Peter Scherbak

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Research Interests

I am interested in theoretical and computational astrophysics, especially involving stars and binary systems. Much of my research involves fluid dynamics, mass transfer, and radiative losses. Applications include the formation of gravitational wave sources, stellar mergers, common envelope evolution, tidal excitation of internal waves, and transient sources.

Education

2026 (expected)	**Ph.D., California Institute of Technology** Astrophysics Advisor: Jim Fuller
2023	**M.S., California Institute of Technology** Astrophysics Advisor: Jim Fuller
2020	**B.A, Cornell University** Physics *summa cum laude* **B.A, Cornell University** Astronomy *summa cum laude*

Research Publications

1. P. Scherbak, W. Lu, and J. Fuller, "Rapid binary mass transfer: Circumbinary outflows and angular momentum losses", *The Astrophysical Journal*, 2025 (accepted for publication).

2. P. Scherbak, A. Polin, M. Kasliwal, and P. Behroozi, "Delay time distributions from ZTF detections: A link between Ca-rich gap transients and 91bg-like supernovae", (in prep.)

3. P. Scherbak and J. Fuller, "Ultrashort-period WD binaries are not undergoing strong tidal heating", *The Astrophysical Journal*, vol. 962, p. 185, 2024.

4. P. Scherbak and J. Fuller, "White dwarf binaries suggest a common envelope efficiency $\alpha \sim 1/3$", *Monthly Notices of the Royal Astronomical Society*, vol. 518, pp. 3966–3984, 2023.

Recent talks and presentations

Conference talks

1. "Rapid binary mass transfer: Outflows and AM losses through L2"
   41st Liége International Astrophysical Colloquium: The Eventful Life of Massive Star Multiples, University of Liége, Belgium, 2024

2. "Tidal heating in double WD binaries"
   3,2,1: Massive Triples, Binaries and Mergers, University of Leuven, Belgium, 2023

3. "White dwarf binaries suggest a common envelope efficiency $\alpha \sim 1/3$"
   White Dwarfs from Physics to Astrophysics, KITP, UCSB, CA, 2022

Seminars and collaboration talks

4 "Simulations of rapid mass transfer including radiative losses"
University of California Berkeley transients group meeting, 2025

5 "Host galaxies and delay times of Ca-rich gap transients vs 91-bg like SNe and Type Ia SNe"
Supernova working group, Cornell University and Caltech (virtual presentation), 2025

6 "Rapid binary mass transfer: Circumbinary outflows and angular momentum losses"
ZTF Theory Network Meeting, Santa Margarita, CA, 2024

7 "Double WD binaries as probes of common envelope evolution and tidal physics"
ZTF Theory Network Meeting, Santa Margarita, CA, 2023

8 "The stability of mass transfer"
ARC (Astrophysics, Relativity, and Cosmology) seminar, Caltech, 2022

Skills

Coding	Python, C, C++, Java, Fortran 90, Bash, LaTeX
Software	PLUTO hydrodynamics code, MESA stellar evolutionary code, PROSPECTOR, dynesty, SLURM, MPI (OpenMPI), SAOImage Ds9, Git/GitHub
Misc.	Basic operation of a dilution refrigerator, alignment of laser optics, CCD analysis and data extraction

Teaching and Work Experience

2022	Teaching assistant, Physics of the Interstellar Medium, Caltech
2021	Teaching assistant, Cosmology, Caltech
2019	Undergraduate researcher, IBM Research facility at Yorktown Heights, for research in quantum computing
	Undergraduate researcher, Princeton University, Ultracold Quantum Gases Lab

Recent Awards

2025	Asset Manager on NSF ACCESS Allocation PHY240274
2024	Asset Manager on NSF ACCESS Allocation PHY240109