Sijin Chen

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EDUCATION BACKGROUND

Ludwig-Maximilians-Universität München *10/2022- expected 04/2025*

- Master of Science in Astrophysics
- Main Courses: Formation and Evolution of Cosmic Structures (1.0 – Excellent), Cosmology and Large-Scale Structure (1.0 – Excellent), The Origin and Emergence of Structure in the Universe (1.0 – Excellent), Hydrodynamics (1.3 – Excellent)

Jilin University *09/2018-06/2022*

- Bachelor of Science in Physics, overall grade: 90.30/100 (5% in rank)
- Main Courses: Analytical Mechanics(96/100), Quantum Mechanics I and II(96/100 and 92/100), Thermodynamics and Statistical Physics(93/100), Electrodynamics(99/100), Particle Physics(93/100), Solid State Physics I and II(92/100 and 91/100)

RESEARCH EXPERIENCE

Master Thesis: Scattering Transform Pipeline on Cosmological Constraints *10/2023 – present*

Advisor: Dr.Stella Seitz & Zhengyangguang (Laurence) Gong

- Utilize Morlet wavelet filters of varying scales and orientations to perform wavelet convolution on cosmological convergence square maps.
- Apply Fisher Forecast analysis to derive cosmological constraints based on the scattering coefficients
- Develop neural network-based emulators trained on CosmoGridV1 simulations to predict scattering coefficients for different cosmologies. Use these emulators to perform MCMC sampling and obtain posterior distributions, thereby deriving precise cosmological constraints.
- Implement the emulators trained in different tomographic bins to conduct a tomographic analysis

Time-Dependent Kinetic Study of Positron-Hydrogen Collisions *12/2021 – 04/2022*

Advisor: Prof.Liguang Jiao

- Investigate the positron-hydrogen scattering problem using time-dependent wave function evolution and the five-point formula on a position grid.
- Apply Fast Fourier Transform for kinetic energy in momentum space, then transform back to position space for potential calculations using a symmetric split of energy terms.
- Simulate and track wave functions, showing positronium formation at high energies and independent scattering at low energies.

COURSE PROJECT

Gravitational Dynamics *04/2023 - 08/2023*

- Explore capturing a meteorite at the Sun's Lagrangian 4 point by setting the particle's initial state to move it there, rotating around the Sun like Jupiter.
- Conclude that circular motion is only possible when the total energy equals the minimum effective potential energy, meaning no radial motion, and any small deviation disrupts the perfect circular orbit.

Hydrodynamics *10/2022 - 02/2023*

- Investigate how nozzle throat shape affects particle acceleration and speed changes before and after passing through the nozzle.
- Conclude that nozzle shape has little impact on velocity, energy, pressure, and density, but a narrower gap can significantly affect acceleration, with choking occurring if the gap is too narrow and long.

Awards

- Computer Skills: Python, MATLAB, LaTeX, C, C++, Origin, Linux
- Languages: English (Fluent), Chinese (Native)
- Awards: Canada Mitacs Globalink Research Internship Scholarship in 2021
- Talk: 2024 Ringberg OPINAS meeting about scattering transform on cosmological constraints