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, "Radiatively-Cooled Mass Transfer: Disk Properties and L2 outflows across Mass Transfer Rates", (in prep.)
2. P. Scherbak, A. Polin, M. Kasliwal, et al, "Delay time distributions from ZTF detections: A link between Ca-rich gap transients and 91bg-like supernovae", (in prep.)
3. P. Scherbak, W. Lu, and J. Fuller, "Rapid binary mass transfer: Circumbinary outflows and angular momentum losses", *The Astrophysical Journal*, 990, 172 (2025).
4. P. Scherbak and J. Fuller, "Ultrashort-period WD binaries are not undergoing strong tidal heating", *The Astrophysical Journal*, 962, 185 (2024).
5. P. Scherbak and J. Fuller, "White dwarf binaries suggest a common envelope efficiency $\alpha \sim 1/3$", *Monthly Notices of the Royal Astronomical Society*, 518, 3966 (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. "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

3. "Rapid binary mass transfer: Circumbinary outflows and angular momentum losses"
Princeton University paper discussion, 2025

4. "Rapid binary mass transfer: Circumbinary outflows and angular momentum losses"
Carnegie Observatories tea talk, Pasadena CA, 2025

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

6. "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

7. "Rapid binary mass transfer: Outflows and AM losses through L2"
ZTF Theory Network Meeting, Santa Margarita, CA, 2024

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

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

10. “Creation and Confinement of a Rubidium BEC in Preparation for Ultracold NaRb Formation” - QURIP presentation, Princeton Unversity, 2019

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 Research Experience

2022	Teaching assistant, Physics of the Interstellar Medium, Caltech
2021	Teaching assistant, Cosmology, Caltech
2020-2025	Graduate research assistant, Caltech
2019	Undergraduate researcher, IBM Research facility at Yorktown Heights - Quantum Computing
	Undergraduate researcher, Princeton University, Ultracold Quantum Gases Lab
2018-2020	Undergraduate researcher, Cornell, Radio Astronomy Group - Fast Radio Bursts

Awards and Honors

2025	PI on NSF ACCESS Allocation PHY250215 (1,500,000 core-hours)
2024-2025	Asset Manager on NSF ACCESS Allocation PHY240274 (500,000 core-hours)
	Asset Manager on NSF ACCESS Allocation PHY240109 (250,000 core-hours)
2020	Yervant Terzian Undergraduate Scholarship

Awards and Honors (continued)

2016-2020	Cornell University Dean's List
2016	National Merit Scholar