*Hanover*
*New Hampshire*
*8026982732*
*lissajousfigures@gmail.com*
*https://shanchanglin.github.io*
*https://github.com/shanchanglin*

# Shan-Chang Lin

## Summary

Computational physicist with expertise in high-performance computing, plasma simulation, and advanced numerical modeling (MHD, PIC). Proven research experience in magnetic reconnection and plasma instabilities. Adept in Python, C++, and scientific data analysis. Passionate about applying physics-driven modeling to real-world technology challenges.

## Skills

Technical Skills: Python (NumPy, pandas, matplotlib, scikit-learn, TensorFlow), C++, HPC, parallel computing, Git, LaTeX
Scientific Computing: Plasma physics, MHD, PIC, finite difference methods, nonlinear ODE/PDE solving, numerical modeling

## Experience

**PhD student researcher - Dartmouth College**
- Developed and solved ODEs from first-principles theory to estimate magnetic reconnection onset; validated results with 2D PIC simulations.
- Designed and conducted 3D PIC simulations on HPC clusters; first to identify the role of drift-kink instability in X-line spreading.
- Conduct 2D MHD simulations; discovered a novel mechanism for fast reconnection. Published findings in peer-reviewed journals.
- Wrote custom Python scripts for large-scale simulation data analysis and visualization.

**Research Assistant - Institute of Astronomy and Astrophysics, Academia Sinica**
- Conduct N-body simulations and analyze observable features for different dark matter models.

**Short-term scholar - The University of Texas at Austin**
- Develop a Python script to solve the Schrödinger-Poisson equations in a one-dimensional system.

**Master student researcher - National Taiwan University**
- Numerically solve an ODE using the finite difference method, C++, and parallel computing. Analyze the results using Python. Discover a new way to solve a spherical symmetric steady-state solution of the Schrödinger-Poisson equations, which are nonlinear partial differential equations (PDEs). Publish the results in a peer-reviewed journal.

## Side Projects

**Machine Learning: Review Classifier**
- Built a Python-based classifier using NLP techniques (bag-of-words, TF-IDF, Word2Vec) to predict rating outcomes from reviews.

**2D Lattice Simulation**
- Created a Python simulation of self-organizing hierarchies via particle encounters on a lattice; explored emergent hierarchy structure formation.

## Education

- **Ph.D. in Physics**, Dartmouth College. Hanover, NH, USA. Jan. 2019–present.
- **Master of Science in Physics**, National Taiwan University. Taipei, Taiwan.
- **Bachelor of Science in Physics**, National Taiwan University. Taipei, Taiwan.

## Publications

- **Shan-Chang Lin**, Yi-Hsin Liu, Xiaocan Li. The spreading of magnetic reconnection X-line in particle-in-cell simulations– mechanism and the effect of drift-kink instability. Journal of Geophysical Research: Space Physics, 130, e2024JA033494 (2025).
- Liu, Yi-Hsin, Paul Cassak, Xiaocan Li, Michael Hesse, **Shan-Chang Lin**, and Kevin Genestreti. "First-principles theory of the rate of magnetic reconnection in magnetospheric and solar plasmas." Communications Physics 5, no. 1 (2022): 1-9.
- **Shan-Chang Lin**, Yi-Hsin Liu, Xiaocan Li. "Fast magnetic reconnection induced by resistivity gradients in 2D magnetohydrodynamics." Physics of Plasmas 28 (7), 072109 (2021).
- Liu, Yi-Hsin, **Shan-Chang Lin**, Michael Hesse, Fan Guo, Xiaocan Li, Haocheng Zhang, and Sarah Peery. "The critical role of collisionless plasma energization on the structure of relativistic magnetic reconnection." The Astrophysical Journal Letters 892, no. 1 (2020): L13.
- **Shan-Chang Lin**, Hsi-Yu Schive, Shing-Kwong Wong, Tzihong Chiueh. "Self-consistent construction of virialized wave dark matter halos." Phys. Rev. D 97, 103523 (2018).