Hannah Klion

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Research Interests

Large-scale multiphysics simulations; computational fluid and particle methods; oceanic and other environmental flows; plasma astrophysics; GPU acceleration

Education

Ph.D. Physics, University of California, Berkeley — Aug 2021
Dissertation: *Monte Carlo Radiation Transport Simulations of Asymmetric Neutron Star Mergers*
M.A. Physics, University of California, Berkeley — May 2017
B.S. Physics, with Honor, California Institute of Technology — June 2015
Minor: Computer Science

Research Positions

Research Scientist, Center for Computational Science and Engineering, Lawrence Berkeley National Laboratory — 2024 – present
Postdoctoral Researcher, Center for Computational Science and Engineering, Lawrence Berkeley National Laboratory — 2021 – 2024
Graduate Student Researcher, UC Berkeley — 2020 – 2021
Physics Theory Graduate Fellow, UC Berkeley — 2019 – 2020
Department of Energy Computational Science Graduate Fellow, UC Berkeley — 2015 – 2019
DOE CSGF Practicum, Oak Ridge National Laboratory — Summer 2017
Robert L. Blinkenberg SURF, UC Berkeley (via Caltech SURF program) — Summer 2014
Robert L. Blinkenberg SURF, Caltech — Summer 2013
Undergraduate Researcher, Theoretical Astrophysics Group, Caltech — 2012 – 2015
LIGO Summer Undergraduate Research Fellowship, Caltech — Summer 2012

Awards

LBNL Director's Award for Scientific Achievement, with WarpX team — 2023
Rising Stars in Computational and Data Sciences — 2022
Department of Energy Computational Science Graduate Fellowship — 2015
UC Berkeley Physics Theory Fellowship — 2015
UC Berkeley Hellman Graduate Award *(declined)* — 2015

Publications (ADS, Google Scholar)

10. **H. Klion**, R. Hetland, J. Sexton, A. Almgren, I. Grindeanu, K. Hinson, V. Mahadevan (2025) *REMORA: Regional Modeling of Oceans Refined Adaptively (built on AMReX).* The Journal of Open Source Software, 10(100), 7958
9. R. Jambunathan, H. Jones, L. Corrales, **H. Klion**, M. E. Rowan, A. Myers, W. Zhang, J.-L. Vay (2025) *Application of mesh refinement to relativistic magnetic reconnection.* Journal of Plasma Physics, Volume 32, 013905
8. **H. Klion**, R. Jambunathan, M. E. Rowan, E. Yang, D. Willcox, J.-L. Vay, R. Lehe, A. Myers, A. Huebl, W. Zhang (2023) *Particle-in-Cell Simulations of Relativistic Magnetic Reconnection with Advanced Maxwell Solver Algorithms.* The Astrophysical Journal, Volume 952, Issue 1, Article ID 8.
7. **H. Klion**, A. Tchekhovskoy, D. Kasen, A. Kathirgamaraju, E. Quataert, R. Fernández (2022) *The impact of r-process heating on the dynamics of neutron star merger accretion disc winds and their electromagnetic radiation.* Monthly Notices of the Royal Astronomical Society, Volume 510, Issue 2, p. 2968.
6. **H. Klion**, P. Duffell, D. Kasen, E. Quataert (2021) *The Effects of Jet-Ejecta Interaction on 2D Kilonova Light Curves.* Monthly Notices of the Royal Astronomical Society, Volume 502, Issue 1, p. 865.

5. P. Duffell, E. Quataert, D. Kasen, **H. Klion** (2018) *Jet Dynamics in Compact Object Mergers: GW170817 Likely Had a Successful Jet.* The Astrophysical Journal, Volume 866, Issue 1, Article ID 3.
4. **H. Klion** and E. Quataert (2017) *A Diagnostic for Localizing Red Giant Differential Rotation.* Monthly Notices of the Royal Astronomical Society Letters, Volume 464, Issue 1, p. L16.
3. E. Quataert, R. Fernández, D. Kasen, **H. Klion**, B. Paxton (2016) *Super-Eddington Stellar Winds Driven by Near-Surface Energy Deposition.* Monthly Notices of the Royal Astronomical Society, Volume 458, Issue 2, p. 1214.
2. J. Fuller, **H. Klion**, E. Abdikamalov, C. D. Ott (2015), *Supernova seismology: gravitational wave signatures of rapidly rotating core collapse.* Monthly Notices of the Royal Astronomical Society, Volume 450, Issue 1, p. 414.
1. E. Abdikamalov, C. D. Ott, D. Radice, L. F. Roberts, R. Haas, C. Reisswig, P. Mösta, **H. Klion**, E. Schnetter (2015), *Neutrino-driven Turbulent Convection and Standing Accretion Shock Instability in Three-Dimensional Core-Collapse Supernovae.* The Astrophysical Journal, Volume 808, p. 70.

Presentations & Posters

Peer-Reviewed Poster

H. Klion, O. E. Bronson Messer, J. Austin Harris, Thomas Papatheodore (2017) *Optimizing Gravity and Nuclear Physics in FLASH for Exascale.* Extended abstract in *Proceedings of ACM SuperComputing 17, Denver Colorado, USA, November 2017 (SC'17).* 3 pages.

Invited Talks

Modeling and Simulation Seminar, Courant Institute, New York University	Oct 2024
Computer Science Summer Program Seminar, LBNL	July 2024
Center for Computational Science and Engineering Seminar, LBNL	Jan 2024
Computer Science Summer Program Seminar, LBNL	June 2022
Rising Stars in Computational and Data Sciences Workshop, Albuquerque, NM	Apr 2022
Physics and Astronomy Seminar, San Jose State University	Apr 2022
LBNL-LANL Collaboration Seminar, Berkeley, CA	Apr 2022
Center for Computational Science and Engineering Seminar, LBNL	June 2021
DOE CSGF Program Review, Arlington, VA	July 2019
KITP, UC Santa Barbara, ZTF Theory Network December Meeting	Dec 2018
KITP, UC Santa Barbara, ZTF Theory Network Summer Meeting	Aug 2018

Contributed Talks

APS Division of Plasma Physics Meeting, Denver, CO	Nov 2023
SIAM CSE, Amsterdam, Netherlands	Feb 2023
LBNL, Computing Sciences Area Postdoc Symposium	Feb 2023
APS Division of Plasma Physics Meeting, Spokane, WA	Sep 2022
LBNL, Computing Sciences Area Postdoc Symposium	Feb 2022
UC Berkeley, Astronomy Graduate Student and Postdoc Seminar	Dec 2019
Multi-Messenger Astrophysics in the Gravitational Wave Era, YITP, Kyoto	Sep 2019
Fifty-One Ergs, Raleigh, NC	May 2019
UC Berkeley, Astronomy Graduate Student and Postdoc Seminar	Nov 2017
UC Berkeley, Astronomy Lunch Seminar	Oct 2017
Theoretical Astrophysics in Southern California, San Diego, CA	Nov 2014

Teaching

Graduate Student Instructor, UC Berkeley Astronomy 160: Stellar Physics	Spring 2019
Teaching assistant, MESA Summer School, UC Santa Barbara	2018 & 2019

Service & Mentorship

Local Organizing Committee, SIAM Northern and Central California Regional Conference	2025
Review Committee, EMSL Large-Scale Research	2025
Applications Committee (Technical Paper Review), Supercomputing 25	2025

Co-Lead, LBNL Lambda Alliance Employee Activity Association 2023 – present
Mentor, LBNL Director's Apprenticeship Program Data Science Project 2022 – 2024
Co-mentor for SULI Intern Lizzette Corrales 2023
Event Organizer, LBNL Lambda Alliance Employee Activity Association 2021 – 2023
Facilitator, UC Berkeley Astronomy Antiracism Book Club 2020
Co-organizer, UC Berkeley Astronomy arXiv Discussion 2017 – 2019
Mentor, UC Berkeley LAGSES Fellowship Workshop Fall 2018
Mentor, UC Berkeley Compass Project 2016 – 2018

UC Berkeley Astronomy Educational Outreach

Outreach Coordinator 2018 – 2021

Responsibilities: Developed new virtual reality and Spanish-language outreach programming. Led planning and night-of operations for Astronomy Night. Coordinated K-12 school visits to the department. Assisted in organizing yearly large (>1000 visitor) outreach events.

Lead Organizer, Astronomy Night 2018 – 2020

Monthly public talk and stargazing event. Typical attendance was 100 – 200 students and community members.

Lead Organizer, UC Berkeley Astronomy Public Liaisons 2017 – 2018

Technical Skills

- Substantial experience with Python and C++
- Experience parallelizing applications with MPI, OpenMP, and the AMReX framework
- Familiar with C, Fortran, Mathematica, and Unix systems