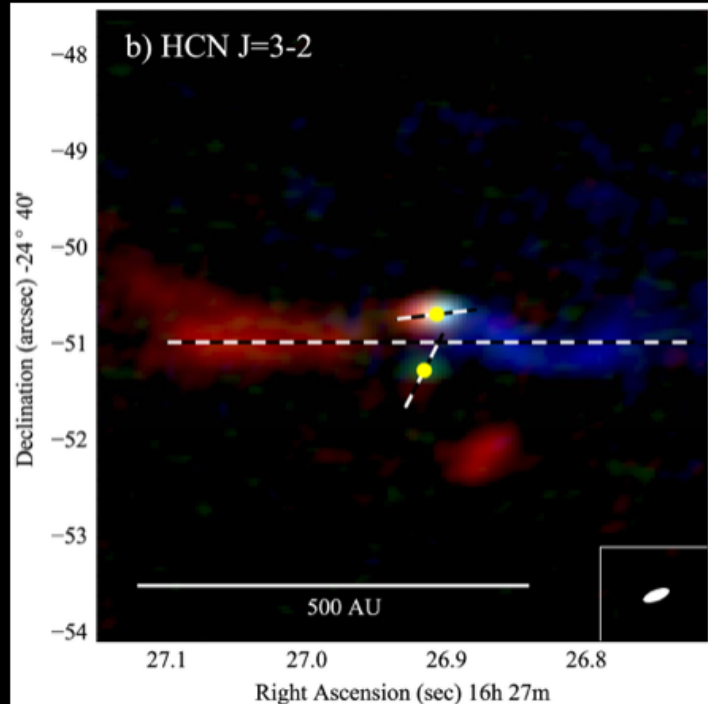
Introduction



Protoplanetary disks

HD 98800

Kennedy et al. 2019/ALMA



Protostellar disks

IRS 43

Brinch et al. 2016/ALMA



Galaxy merge
Massive black holes

NGC 4676

HST



文献阅读与管理

文献阅读

- **arXiv**
- (<https://arxiv.org/>)

~~arXiv~~

- **ADS**
- (<https://ui.adsabs.harvard.edu/>)

 **astrophysics**
data system

文献阅读与管理

文献管理



Zotero

Circu...

On the Ro... X

Disk-sate... X

Suppressi... X

How Binar... X

Hydrodyn... X

Formation... X

Black hole... X

PULSED A... X

GIANT IM... X

The Role ... X

BINARY B... X

My Library

Annual reviews

Arxiv

Astrophysics

Astrophysics of Galaxies

Black holes

Cosmology and Nongalactic Astrophysics

Cosmological simulations

Earth and Planetary Astrophysics

Athena++

Circumbinary disk

Circumbinary planets

GRMHD

MHD

Misaligned disks

SMBHs

Giant impact

Giant planet

Jupiter & Jupiter-like planets

Planetary atmosphere

Protoplanet disk

Debris disk

PPD FD Simulation

High Energy Astrophysical Phenomena

Observation & Methods

Solar and Stellar Astrophysics

Protostellar

Electrodynamics

Fluid dynamics

Health

Human behaviour

Music

Blues

Nuclear Fusion

Title

Creator

Year

Viscous hydrodynamics simulations of circumbinary accretion discs: variability, qua...

Miranda et al.

2017

The Evolution of Accreting Binaries: from Brown Dwarfs to Supermassive Black Holes

Dittmann and Ryan

2023

Suppression of the accretion rate in thin discs around binary black holes

Ragusa et al.

2016

PULSED ACCRETION ONTO ECCENTRIC AND CIRCULAR BINARIES

Muñoz and Lai

2016

Pulsed Accretion in the T Tauri Binary TWA 3A

Tofflemire et al.

2017

Planet migration in massive circumbinary discs

Teasdale and Stama...

2023

On the Role of Dynamical Cooling in the Dynamics of Circumbinary Disks

Wang et al.

2023

Long-lived Eccentric Modes in Circumbinary Disks

Muñoz and Lithwick

2020

IMPLEMENTATION OF THE SHEARING BOX APPROXIMATION IN ATHENA

Stone and Gardiner

2010

Hydrodynamics of Circumbinary Accretion: Angular Momentum Transfer and Binary ...

Muñoz et al.

2019

Hydrodynamical simulations of circumbinary accretion: balance between heating an...

Wang et al.

2023

Hydrodynamic Torques in Circumbinary Accretion Disks

Moody et al.

2019

How Binaries Accrete: Hydrodynamic Simulations with Passive Tracer Particles

Tiede et al.

2022

FARGO: A fast eulerian transport algorithm for differentially rotating disks

Masset

2000

Disk-satellite interactions.

Goldreich and Trem...

1980

Circumbinary Accretion: From Binary Stars to Massive Binary Black Holes

Lai and Muñoz

2023

Black holes in binary systems. Observational appearance.

Shakura and Sunyaev

1973

ACCRETION AND MAGNETIC RECONNECTION IN THE CLASSICAL T TAURI BINARY DQ...

Tofflemire et al.

2017

AC Her: Evidence of the first polar circumbinary planet

Martin et al.

2023

A survey of disc thickness and viscosity in circumbinary accretion: Binary evolution, ...

Dittmann and Ryan

2022

Info

Notes

Tags

Related

Citation Key

lai2023a

Item Type

Journal Article

Title

Circumbinary Accretion: From Binary Stars to Massive Binary Black Holes

Author

Lai, Dong

Author

Muñoz, Diego J.

Abstract

We review recent works on the dynamics ...

Publication

Annual Review of Astronomy and Astrophysics

Volume

61

Issue

1

Pages

517-560

Date

2023

Series

Series Title

Series Text

Journal Abbr

Language

DOI

10.1146/annurev-astro-052622-022933

ISSN

Short Title

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Archive

Loc. in Archive

Library Catalog

Annual Reviews

Call Number

Rights

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_eprint: https://doi.org/10.1146/annurev-astro-052622-022933

Date Added

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Modified

11/13/2023, 6:17:15 PM

accretion

accretion disks

Angular Momentum

Astronomy

Astrophysics

Astrophysics of Galaxies

Astrophysics

Earth and Planetary Astrophysics

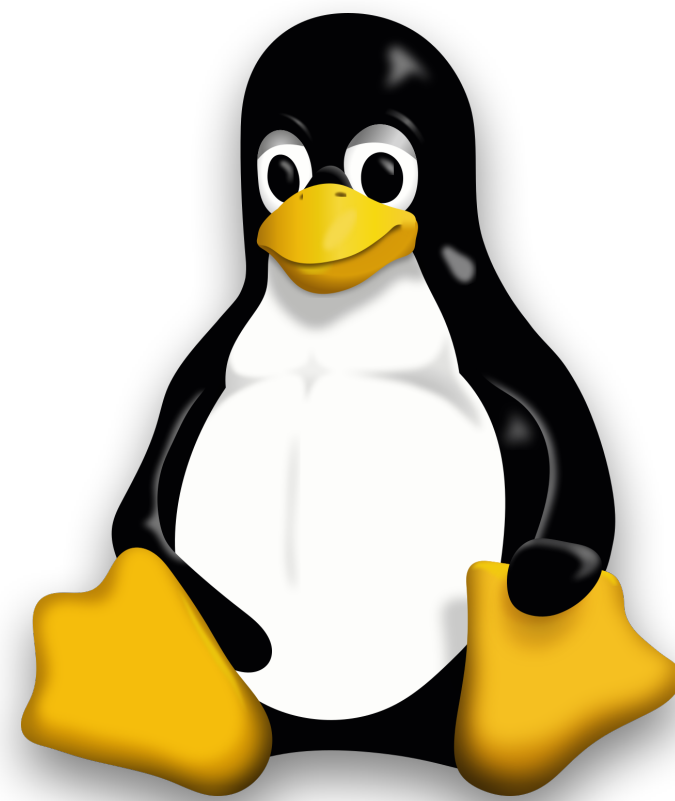
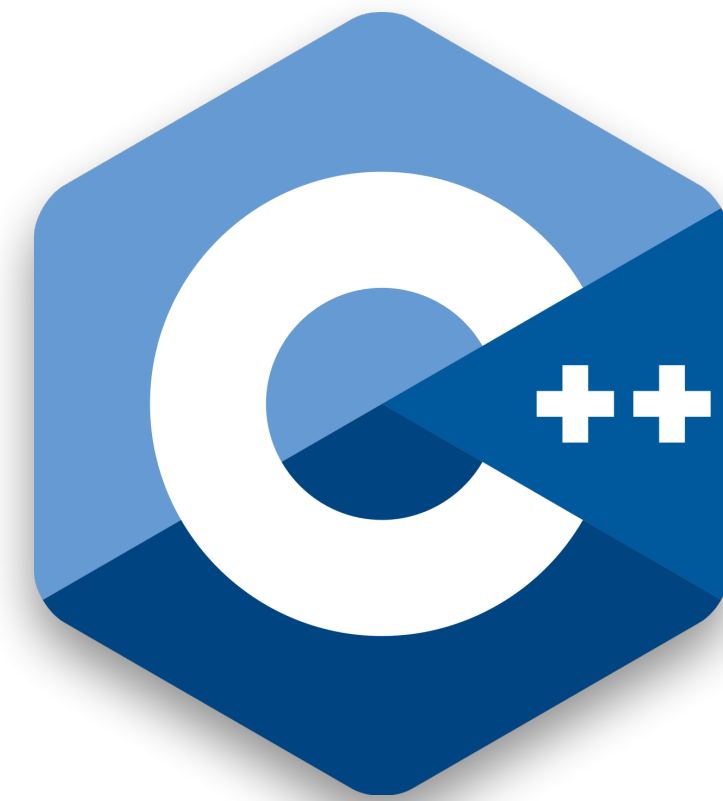
Astrophysics

High Energy Astrophysical Phenomena

代码学习

语言和系统选择

- 以问题为导向
- Python
- C++
- FORTRAN
- Ubuntu
- WSL/WSL2



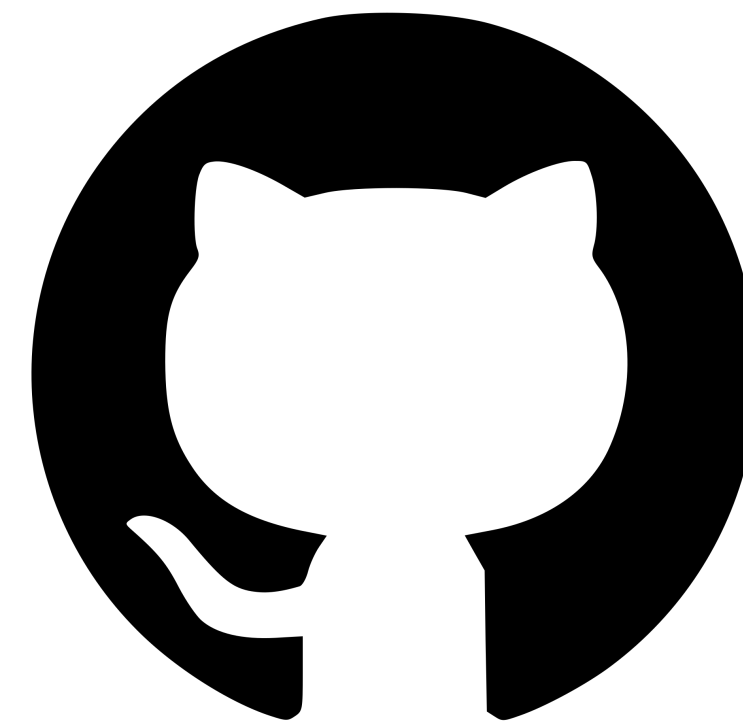
Ubuntu



代码学习

解决问题

- 社区
- Github, Overflow
- ChatGPT



stackoverflow

代码学习

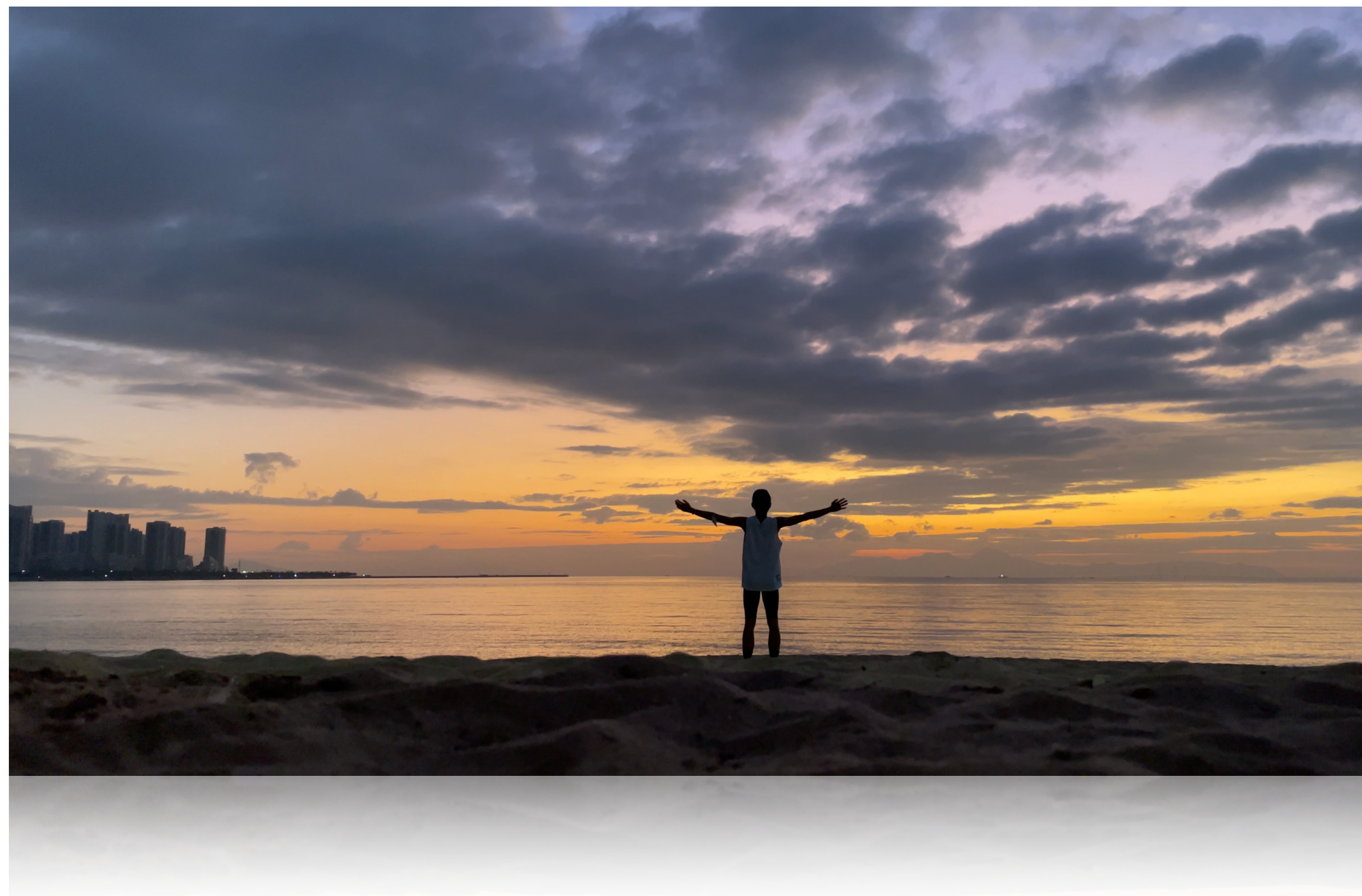


动手





学会调节



学会调节



科研是场“马拉松”

累，消耗心力和体力



学会调节

- 与朋友谈心（开黑）
- 与父母、老师交流
- 与书籍对话

- 爱好：音乐、运动
- 长跑
- 作息

乐观

为祖国健康工作50年



“我不是爱因斯坦，也不会假装自己是爱因斯坦。成为某个很小的领域的专家我就知足了。”

——Adam Riess
Nobel Prize in Physics, 2011

保持好奇心与想象力
不断尝试 勇于探索
找到适合自己的方向



Thanks!