Brent Tan

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Summary

Research Scientist/Computational Astrophysicist. My research focus lies in computational modelling of galactic weather. I use fluid simulations to probe and understand the complex physics in turbulent systems that drive galaxy evolution.

Technical Skills

Programming Languages: Python, C++, Linux/Bash

Deep Learning Frameworks: PyTorch, JAX

Libraries & Tools: NumPy, SciPy, Git, LaTeX

Skills: High Performance Computing, Fluid Simulations, Neural ODEs

Experience

Flatiron Research Fellow 2023 – 2024
Flatiron Institute, Simons Foundation *New York, NY*

Graduate Researcher 2017 – 2023
University of California, Santa Barbara *Santa Barbara, CA*

Education

University of California, Santa Barbara Santa Barbara, CA
Ph.D. in Physics/Astronomy *2017 – 2023*

Carnegie Mellon University Pittsburgh, PA
B.S. in Physics (Astrophysics Concentration) with Computer Science Minor *2013 – 2017*

Projects

Neural Infalling Cloud Equations 2024
Scientific Machine Learning Project *Python, JAX, Diffax, Equinox, PySR*
- Increasing the Efficacy of Subgrid Models and Scientific Equation Discovery using Neural ODEs and Symbolic Regression

Cool Things That Matter 2017-2023
High Performance Computing, Modelling *Python, C++*
- Thesis topic spanning research publications. Used simulations and analytic theory to investigate the multiphase dynamics of galactic atmospheres.

Extended Townsend Algorithm 2022
Fluid Simulation *C++*
- Designed and implemented a general version of the Townsend Algorithm for a rapid and accurate radiative cooling module in the MHD code Athena++

Selected Publications

• **Brent Tan**, Drummond B Fielding, Cloud atlas: navigating the multiphase landscape of tempestuous galactic winds, *Monthly Notices of the Royal Astronomical Society*, Volume 527, Issue 4, February 2024, Pages 9683–9714, https://doi.org/10.1093/mnras/stad3793

• **Brent Tan**, S Peng Oh, Max Gronke, Cloudy with a chance of rain: accretion braking of cold clouds, *Monthly Notices of the Royal Astronomical Society*, Volume 520, Issue 2, April 2023, Pages 2571–2592, https://doi.org/10.1093/mnras/stad236

• **Brent Tan**, S Peng Oh, A model for line absorption and emission from turbulent mixing layers, *Monthly Notices of the Royal Astronomical Society: Letters*, Volume 508, Issue 1, November 2021, Pages L37–L42, https://doi.org/10.1093/mnrasl/slab100

• **Brent Tan**, S Peng Oh, Max Gronke, Radiative mixing layers: insights from turbulent combustion, *Monthly Notices of the Royal Astronomical Society*, Volume 502, Issue 3, April 2021, Pages 3179–3199, https://doi.org/10.1093/mnras/stab053