

# Hengyue Zhang

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## Education

### DPhil in Astrophysics, University of Oxford

10/2022 - Present

- Balliol College JT Hamilton Scholarship
- STFC studentship
- Supervisor: Martin Bureau
- Thesis: Weighing supermassive black holes
- Visiting researcher at the University of Montreal from 09/2024 to 12/2024

### B.S. in Physics, University of California, Santa Barbara

09/2018 - 03/2022

- GPA: 4.00/4.00
- 2022 Arnold Nordsieck Memorial Award (for one graduating senior who shows research promise)
- Honors student of College of Letters and Science
- Dean's Honors

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## Research Summary

**Research interests:** Supermassive black holes and their co-evolution with galaxies, gas dynamics, gravitational lensing, interferometry, machine learning, data analysis tools for astronomy.

**Ongoing projects:** (1) Performing high-precision SMBH mass measurements in the local universe using highest-resolution ALMA observations; (2) Preparing for the first cold-gas-dynamical SMBH mass measurements at high redshifts by utilising strong gravitational lensing.

**Publication summary:** 13 peer-reviewed papers, including 5 first-author papers.

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## Talks and Posters

### Purple Mountain Observatory Seminar / Invited by Daizhong Liu

10/2025

*"Supermassive black hole mass measurements using gas dynamics from the local universe to unprecedented redshifts"*

### Westlake University Seminar / Invited by Shude Mao

10/2025

*"Supermassive black hole mass measurements using gas dynamics from the local universe to unprecedented redshifts"*

### Nanjing University Martes Colloquium / Invited by Yanmei Chen

09/2025

*"Supermassive black hole mass measurements using gas dynamics from the local universe to unprecedented redshifts"*

### Galaxy Formation in the Cosmic Web: Bridging Simulations and Observations / Contributed talk

09/2025

*"Tracing black hole-galaxy co-evolution across cosmic time: supermassive black hole mass measurements using gas dynamics from the local universe to unprecedented redshifts"*

### IAU Symposium #396: Massive Galaxies across the Universe / Contributed poster

06/2025

*"Accurate supermassive black hole mass measurements from the local universe to high redshifts using ALMA molecular gas kinematics"*

### Shanghai Jiaotong University Department of Astronomy Seminar / Invited by Juntai Shen

01/2025

*"The most precise and the most distant supermassive black hole masses ever measured"*

### Shanghai Normal University Seminar / Invited by Zhi Li

01/2025

*"The most precise and the most distant supermassive black hole masses ever measured"*

### Tsinghua University Department of Astronomy Seminar / Invited by Cheng Li

09/2024

*“A precise measurement of the supermassive black hole mass in the galaxy NGC 383 using molecular gas kinematics down to the circumnuclear disc”*

**Shanghai Astronomical Observatory Astrophysics Colloquium** / Invited by Lei Hao 09/2024

*“A precise measurement of the supermassive black hole mass in the galaxy NGC 383 using molecular gas kinematics down to the circumnuclear disc”*

**2024 National Astronomy Meeting** / Contributed talk 07/2024

*“A precise measurement of the supermassive black hole mass in the galaxy NGC 383 using molecular gas kinematics down to the circumnuclear disc”*

**Nanjing University Martes Colloquium** / Invited by Yanmei Chen 12/2023

*“A 5%-precision SMBH mass measurement in NGC 383 from the highest-resolution molecular gas kinematics”*

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## Accepted Observing Programs

**Principal Investigator** / ALMA Project 2025.1.01248.S Cycle 12 (5.3 h)

*“A gas-dynamical SMBH mass measurement at  $z=4.23$ : probing the sphere of influence of SPT0113 at  $\sim 50$  pc resolution”*

**Principal Investigator** / ALMA Project 2025.1.00772.S Cycle 12 (1.1 h)

*“First dynamical supermassive black hole mass measurement at  $z \sim 4$ : resolving the lensed sphere of influence of ID141”*

**Principal Investigator** / ALMA Project 2024.1.01711.S Cycle 11 (8.6 h)

*“First dynamical supermassive black hole mass measurement at  $z \sim 4$ : resolving the sphere of influence of a  $z=4.24$  galaxy”*

**Co-Investigator** / ALMA Project 2023.1.01084.S Cycle 10 (18.2 h)

*“Identifying targets for cross-checking black hole mass measurements”*

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## Telescope Experience

**ALMA**: proposal planning, data reduction, imaging, visibility-space modelling, data analysis

**JWST**: proposal planning, image processing and analysis

**HST**: image processing and analysis

**Keck / NIRC2**: angular differential imaging, coronagraph imaging

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## Coding Experience

**Programming languages**: Python (proficient), R (intermediate), SQL (intermediate), IDL (intermediate)

**Software**: NumPy, PyTorch, SciPy, Astropy, CASA, CARTA, KinMS, 3D-Barolo, Caustics, piXedfit

**Packages developed**: SuperMAGE, astrofix

**OS**: macOS, Linux, Windows

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## Awards and Grants

- RAS Travel Grant 2025
  - Balliol College Graduate Project Grant 2025
  - STFC LTA Travel Funding 2024
  - Balliol College JT Hamilton Scholarship 2022 - 2026
  - STFC studentship 2022 - 2026
  - UCSB Arnold Nordsieck Memorial Award (for one graduating senior student who shows research promise) 2022
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## Professional Services

**Local Organising Committee member** / SMBH and Blue Notes Meeting 07/2025 - Present

**Proposal peer reviewer** / ALMA 2023, 2024, 2025

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## Teaching and Outreach

### Private Tutor / Independent

10/2024 - Present

Tutored two students on interferometry and ALMA data reduction and imaging

### Teaching Fellow / GEC Academy Summer Research Program

06/2023 - 08/2024

Introduced cutting-edge astrophysics research to high-school students, helped them develop scientific research and presentation skills, and tutored them to perform small research projects.

Course titles: (1) Simulating the universe; (2) Orbital motion and detection of extrasolar planets; (3) Quantum Physics

### Learning Assistant / UCSB Physics Department

04/2019 - 03/2022

Assisted students with solving worksheet problems and reviewing course material in undergraduate physics discussion sections. Organised group discussions and presentation activities.

### Volunteer / UCSB Physics Circus

10/2018 - 03/2022

Presented physics demonstration experiments at local primary schools in Santa Barbara. Created a fun and welcoming space for children to enjoy and learn about science.