Cameron W. Trapp

Computational Physicist · MHD & Multiphysics Simulations · HPC Code Development

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Computational physicist with **9 years of experience** developing, running, and analyzing **(magneto)hydrodynamic simulations on national supercomputers**.

Education

Ph.D., Physics, UC San Diego — Aug. 2024
Thesis: *Radial Flows and Torques in Cosmological Simulations of Milky Way Mass Galaxies*

B.S., Astrophysics, University of New Mexico (GPA 4.0) — May 2016

Skills

Languages: Python, C/C++, C#, MATLAB, Fortran, LaTeX, Perl
Numerical Methods: Adaptive Mesh Refinement, Meshless finite mass (Lagrangian) methods, MPI/OpenMP
Software & Data: Git, Linux, Slurm/PBS, HDF5, yt, h5py, datashader, matplotlib, PyTorch
HPC: Production runs and analysis on SDSC, NASA Pleiades, IU Big Red 200, and TACC systems

Experience

Assistant Research Scientist — Johns Hopkins University, *2024-Present*

- Implemented an efficient radiative transfer model by coupling external physics models into an existing Fortran/C++ simulation framework (Enzo).
- Replaced a serial, patch-stitching clump finder for AMR data with a parallel uniform-grid algorithm, making substructure identification feasible on full simulation outputs.
- Developed a synthetic-diagnostic pipeline to forward model radio images from simulations, sparsely sample them in Fourier space, and reconstruct the images to investigate how much signal is recoverable.

Graduate Research Assistant — UC San Diego, *2017-2024*

- Quantified and characterized radial mass fluxes and velocities through galactic disks in a Lagrangian simulation
- Extended the massively parallel C package GIZMO to track torques acting on gas from gravity, magnetohydrodynamic forces, and subgrid physics in simulations run on ∼224 cores.
- Developed a convolutional neural network using PyTorch to infer radial mass transport from HI observations
- Served as Teaching Assistant Coordinator, leading teams of up to 20 TAs, holding office hours, assisting in course design, and managing the labs.

Research Assistant — University of New Mexico, *2014-2017*

- Analyzed high-frequency correlations in fMRI data to identify functional resting state networks in human brains using MATLAB and custom software.
- Created a pipeline in Perl to identify and rank potential radio calibrator sources for VLBA surveys

Selected Publications

- "FOGGIE XII: Formation & Evolution of Extended HI Galactic Disks & Warps with a Dynamic CGM"
  C.W. Trapp, M.S. Peeples, J. Tumlinson, B.W. O'Shea, C. Lochhaas, A.C. Wright, B.D. Smith, V. Saeedzadeh, A. Acharyya, R. Augustin, R.C. Simons, 2026, ApJ, doi: 10.3847/1538-4357/ae6503, arXiv:2511.00158
- "FOGGIE XIII: On the Observability of Extended HI Disks and Warps"
  C.W. Trapp, M.S. Peeples, J. Tumlinson, B.W. O'Shea, A.C. Wright, A. Acharyya, B.D. Smith, V. Saeedzadeh, R. Augustin, 2026, ApJ, doi:10.3847/1538-4357/ae7a38, arXiv:2511.00159
- "Angular momentum transfer in cosmological simulations of Milky Way-mass discs"
  C.W. Trapp, D. Kereš, P.F. Hopkins, C.A. Faucher-Giguère, N. Murray, 2024, MNRAS, 533, 3008, doi: 10.1093/mnras/stae2021
- "Gas infall and radial transport in cosmological simulations of Milky Way-mass discs"
  C.W. Trapp, D. Kereš, T.K. Chan, I. Escala, C. Hummels, P.F. Hopkins, C.A. Faucher-Giguère, N. Murray, E. Quataert, A. Wetzel, 2022, MNRAS, 509, 3, 4149, doi:10.1093/mnras/stab3251
- "On the detection of high frequency correlations in resting state fMRI"
  C.W. Trapp, K. Vakamudi, S. Posse, 2018, NeuroImage, 164, 202
- 6 additional papers, 10 talks and 6 posters at various international conferences and universities.