Haowen Si 🆔

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OBJECTIVE

Graduate student in high-energy astrophysics, modeling SMBH jets and their connections to cosmic ray generation and detection in multi-messenger and multi-wavelength studies.

EDUCATION

- **M.Sc. in Physics and Astronomy** *Sept. 2024 - Present*
  University of Amsterdam Amsterdam, Netherlands
  - Selected Coursework: Extreme Astrophysics, Disks and Accretion, Space Instrumentation for High-Energy Astrophysics, General Relativity, Machine Learning.

- **B.Sc. in Mathematics and Applied Mathematics** *Sept. 2020 – June 2024*
  The Chinese University of Hong Kong, Shenzhen Shenzhen, China
  - Selected Coursework: Complex Analysis, Real Analysis, Coding Theory, Electrodynamics, Fluid Mechanics, Computational Methods.

- **Exchange Program in Physics** *Feb. 2023 – June 2023*
  University of Melbourne Melbourne, Australia
  - Coursework: Astrophysics, Optics, Computational Physics.

SKILLS & LANGUAGES

- **Programming:** Python, C++, Fortran (basic), Bash scripting, Julia (basic), MATLAB
- **Data & Modeling:** Machine Learning, Semi-analytical Modeling, Numerical Simulations, Data Analysis
- **Astrophysics Tools:** ISIS (X-ray spectral modeling), SPEX (spectral fitting), DISKLAB (disk modeling)
- **Version Control & Collaboration:** Git, GitHub
- **Languages:** Mandarin (Native), English (Fluent), Cantonese (Conversational), Dutch (Beginner), Spanish (Basic)

PROJECTS

- **Constraining Hadronic Processes in Past Sgr A* Jets (Supervisor: Sera Markoff)** *Sep. 2025 – Present*
  Tools: Python, BHJet/HADJet, ISIS, Gammapy Amsterdam, Netherlands
  - Modeling past Sgr A* jet with lepto–hadronic scenarios, linking CR production to detector predictions.
  - Reproducing MWL baselines in ISIS and refining HADJet with proton injection setups.
  - Simulating CR confinement and diffusion in the Galactic Center environment.
  - Folding outputs through CTA/KM3NeT instrument responses to forecast detectable signatures.

- **XENONnT Experiment: Dark Matter & Detector Calibration (Supervisor: Jingqiang Ye)** *Feb. 2024 – Sep. 2024*
  Tools: Python, Data Analysis Pipelines, Correction Algorithms Shenzhen, China
  - Worked on detector calibration and low-energy event analysis.
  - Calibrated with Krypton-83m injections to monitor xenon purity, drift fields, and PMT stability.
  - Developed correction algorithm for false photoionization events, improving low-energy sensitivity.
  - Identified detector artifact mimicking neutrino magnetic moment signals, reducing systematic errors.

- **MHD Simulation: Tracing Alfvén Waves in Solar Wind (Supervisor: Xin Cheng)** *July 2023 – Sep. 2023*
  Tools: Python, MPI-AMRVAC, Fortran, Bash Nanjing, China
  - Modeled Alfvén wave propagation in the slow solar wind using MPI-AMRVAC (1D diffusion setup).
  - Configured grid, boundary conditions, and solvers to study wave transport and damping.
  - Gained experience in MHD theory, plasma simulations, and numerical stability challenges.
  - Built foundation for future higher-dimensional plasma modeling projects.

- **LAMOST Survey: Stellar Activity & Spectral Variations (Supervisor: Pengfei Chen)** *June 2021 – Aug. 2021*
  Tools: Python, FITS, K-means clustering, correlation analysis Nanjing, China
  - Analyzed LAMOST spectra to study stellar activity (H-alpha, Fe lines) in solar-like stars (G6–G9).
  - Processed spectra and applied machine learning (K-means) to detect anomalies and variability.
  - Found activity correlates with lower surface gravity and higher radial velocity, not metallicity.
  - Gained hands-on skills in spectral data reduction and stellar activity diagnostics.