

# Abigail Polin, PhD

Purdue University  
Physics & Astronomy  
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As a theoretical astrophysicist I employ a combination of analytic, numerical and high-performance computing techniques to study the physics driving astrophysical explosions and I specialize in connecting that theory to observed transient phenomena.

## EDUCATION

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<b>Ph.D. in Physics</b> University of California, Berkeley Advisors: Peter Nugent & Daniel Kasen Thesis: <i>Pushing the Helium Envelope: Signatures of Normal and Unusual Supernovae from Sub-Chandrasekhar Mass White Dwarf Explosions</i>	May 2020
<b>M.S. in Physics</b> University of California, Berkeley	May 2015
<b>B.S. in Physics</b> New York University	December 2012

## APPOINTMENTS

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<b>Assistant Professor</b> Purdue University Department of Physics and Astronomy	2024-Present
<b>Joint Postdoctoral Research Fellow</b> Carnegie Fellowship, Carnegie Observatories Burke Fellowship in Theoretical Physics, Caltech	2020-2024
<b>NSF Graduate Research Fellow</b> University of California, Berkeley	2015-2020

## FELLOWSHIPS & AWARDS

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Scialog Fellow: Early Science with the LSST	2024
<b>NERSC Early Career Award: High Impact Scientific Achievement</b>	2021
Burke Fellowship in Theoretical Physics, Caltech	2020-2024
Carnegie Fellowship, Carnegie Observatories	2020-2024
– GRAD NSF Graduate Research Fellowship	2015-2020
– Wonderfest Science Envoy	2019-2020
– Berkeley Connect Fellowship	2014-2016
– Outstanding Graduate Student Instructor Award, UC Berkeley	2014

GRANT FUNDING

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**Royal Society International Exchange Grant** 2022

Co-PIed with Chris Frohmier, PhD – University of Southampton

*“Helium-shell white dwarf explosions leading to unusual transient phenomena”*

Awarded £5,707.37

COMPUTING GRANTS (PI-ED)

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**National Energy Research Scientific Computing Center (NERSC):**

ERCAP 2022:

Perlmutter GPUs ..... 15,000 node-hours

Cori KNL CPUs ..... 1,156,000 core-hours

**NERSC Early Career Award 2021:** Early Access to the Perlmutter GPU Supercomputer**NSF Extreme Science and Engineering Discovery Environment (XSEDE):**

XRAC 2021: Stampede2 CPUs ..... 3,060,000 core-hours

Startup Allocation: Stampede2 CPUs ..... 108,800 core-hours

**DOE INCITE Leadership Computing Award 2023-2025 (co-PI):**

Oak Ridge National Laboratory, Summit GPUs ..... 400,000 node-hours

Oak Ridge National Laboratory, Frontier CPUs ..... 300,000 node-hours

Argonne National Laboratory, Polaris GPUs ..... 100,000 node-hours

AWARDED TELESCOPE TIME (PI-ED)

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**Gemini Observatory – Gemini/Subaru Exchange:**

Subaru telescope

— FOCUS Spectrograph ..... 0.5 hours ToO (2025A)

**W. M. Keck Observatory:**

Keck II: 10m telescope

— KCWI Integral Field Spectrographs ..... 4 half nights (2024B)

**Las Campanas Observatory:**

Magellan: Baade 6.5m telescope

— IMACS Optical &amp; FIRE NIR Spectrographs ..... 28 nights (2022A-2024B)

Magellan: Clay 6.5m telescope

— LDSS3 Optical Spectrograph ..... 2 nights (2021B)

## INVITED TALKS &amp; CONFERENCE PROCEEDINGS:

COLLOQUIA	University of Minnesota, Institute for Astrophysics Colloquium	Feb 2025
	Indiana University, Department of Astronomy Colloquium	Jan 2025
	University of Chicago Astronomy Colloquium	Nov 2024
	Purdue University Physics & Astronomy Colloquium	Oct 2024
	Carnegie Observatories Astronomy Colloquium	May 2024
	University of Virginia & NRAO Joint Colloquium	May 2024
	University of Hawai'i Institute for Astronomy Colloquium	Feb 2023
	University of Delaware, Physics and Astronomy Colloquium	Oct 2022
Haverford College, Physics and Astronomy Colloquium	Sept 2019	
SEMINARS	Institute for Advanced Study Astrophysics Seminar	Apr 2024
	Michigan State University Astronomy Seminar	Nov 2023
	Lawrence Berkeley National Lab, NERSC Awards Seminar Series	Nov 2021
	UC Davis, Physics & Astronomy Seminar	Apr 2021
	Purdue University, Astronomy Seminar	Feb 2021
	Florida State University, Astronomy Seminar	Nov 2020
	Stony Brook University, Astronomy Seminar	Oct 2020
	Harvard University, Galaxy and Cosmology Seminar	Dec 2019
	Northwestern University, Observational Astronomy Seminar	Nov 2019
	UC Santa Barbara, Astronomy Lunch Talk	Nov 2019
	UC Santa Cruz, Astronomy FLASH Talk	Oct 2019
	Caltech, Astronomy Tea Talk	Oct 2019
	Carnegie Observatories, Lunch Talk	Oct 2019
	New York University, CCPP Astrophysics Seminar	May 2017
University of Wisconsin, Milwaukee, Astronomy Seminar	Mar 2013	
INVITED	Stars With Lars: Bildsten's 60th Conference	Feb 2024
	SNEX: Supernova Explosions Conference - Technion	Aug 2023
	SuperVirtual 2022 - From Common to Exotic Transients	Nov 2022
	Chandra Workshop: Supernova Remnants and Their Progenitors	Aug 2022
	NBIA Workshop Radiation Transfer in Astrophysics, Niels Bohr Institute	June 2022
	Texas A&M, Cook's Branch Supernova Workshop	Mar 2019
	UC Santa Cruz, Pre-Filippenkopalooza Supernovae Meeting	Aug 2018
	KITP, UC Santa Barbara, ZTF Theory Network Summer Meeting	Aug 2018
Weizmann Institute of Science, Particle Physics and Astrophysics Workshop	Dec 2017	
CONTRIBUTED	Transients Down Under, Melbourne, Australia	Feb 2024
	Cosmic Streams in the Era of Rubin, Puerto Varas, Chile	Dec 2023
	KITP White Dwarfs Conference, Santa Barbara, CA	Nov 2022
	NASA TDAMM Workshop, Anapolis, MD	Aug 2022
	AAS Dissertation Talk, Winter Meeting, Honolulu, HI	Jan 2020
	Midwest Workshop on Supernovae and Transients, Ohio State	Sept 2019
	The Beginnings and Ends of Double White Dwarfs, DARK, Copenhagen	July 2019
	UC Berkeley, Theoretical Astrophysics Seminar	Jan 2018
	Supernovae: The LSST Revolution Workshop, Northwestern	May 2017
	APS March Meeting, Houston TX	Mar 2011

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 MENTORSHIP: ADVISING STUDENT RESEARCH
 

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\* denotes students for whom A. Polin was the primary advisor

## GRADUATE STUDENTS

Tess Hoover\* (Purdue, Current Grad Student)  
 Miranda Pikus\* (Purdue, Current Grad Student)  
 Soham Mandal (Purdue Grad Student now UVA Postdoc)  
 Peter Scherbak (Caltech, Current Grad Student)  
 Margot Fitz Axen (UT Austin, DOE CSGF Fellow)

## UNDERGRADUATE STUDENTS

Roy Galazka\* (Current Purdue Undergraduate)  
 Akshith Karri\* (Current Purdue Undergraduate)  
 Owen Odney\* (Current Purdue Undergraduate)  
 Desiree Harvell\* (CASSI Summer Student: California State University, San Bernardino)  
 Siddharth Boyeneni\* (Caltech SURF: Caltech)  
 Hayden Campos\* (CASSI Summer Student: Dartmouth)  
 Wynn Jacobson-Galán (UCSC, now Caltech Postdoc)

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 TEACHING EXPERIENCE
 

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<b>Outstanding Graduate Student Instructor Award</b> (UC Berkeley)	2014
PROFESSOR OF RECORD (Purdue University)	
Physics 560: Stellar Evolution	Spring 2025
Physics 567: Observational Astronomy	Fall 2024
ADJUNCT INSTRUCTOR (UC Berkeley)	
Astro 9: Introduction to Scientific Computing	Summer 2020
<i>Sole Instructor: in charge of syllabus, course design and instruction</i>	
HEAD GRADUATE STUDENT INSTRUCTOR (UC Berkeley)	
Physics 7A: Introductory Mechanics	Spring 2014
GRADUATE STUDENT INSTRUCTOR (UC Berkeley)	
Astro C10: Introduction to General Astronomy	Fall 2019
Astro 7A: Introduction to Astrophysics	Fall 2017
Astro 250: Introduction to High Performance Computing	Spring 2017
Physics 7A: Introductory Mechanics	Fall 2013
ADJUNCT INSTRUCTOR (New York University)	
Observational Astronomy	Spring 2013
UC BERKELEY TEACHING CONFERENCE	
Developer and instructor of a mandatory workshop for first time graduate student instructors	Fall 2014
COURSEWORK IN TEACHING DEVELOPMENT (UC Berkeley)	
Physics 198: Progressive Physics Education	Spring 2015
Physics 198: Physics Pedagogy Seminar	Spring 2014
Physics 375: Professional Preparation in Teaching Physics	Fall 2013

LEADERSHIP, OUTREACH & SERVICE

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## PUBLIC &amp; OUTREACH TALKS

The Astrophysics Podcast – Guest host	Jan 2025
Astronomy on Tap, Cradle of Astronauts, Lafayette IN	Dec 2024
The Astrophysics Podcast	Jan 2024
Carnegie Astronomy Lecture Series, Huntington Library, Pasadena CA	May 2023
AAS Journal Author Series	Jan 2023
Astronomy on Tap, Pasadena CA	Oct 2022
Radio Interview: Women in STEM w/ KPOO-FM	Mar 2020
Wonderfest Science Envoy Speaks at the Verdi Club, San Francisco, CA	Feb 2020
Berkeley Art Museum and Pacific Film Archive, Berkeley, CA	Nov 2018

## LEADERSHIP &amp; SERVICE POSITIONS

Faculty Advisor to Undergraduate Gender Minorities in Physics Purdue University	2024-present
Faculty organizer, panelist, and Member of the LOC APS Conference for Undergraduate Gender Minorities in Physics (CU*iP) Purdue University, West Lafayette, IN	Jan 2025
Conference Scientific Organizing Committee:	
Rise Time: Explosive Astrophysics in the Era of High-Cadence Astronomy Purdue University, West Lafayette, IN	Aug 2024
SNEX: Supernova Explosions Conference Technion, Haifa, Israel	Aug 2023
Instructor: Physics Inside Out, Purdue University A program designed work with local 7th and 8th grade students to get them excited about STEM.	2024
Carnegie Postdoc Representative	2021-2023
Caltech TAPIR Seminar Organizer	2021-2023
CASSI Science Mentor CASSI is a 10 week internship and educational program at Carnegie designed to improve undergraduate students' fluency with research and communication.	2021-2022
Wonderfest Science Envoy A program funded by the Gordon and Betty Moore Foundation that identifies PhD students who show particular science-popularization promise. The program helps us to develop the subtle art and science of public outreach.	2019-2020
UC Berkeley Society for Women in the Physical Sciences:	

Astronomy Coordinator Fall 2015 - Spring 2019  
 Mentoring Coordinator Fall 2014 - Spring 2016  
 Individually in charge of running our multi-tiered mentorship program which included over 200 students, postdocs and faculty members in Physics, Astronomy, Earth and Planetary Sciences and Biophysics at UC Berkeley.

Berkeley Connect Fellow Fall 2014 - Spring 2017  
 Berkeley Connect is a teaching and mentorship program intended to strengthen the relationship between undergraduate students and the Physics Department. As a Fellow, I contributed to curriculum design, led class meetings, and mentored students.

Respect is Part of Research: Founding Member and Peer Facilitator 2014 - 2016  
 RPR is a graduate student group that runs annual peer-led sexual assault and sexual harassment prevention workshops for incoming first-year graduate students. RPR's primary mission is to create a respectful, positive working environment where everyone can do their best science.

Compass Program Organizer/Instructor/Research Mentor Summer 2014  
 The Berkeley Compass Project is a Physics graduate student-run organization that aims to improve the experiences of undergraduate students from under-represented groups interested in STEM.

Anonymous Peer Reviewer for: Nature Astronomy, ApJ, ApJL & MNRAS

## PUBLICATIONS

[\[ADS LINK\]](#)

SUMMARY: 37 journal articles, 3 as first author, 7 identifying supernovae belonging to a newly discovered class of transients, which matched our modeled theoretical predictions.

1. *Using Anisotropies as a Forensic Tool for Decoding Supernova Remnants*  
**Polin, A.**, P. Duffell, and D. Milisavljevic  
 The Astrophysical Journal Letters, 940, L28, (2022).
2. *Nebular Models of Sub-Chandrasekhar Mass Type Ia Supernovae: Clues to the Origin of Ca-rich Transients*  
**Polin, A.**, P. Nugent, and D. Kasen  
 The Astrophysical Journal, 906, 65 (2021).
3. *Observational Predictions for Sub-Chandrasekhar Mass Explosions: Further Evidence for Multiple Progenitor Systems for Type Ia Supernovae*  
**Polin, A.**, P. Nugent, and D. Kasen  
 The Astrophysical Journal, 873, 84 (2019).
4. *SN 2023xwi: Forbidden line emission in the peak spectrum of a Ca-strong transient*  
 Touchard-Paxton, C.G., C.Frohmaier, M. Pursiainen, M. Sullivan, **A.Polin** and 4 colleagues.  
 Monthly Notices of the Royal Astronomical Society, *accepted and in press* (2025).
5. *Near-infrared spectroscopy of the LMC recurrent nova LMCN 1968-12a*  
 Evans, A., Banerjee, D. P. K., Geballe, T. R., **Polin, A.**, and 4 colleagues  
 Monthly Notices of the Royal Astronomical Society, 536, 2 (2025).

6. *Expansion Properties of the Young Supernova Type Ia Remnant Pa 30 Revealed*  
Cunningham, T. and 16 colleagues including **A. Polin**  
The Astrophysical Journal Letters, 975, 1 (2024).
7. *Characterizing the Rapid Hydrogen Disappearance in SN 2022crv: Evidence of a Continuum between Type Ib and IIb Supernova Properties*  
Dong, Y., and 54 colleagues including **A. Polin**  
The Astrophysical Journal, 974, 2, (2024).
8. *Measurement of Anisotropies in Supernova Remnant Observations and Their Interpretation Using Numerical Models* Mandal, S., P. Duffell, **A. Polin** and D. Milisavljevic.  
The Astrophysical Journal, 972, 1, (2024).
9. *1991T-like Supernovae*  
Phillips, M. and 25 colleagues including **A. Polin**  
The Astrophysical Journal Supplement Series, 273, 1 (2024).
10. *Discovery and follow-up of ASASSN-23bd (AT 2023clx): the lowest redshift and luminosity optically selected tidal disruption event*  
Hoogendam, W. B. and 25 colleagues including **A. Polin**  
Monthly Notices of the Royal Astronomical Society, 530, 4 (2024).
11. *Sensitivity of Simulations of Double Detonation Type Ia Supernova to Integration Methodology*  
Zingale, M., Z. Chen, M. Rasmussen, **A. Polin**, M. Katz, A. Smith Clark, and E. Johnson.  
The Astrophysical Journal, 966, 2 (2024).
12. *Ground-based and JWST Observations of SN 2022pul: II. Evidence from Nebular Spectroscopy for a Violent Merger in a Peculiar Type-Ia Supernova*  
Kwok, L., and 80 colleagues including **A. Polin**.  
The Astrophysical Journal, 966, 1 (2024).
13. *Ground-based and JWST Observations of SN 2022pul: I. Unusual Signatures of Carbon, Oxygen, and Circumstellar Interaction in a Peculiar Type Ia Supernova*  
Siebert, M. and 81 colleagues including **A. Polin**.  
The Astrophysical Journal, 960, 1, (2024).
14. *Flight of the Bumblebee: the Early Excess Flux of Type Ia Supernova 2023bee revealed by TESS, Swift and Young Supernova Experiment Observations*  
Wang, Q. and 43 colleagues including **A. Polin**.  
The Astrophysical Journal, 962, 1 (2024).
15. *Strong Carbon Features and a Red Early Color in the Underluminous Type Ia SN 2022xkq*  
Pearson J., and 87 colleagues including **A. Polin**.  
The Astrophysical Journal, 960, 1 (2024).
16. *Extreme Nuclear Transients Resulting from the Tidal Disruption of Intermediate Mass Stars*  
Hinkle, J., B. Shappee, K. Auchettl, C. Kochanek, J. Neustadt, **A. Polin** and 9 colleagues.  
arXiv:2405.08855. *submitted to Science Advances* (2024).
17. *The Host Galaxies of High Velocity Type Ia Supernovae*  
Nugent, A., **A. Polin**, and P. Nugent.  
arXiv:2304.10601 (2024).

18. *Sculpting the Morphology of Supernova Remnant Pa 30 via Efficient Ejecta Cooling*  
Duffell, P., **A. Polin**, and S. Mandal  
arXiv:2403.13641. (2024).
19. *Probing the Low-mass End of Core-collapse Supernovae Using a Sample of Strongly-stripped Calcium-rich Type IIb Supernovae from the Zwicky Transient Facility.*  
Das, K. and 28 colleagues including **A. Polin**.  
The Astrophysical Journal, 959, 1, (2023).
20. *A 3D Numerical Study of Anisotropies in Supernova Remnants*  
Mandal, S., P. Duffell, **A. Polin** and D. Milisavljevic.  
The Astrophysical Journal, 956, 2, (2023).
21. *SN 2021gno: a calcium-rich transient with double-peaked light curves*  
Ertini, K. and 54 colleagues including **A. Polin**.  
MNRAS, 526, 279, (2023).
22. *SN 2020jgb: A Peculiar Type Ia Supernova Triggered by a Massive Helium-Shell Detonation in a Star-Forming Galaxy*  
Liu, C., A. Miller, **A. Polin**, and 25 colleagues.  
The Astrophysical Journal, 946, 83, (2023).
23. *Fast and Not-so-Furious: Case Study of the Fast and Faint Type IIb SN 2021brx*  
Desai, D., and 38 colleagues including **A. Polin**.  
MNRAS, 524, 767 (2023).
24. *SN 2021zny: an early flux excess combined with late-time oxygen emission suggests a double white dwarf merger event*  
Dimitriadis, G., and 30 colleagues including **A. Polin**.  
MNRAS, 521, 1. (2023).
25. *The origin and evolution of the normal Type Ia SN 2018aoz with infant-phase reddening and excess emission*  
Qi Ni, Y., D. Moon, M. Drout, **A. Polin**, and 40 colleagues  
The Astrophysical Journal, 946, 7 (2023).
26. *SN 2016dsg: A Thermonuclear Explosion Involving a Thick Helium Shell*  
Dong, Y., S. Valenti, **A. Polin**, and 29 colleagues.  
The Astrophysical Journal, 934, 2, (2022).
27. *The Absolute Magnitudes of 1991T-like Supernovae*  
Phillips, M., and 22 colleagues including **A. Polin**.  
The Astrophysical Journal, 938, 47, (2022).
28. *Physical Properties of the Host Galaxies of Ca-rich Transients*  
Dong, Y., D. Milisavljevic, and 9 colleagues, including **A. Polin**  
The Astrophysical Journal, 927, 2, (2022).
29. *Infant-phase Reddening by Surface Fe-peak Elements in a Normal Type Ia Supernova*  
Qi Ni, Y., D. Moon, M. Drout, **A. Polin**, and 40 colleagues  
**Nature Astronomy, cover article** February, (2022).



30. *The Zwicky Transient Facility Census of the Local Universe I: Systematic search for Calcium rich gap transients reveal three related spectroscopic sub-classes*  
De, Kishalay, and 49 colleagues including **A. Polin**  
The Astrophysical Journal, 905, 58 (2020).
31. *ZTF Early Observations of Type Ia Supernovae. III. Early-time Colors As a Test for Explosion Models and Multiple Populations*  
Bulla, M. and 24 colleagues including **A. Polin**  
The Astrophysical Journal, 902, 1, 48 (2020).
32. *Strong Calcium Emission Indicates that the Ultraviolet-flashing SN Ia 2019yvq Was the Result of a Sub-Chandrasekhar Mass Double-detonation Explosion*  
Siebert, M. R.; G. Dimitriadis, **A. Polin**, and R. J. Foley  
The Astrophysical Journal Letters, 900, 2, L27, (2020).
33. *The Spectacular Ultraviolet Flash from the Peculiar Type Ia Supernova 2019yvq*  
Miller, A. A., M. R. Magee, **A. Polin**, and 42 colleagues  
The Astrophysical Journal, 898, 1, 56 (2020).
34. *Ca hnk: The Calcium-rich Transient Supernova 2016hnk from a Helium Shell Detonation of a Sub-Chandrasekhar White Dwarf*  
Jacobson-Galán, W., **A. Polin**, R. J. Foley, and 11 colleagues  
The Astrophysical Journal, 896, 2, 165 (2020).
35. *ZTF 18aaqasu (SN 2018byg): A Massive Helium-shell Double Detonation on a Sub-Chandrasekhar Mass White Dwarf*  
De, K., M. Kasliwal, **A. Polin**, and 27 colleagues  
The Astrophysical Journal Letters, 873, L18 (2019).
36. *K2 Observations of SN 2018oh Reveal a Two-Component Rising Light Curve for a Type Ia Supernova*  
Dimitriadis G., R. J. Foley, A. Rest, D. Kasen, A. L. Piro, **A. Polin**, and 144 colleagues  
The Astrophysical Journal Letters, 870L, 1D (2019).
37. *Gravitational Wave Hotspots: Ranking Potential Locations of Single-Source Gravitational Wave Emission*  
Simon J., **A. Polin**, A. Lommen, B. Stappers, L.S. Finn, F. Jenet and B. Christy  
The Astrophysical Journal, 784, 60 (2014).