### 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	g-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)

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• 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 Supervision**

- 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 Fellow, 2024
- Code of Conduct Committee, N-Body Shop Collaboration, 2023

#### **Presentations and Seminars**

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

Long-Term Evolution in Simulations of the Common Envelope Phase	Sept 2022
<ul> <li>Invited talk, ZTF Theory Network Meeting (Santa Margarita, CA, USA)</li> </ul>	
Modeling Common Envelopes on a Moving Mesh	Sept 2022
<ul> <li>Blackboard talk, KITP Locals' Lunch (Santa Barbara, CA, USA)</li> </ul>	
Simulating the Common Envelope Phase on a Moving Mesh	Jun 2022
<ul> <li>Session talk, Flatiron N-Body Workshop (New York, NY, USA)</li> </ul>	
New Physics in Simulations of the Common Envelope Phase	Nov 2021
<ul> <li>Session talk, 2021 Midwest Relativity Meeting (Champaign, IL, USA)</li> </ul>	
Moving Boundary Conditions in Common Envelope Evolution	Aug 2021
<ul> <li>Contributed talk, Common Envelope Physics and Outcomes (Virtual)</li> </ul>	
Simulating Common Envelope Evolution on a Moving Mesh	Aug 2021
<ul> <li>Invited talk, Wisconsin Space Conference 2021 (Milwaukee, WI, USA)</li> </ul>	
Moving and Reactive Boundary Conditions on a Moving Mesh	Jan 2021
<ul> <li>Contributed talk, N-Body Shop Excellence Conference (Virtual)</li> </ul>	
Moving Boundary Conditions in Common Envelope Evolution	Oct 2020
<ul> <li>Session talk, 2020 Midwest Relativity Meeting (Notre Dame, IN, USA)</li> </ul>	
Simulating the CE Phase Using Moving-Mesh Hydrodynamics	Jul 2020
<ul> <li>Contributed talk, EAS Annual Meeting 2020 (Leiden, Netherlands)</li> </ul>	
Moving-Mesh Hydrodynamics Using MANGA	Dec 2019
<ul> <li>Seminar talk, CGCA Seminar Series (Milwaukee, WI, USA)</li> </ul>	
Simulating the Common Envelope Phase in Binary Stars	Aug 2019
<ul> <li>Invited talk, Wisconsin Space Conference 2019 (Platteville, WI, USA)</li> </ul>	
CEE on a Moving Mesh with MANGA	May 2019
<ul> <li>Invited talk, Flatiron CEE Workshop (New York, NY, USA)</li> </ul>	
Common Envelope Evolution on a Moving Mesh	Oct 2018
<ul> <li>Session talk, 2018 Midwest Relativity Meeting (Milwaukee, WI, USA)</li> </ul>	
Other Workshops Attended	
Stellar Interactions and the Transients They Cause	July 2023
<ul> <li>Aspen Center for Physics (Aspen, CO, USA)</li> </ul>	
Physics and Astrophysics of Common Envelopes (PACE)	May 2022
<ul> <li>Los Alamos National Laboratory (Los Alamos, NM, USA)</li> </ul>	
MESA Summer School	Aug 2019
<ul> <li>UC Santa Barbara (Santa Barbara, CA, USA)</li> </ul>	
Various KITP Programs	2022 - 2024
<ul> <li>Kavli Institute for Theoretical Physics (Santa Barbara, CA, USA)</li> </ul>	

#### **Refereed Publications**

- "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. In preparation.
- 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.