

Logan J. Prust

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Research Interests

- Binary stellar interactions
- Bondi-Hoyle-Lyttleton accretion
- Computational fluid dynamics
- Moving-mesh hydrodynamics
- Supernova remnants

Employment

Kavli Institute for Theoretical Physics (KITP) **Santa Barbara, CA**
Postdoctoral Scholar Sept 2022 – Present
Supervisor: Lars Bildsten

Education

University of Wisconsin-Milwaukee (UWM) **Milwaukee, WI**
Ph.D. Physics Aug 2017 – May 2022
Adviser: Philip Chang
Thesis: *Simulating the Common Envelope Phase Using Moving-Mesh Hydrodynamics*

Iowa State University (ISU) **Ames, IA**
B.S. Aerospace Engineering Aug 2011 – Dec 2016
B.S. Physics
B.S. Mathematics
Minor in Astronomy
Magna cum laude

Research Experience

Graduate Research Assistant (UWM Dept. of Physics) **Milwaukee, WI**
• **Adviser:** Philip Chang May 2018 – May 2022
Undergraduate Research Assistant (ISU) **Ames, IA**
• **Adviser:** Amanda Weinstein May – Sept 2016
• **Adviser:** Marzia Rosati May – Aug 2014

Teaching Experience

Graduate Teaching Assistant (UWM Dept. of Physics)Milwaukee, WI

- Phys 720: Electrodynamics I (Grader) (Spring 2020)
- Phys 441: Introduction to Quantum Mechanics (Fall 2019)
- Physics Tutor (Fall 2019)
- Astron 103: Survey of Astronomy (Spring 2019)
- Phys 122: General Physics II, Non-Calculus Treatment (Fall 2017; Fall 2018)
- Phys 120: General Physics I, Non-Calculus Treatment (Spring 2018)

Undergraduate Teaching Assistant (ISU) Ames, IA

- Aer E 351: Astrodynamics I (Fall 2015; Spring 2016; Fall 2016)
- Aer E 192: Aerospace Seminar (Spring 2013)

Grader (ISU)..... Ames, IA

- Various courses, including Aer E 310: Aerodynamics I, EM 274: Engineering Statics, EM 324: Mechanics of Materials, and EM 345: Engineering Dynamics.

Awards and Distinctions

- Recipient of a UWM R1 Distinguished Dissertation Fellowship (2021-2022).
- Recipient of the Papastamatiou Scholarship for an outstanding graduate student in theoretical physics from the UWM Dept. of Physics (2021).
- Recipient of a UWM Distinguished Dissertation Fellowship (2020-2021).
- Recipient of a Wisconsin Space Grant Consortium Graduate & Professional Research Fellowship: Summer 2019; Summer 2020; Summer 2021.
- Recipient of a UWM Chancellor's Graduate Student Award: Fall 2017; Spring 2018; Fall 2018; Spring 2019; Fall 2019; Spring 2020; Fall 2020.
- Recipient of a Research Excellence Award, from the UWM Dept. of Physics: Fall 2017; Spring 2018; Fall 2018; Spring 2021.
- Induction into the Phi Beta Kappa National Honor Society (2015) at ISU.
- Recipient of the Jun Ye & Huiqing Wang Award for outstanding academic performance from the ISU Physics Dept. in both 2014 and 2015.

Student Mentoring

- **Hila Glanz (Grad Student, Technion)**
Co-authored a paper on Bondi-Hoyle accretion.
- **Joseph Farah (Grad Student, Las Cumbres Observatory)**
Co-authored a paper on radio interferometry of the SN 1993J remnant.
- **Gabriel Kumar (Undergrad, UCSB)**
Co-authoring a paper on radiation hydrodynamics of SN ejecta.
- **Kathlynn Simotas (Grad Student, UCSB)**
Mentored a project on D6 supernovae.
- **Sarah Villanova-Borges (Grad Student, UWM)**
Co-authored a paper on long-term evolution of CEE ejecta.

- **Vinaya Valsan (Grad Student, UWM)**
Co-authored a paper and developed analysis code for Vinaya's simulation output.
- **Sunny Wong (Grad Student, UCSB)**
Collaborate on double-degenerate type Ia supernovae.
- **Ronan Humphrey (Grad Student, UWM)**
Provide guidance on development of MANGA simulation code.
- **Alexandra Spaulding (Grad Student, UWM)**
Provided guidance on setting up MANGA to model tidal disruption events.

Other Service Work

- Postdoc Mentor for KITP Graduate Fellows (Fall 2024, Spring 2025)
- Code of Conduct Committee, N-Body Shop Collaboration (2023)

Presentations and Seminars

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| <i>Ejecta Wakes from Companion Interaction in Type Ia Supernova Remnants</i> | Jan 2025 |
| • Poster, AAS Winter Meeting (Oxon Hill, MD, USA) | |
| <i>A Birdwatcher's Guide to D6 Supernova Remnants</i> | Sept 2024 |
| • Invited talk, ZTF Theory Network Meeting (Santa Margarita, CA, USA) | |
| <i>Evolution of Ejecta Wakes in Supernova Remnants</i> | Aug 2024 |
| • Poster, Rise Time 2024 (West Lafayette, IN, USA) | |
| <i>Shock Waves in Asymmetrical Supernova Remnants</i> | July 2024 |
| • Seminar talk, Graduate Simulation Seminar Series GS ³ (Santa Barbara, CA, USA) | |
| <i>Reverse Shocks in D6 Supernovae</i> | June 2024 |
| • Invited talk, ZTF Theory Network Meeting: WD Detonations (Cambria, CA, USA) | |
| <i>Shock Trajectories in Asymmetrical Supernova Remnants</i> | May 2024 |
| • Blackboard talk, KITP Locals' Lunch (Santa Barbara, CA, USA) | |
| <i>Morphology and Entropy Dependence of Subsonic Bondi-Hoyle Accretion</i> | Oct 2023 |
| • Seminar talk, UCSB Astrophysics Theory Seminar (Santa Barbara, CA, USA) | |
| <i>Black Hole Accretion as a Nozzle Flow</i> | Oct 2023 |
| • Blackboard talk, KITP Locals' Lunch (Santa Barbara, CA, USA) | |
| <i>Flow Morphology in Planetary Engulfment Events</i> | Sept 2023 |
| • Invited talk, ZTF Theory Network Meeting (Santa Margarita, CA, USA) | |
| <i>Hydrodynamical Simulation Techniques in Astrophysics</i> | Aug 2023 |
| • Seminar talk, Graduate Simulation Seminar Series GS ³ (Santa Barbara, CA, USA) | |
| <i>Flow Morphology in Planetary Engulfment Events</i> | July 2023 |
| • ePoster, EAS Annual Meeting 2023 (Krakow, Poland) | |
| <i>Managing Friction in Planet-Star Relationships</i> | May 2023 |
| • Seminar talk, UCSB Astrophysics Theory Seminar (Santa Barbara, CA, USA) | |
| <i>Planetary Engulfment in Athena++</i> | May 2023 |
| • Session talk, Flatiron Athena++ Workshop (New York, NY, USA) | |
| <i>Flow Morphology of a Supersonic Gravitating Sphere</i> | Apr 2023 |
| • Blackboard talk, KITP Locals' Lunch (Santa Barbara, CA, USA) | |

<i>Flow Morphology in Post-Main Sequence Planetary Engulfment</i>	Apr 2023
• Seminar talk, UCSB Astro Lunch (Santa Barbara, CA, USA)	
<i>Long-Term Evolution in Simulations of the Common Envelope Phase</i>	Sept 2022
• Invited talk, ZTF Theory Network Meeting (Santa Margarita, CA, USA)	
<i>Modeling Common Envelopes on a Moving Mesh</i>	Sept 2022
• Blackboard talk, KITP Locals' Lunch (Santa Barbara, CA, USA)	
<i>Simulating the Common Envelope Phase on a Moving Mesh</i>	Jun 2022
• Session talk, Flatiron N-Body Workshop (New York, NY, USA)	
<i>New Physics in Simulations of the Common Envelope Phase</i>	Nov 2021
• Session talk, 2021 Midwest Relativity Meeting (Champaign, IL, USA)	
<i>Moving Boundary Conditions in Common Envelope Evolution</i>	Aug 2021
• Contributed talk, Common Envelope Physics and Outcomes (Virtual)	
<i>Simulating Common Envelope Evolution on a Moving Mesh</i>	Aug 2021
• Invited talk, Wisconsin Space Conference 2021 (Milwaukee, WI, USA)	
<i>Moving and Reactive Boundary Conditions on a Moving Mesh</i>	Jan 2021
• Contributed talk, N-Body Shop Excellence Conference (Virtual)	
<i>Moving Boundary Conditions in Common Envelope Evolution</i>	Oct 2020
• Session talk, 2020 Midwest Relativity Meeting (Notre Dame, IN, USA)	
<i>Simulating the CE Phase Using Moving-Mesh Hydrodynamics</i>	Jul 2020
• Contributed talk, EAS Annual Meeting 2020 (Leiden, Netherlands)	
<i>Moving-Mesh Hydrodynamics Using MANGA</i>	Dec 2019
• Seminar talk, CGCA Seminar Series (Milwaukee, WI, USA)	
<i>Simulating the Common Envelope Phase in Binary Stars</i>	Aug 2019
• Invited talk, Wisconsin Space Conference 2019 (Platteville, WI, USA)	
<i>CEE on a Moving Mesh with MANGA</i>	May 2019
• Invited talk, Flatiron CEE Workshop (New York, NY, USA)	
<i>Common Envelope Evolution on a Moving Mesh</i>	Oct 2018
• Session talk, 2018 Midwest Relativity Meeting (Milwaukee, WI, USA)	

Other Workshops Attended

<i>Stellar Interactions and the Transients They Cause</i>	July 2023
• Aspen Center for Physics (Aspen, CO, USA)	
<i>Physics and Astrophysics of Common Envelopes (PACE)</i>	May 2022
• Los Alamos National Laboratory (Los Alamos, NM, USA)	
<i>MESA Summer School</i>	Aug 2019
• UC Santa Barbara (Santa Barbara, CA, USA)	
<i>Various KITP Programs</i>	2022 – 2024
• Kavli Institute for Theoretical Physics (Santa Barbara, CA, USA)	

Refereed Publications

1. "Morphology and Entropy Dependence of Subsonic Bondi-Hoyle Accretion." **Logan Prust**, Hila Glanz, Lars Bildsten, Hagai Perets, Fritz Röpke. 2024, *The Astrophysical Journal*, Volume 966, Issue 1, id.103, 11 pp.
2. "Flow Morphology of a Supersonic Gravitating Sphere." **Logan Prust**, Lars Bildsten. 2024, *Monthly Notices of the Royal Astronomical Society*, 527, 2869-2886.
3. "Envelope Ejection and the Transition to Homologous Expansion in Common-Envelope Events." Vinaya Valsan, Sarah Villanova-Borges, **Logan Prust**, Philip Chang. 2023, *Monthly Notices of the Royal Astronomical Society*, 526, 5365-5373.
4. "The Role of Radiation in Common Envelope Evolution." **Logan Prust**. 2022, *Proceedings of the Wisconsin Space Conference*, doi: 10.17307/wsc.v1i1.346.
5. "Moving Boundary Conditions in Common Envelope Evolution." **Logan Prust**. 2022, *Proceedings of the Wisconsin Space Conference*, doi: 10.17307/wsc.v1i1.327.
6. "Moving and Reactive Boundary Conditions in Moving-Mesh Hydrodynamics." **Logan Prust**. 2020, *Monthly Notices of the Royal Astronomical Society*, 494, 4616-4626.
7. "Common Envelope Evolution on a Moving Mesh." **Logan Prust**. 2020, *Proceedings of the Wisconsin Space Conference*, doi: 10.17307/wsc.v1i1.306.
8. "Common Envelope Evolution on a Moving Mesh." **Logan Prust** & Philip Chang. 2019, *Monthly Notices of the Royal Astronomical Society*, 486, 5809-5818.

Non-Refereed Publications

1. "Ejecta Wakes from Companion Interaction in Type Ia Supernova Remnants." **Logan Prust**, Gabriel Kumar, Lars Bildsten. Submitted to *The Astrophysical Journal*.
2. "Progenitor Constraints via Early-time Observations of Type IIb SN 2022hnt Shock Cooling Emission." J. Farah, D. A. Howell, G. Terreran, I. Irani, J. Morag, C. Pellegrino, C. McCully, M. Newsome, E. P. Gonzalez, A. Boestrom, G. Hosseinzadeh, M. Andrews, **L. Prust**, D Hiramatsu. Submitted to *The Astrophysical Journal*.
3. "The Effect of Hydrodynamic Forces on Common Envelope Evolution." **Logan Prust**. Submitted to *Monthly Notices of the Royal Astronomical Society*.
4. "Robust Geometric Modeling of the Supernova 1993J Ejecta at Radio Wavelengths." Joseph Farah, Giacomo Terreran, D. Andrew Howell, Michael Bietenholz, Norbert Bartel, **Logan Prust**, Curtis McCully, Lars Bildsten, Michael Johnson. In preparation.