Hongzhe Zhou **hongzhe.zhou@sjtu.edu.cn** **November, 2023**

Personal Information

Born in 1992 in Shanghai, China

Research Interests

Theoretical and computational astrophysics
Plasma astrophysics and dynamo theories of stars, galaxies, and accretion engines
Astrophysical turbulence

Education

M.A. and Ph.D., University of Rochester, Rochester, NY, U.S.A. — 2015-2020
Theoretical astrophysics. Advisor: Eric G. Blackman, Ph.D.

B.S., Fudan University, Shanghai, China — 2011-2015
Physics

Professional Appointments

Postdoc Fellow, Tsung-Dao Lee Institute, Shanghai Jiao Tong University — 2022-present
Nordita Postdoc Fellowship, Nordic Institute for Theoretical Physics (Nordita) — 2020-2022

Academic activities

Co-organizer of Nordita Winter School 2022 - Waves in Astrophysics, Nordita — 2022
Undergraduate research at Fudan University — 2014-2015

- Holographic entropy in a topologically massive gravity theory. Supervisor: Lingyan Hung, Ph.D
- Laboratory work on electron-beam evaporation sources. Supervisor: Donglai Feng, Ph.D

Fellowships and Awards

University of Rochester

- Horton Fellowship, Laboratory for Laser Energetics — 2017-2020
- Okubo Prize (for 1st place in the graduate written comprehensive examination) — 2017

Fudan University

- Honors Student Award in Physics, National Top Talent Undergraduate Training Program — 2015
- Second Prize of the Scholarship for Outstanding Students — 2012-2014
- Scholarship for Freshman — 2011

Teaching Experience

Department of Astronomy, Stockholm University

- AS7019 - Astrophysical magnetohydrodynamics. — Spring 2022
  Co-lecturer. Shared credit with Dhrubaditya Mitra, Ph.D

Department of Physics and Astronomy, University of Rochester

- AST 231 - Special and General Relativity. Temporary Lecturer — Fall 2018
- AST 231 - Gravity. Teaching Assistant. — Fall 2016
- PHY 121P - Mechanics Mastery/Self-paced. Teaching Assistant. — Spring 2016
- PHY 122P - Electricity and Magnetism Mastery/Self-paced. Teaching Assistant. — Fall 2015

Computer Programming

- The `Pencil Code`: Developer (in Fortran), and one of the 20 owners of the code who have the privilege to give others check-in rights. The `Pencil Code` is a high-order finite-difference code for compressible hydrodynamic flows with magnetic fields and particles, with a large community of more than 108 users.
- Mathematica: Both numerical and symbolic programming.
- Python, C++: Beginner.

Grants

- General funding from the China Postdoctoral Science Foundation — 2023

Presentations

- Purple Mountain Observatory, Nanjing, China — October 2023
  Decay laws of helical and nonhelical magnetically-dominated MHD turbulence
- University of Graz, Graz, Austria — September 2023
  Pencil Code User Meeting 2023
  Helical and nonhelical large-scale dynamos in thin accretion disks

- Institute for Advanced Study, Tsinghua University — March 2023
  New perspectives on the shear dynamo problem
- Tsung-Dao Lee Institute, Shanghai Jiao Tong University — October 2022
  TDLI Astrophysics Seminar
  Developments in the shear dynamo problem
- Nordita — September 2022
  Virtual Nordic Dynamo Seminar
  Scaling of the Hosking integral in decaying magnetically-dominated turbulence
- Nordita — June 2022
  Program: Magnetic field evolution in low density or strongly stratified plasmas
  Scaling of the Saffman helicity integral in decaying magnetically-dominated turbulence
- Nordita — May 2022
  Program: Magnetic field evolution in low density or strongly stratified plasmas
  Correlation times of velocity and kinetic helicity fluctuations in rotating and shearing turbulence
- Nordita — May 2022
  Pencil Code User Metting 2022
  Tutorial and updates on the Mathematica package for the Pencil Code
- Nordita — May 2022
  Pencil Code User Metting 2022
  Correlation times of velocity and kinetic helicity fluctuations in rotating and shearing turbulence
- Nordita — May 2021
  Virtual Nordic Dynamo Seminar
  On the shear-current effect: toward understanding why theories and simulations have mutually and separately conflicted
- Nordita — May 2021
  Pencil Code User Meeting 2021
  On the shear-current effect: toward understanding why theories and simulations have mutually and separately conflicted
- Nordita — September 2020
  Nordita Astrophysics Seminar
  Precision of mean-field theories in Astrophysics with applications to dynamos and accretion disks
- Center for Computational Astrophysics, Flatiron Institute — August 2019
  Summer School 2019: Multiscale Modeling of Astrophysical and Space Plasmas
  Minimal-energy state in accretion disk coronae and towards a holistic accretion model
- University of Rochester — February 2019
  3rd Annual Graduate Student Research Meeting
  Astrophysical dynamos
- University of Rochester — February 2019
  Journal club of Astrophysics
  Kinematic α effect in mean-field dynamos
- University of Rochester — March 2018
  Qualifying Examination for Ph.D. degree
  New perspectives on mean-field dynamo theories
- University of Rochester — March 2018
  Journal club of Astrophysics
  Derivation and precision of mean-field electrodynamics with mesoscale fluctuations

Refereed Publications

1. **Zhou, H.**, 2023. Helical and nonhelical large-scale dynamos in thin accretion discs. *Monthly Notices of the Royal Astronomical Society, 527(2), pp.3018–3028.*

2. Brandenburg, A., **Zhou, H.**, and Sharma, R., 2022. Batchelor, Saffman, and Kazantsev spectra in galactic small-scale dynamos. *Monthly Notices of the Royal Astronomical Society, 518(3), pp.3312–3325.*

3. **Zhou, H.**, Sharma, R., and Brandenburg, A., 2022. Scaling of the Saffman helicity integral in decaying magnetically-dominated turbulence. *Journal of Plasma Physics, 88, p. 905880602.*

4. **Zhou, H.** and Blackman, E. G., 2021. On the shear-current effect: toward understanding why theories and simulations have mutually and separately conflicted. *Monthly Notices of the*

Royal Astronomical Society, 507(4), pp.5732–5746.

5. **Zhou, H.** and Blackman, E. G., 2021. Influence of inhomogeneous stochasticity on the falsifiability of mean-field theories and examples from accretion disc modeling. *Monthly Notices of the Royal Astronomical Society, 507(2), pp.2735–2743.*
6. **Zhou, H.** and Blackman, E. G., 2018. Calculating turbulent transport tensors by averaging single-plume dynamics and application to dynamos. *Monthly Notices of the Royal Astronomical Society: Letters, 483(1), pp.L104-L108.*
7. **Zhou, H.**, Blackman, E. G. and Chamandy, L., 2018. Derivation and precision of mean field electrodynamics with mesoscale fluctuations. *Journal of Plasma Physics, 84(3), p. 735840302.* Selected by the Editorial Board of the JPP as one of the "Featured Articles".
8. **Zhou, H.** and Blackman, E. G., 2017. Some consequences of shear on galactic dynamos with helicity fluxes. *Monthly Notices of the Royal Astronomical Society, 469(2), pp.1466-1475.*
9. Cheng, L., Hung, L. Y., Liu, S. N. and **Zhou, H.Z.**, 2016. First law of entanglement entropy in topologically massive gravity. *Physical Review D, 94(6), p.064063.*

Submitted work

1. **Zhou, H.** and Blackman, E. G., 2023. Helical dynamo growth at modest versus extreme magnetic Reynolds numbers. *arXiv-eprints*, page arXiv:2302.06042. Submitted to *Physical Review Letters*.

Other Archived Publications

1. **Zhou, H.** and Blackman, E. G., 2019. Generalized quenching of large-scale dynamos for helical and non-helical flows. *arXiv-eprints*, page arXiv:1905.01256.

Refereeing

Monthly Notices of the Royal Astronomical Society, The Astrophysical Journal, Astronomy & Astrophysics, Galaxies