

Chang Liu

TIME-DOMAIN ASTRONOMER

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Education

PHD CANDIDATE Department of Physics and Astronomy, Northwestern University

Sep 2021 –

- Advisor: Adam A. Miller

MASTER OF SCIENCE Department of Physics and Astronomy, Northwestern University

Sep 2021 – Jun 2023

BACHELOR OF SCIENCE (HON) Department of Astronomy, Peking University

Sep 2016 – Jun 2020

- Thesis: *The Hydrodynamics of Binary Mass Transfer in Compact Binaries*
- Advisors: Enrico Ramirez-Ruiz & Xian Chen

Research Interests

- Leverage advanced statistical and machine learning methods to reveal correlations and population-level signatures in vast time-domain survey datasets (e.g., ZTF, LS4, LSST) connecting transients to their origins.
- Constrain supernova progenitor demographics via simulation-based inference using early and late-time observations.
- Build open-source tools for efficient and reproducible astronomical data processing and analysis.
- Simulate repeating tidal disruption events with hydrodynamical methods to probe extreme transients.

Skills

Astronomy Transient follow-up, spectroscopic observations and data reduction

Data Science Hierarchical Bayesian modeling, Gaussian processes, gradient boosting

Programming **Proficient:** Python **Experienced:** Shell, Fortran, SQL

- HostSub_GP (**developer**): removing host galaxy background in transient spectroscopy

Softwares • BayeSpecFit (**developer**): fitting blended supernova spectroscopic features with Bayesian inference

- Pypeit: optical/NIR spectrum reduction

Publications

7 first-author papers out of 25 publications

- **C. Liu**, A. A. Miller., HostSub_GP: Precise Galaxy Background Subtraction in Transient Spectroscopy with Gaussian Processes, *arXiv: 2508.15278*.
- **C. Liu**, A. A. Miller, J. S. Bloom, et al., A Morphological Model to Separate Resolved–Unresolved Sources in the DESI Legacy Surveys: Application in the LS4 Alert Stream, 2025, *PASP*, 137, 084501.
- **C. Liu**, R. Yarza, & E. Ramirez-Ruiz., Repeating Partial Tidal Encounters of Sun-like Stars Leading to their Complete Disruption, 2025, *ApJ*, 979, 40.
- **C. Liu**, A. A. Miller, S. J. Boos, et al., SN 2022joj: A Peculiar Type Ia Supernova Possibly Driven by an Asymmetric Helium-shell Double Detonation, 2023, *ApJ*, 958, 178.
- **C. Liu**, A. A. Miller, A. Polin, et al., SN 2020jgb: A Peculiar Type Ia Supernova Triggered by a Helium-Shell Detonation in a Star-Forming Galaxy, 2023, *ApJ*, 946, 83.
- **C. Liu**, B. Mockler, E. Ramirez-Ruiz, et al., Tidal Disruption Events from Eccentric Orbits and Lessons Learned from the Noteworthy ASASSN-14ko, 2023, *ApJ*, 944, 184.

- **C. Liu**, X. Chen, & F. Du, Impact of an Active Sgr A* on the Synthesis of Water and Organic Molecules Throughout the Milky Way, 2020, *ApJ*, 899, 2.
- A. A. Miller et al. (incl. **C. Liu**), The La Silla Schmidt Southern Survey, 2025, *accepted by PASP*.
- A. Gordon et al. (incl. **C. Liu**), Mapping the Spatial Distribution of Fast Radio Bursts within their Host Galaxies, 2025, *accepted by ApJ*.
- J. Pearson et al. (incl. **C. Liu**), Mid-Infrared Dust Evolution and Late-time Circumstellar Medium Interaction in SN 2017eaw, 2025, *accepted by ApJ*.
- P. J. Pessi et al. (incl. **C. Liu**), The ambiguous AT2022rze: Changing-look AGN mimicking a supernova in a merging galaxy system, 2025, *MNRAS*, *staf1433*.
- L. A. Kwok et al. (incl. **C. Liu**), JWST and Ground-based Observations of the Type Iax Supernovae SN 2024pxl and SN 2024vjm: Evidence for Weak Deflagration Explosions, 2025, *ApJL*, 989, L33.
- A. Y. Q. Ho et al. (incl. **C. Liu**), A Luminous Red Optical Flare and Hard X-ray Emission in the Tidal Disruption Event AT2024kmq, 2025, *ApJ*, 989, 54.
- J. C. Rastinejad et al. (incl. **C. Liu**), EP 250108a/SN 2025kg: Observations of the most nearby Broad-Line Type Ic Supernova following an Einstein Probe Fast X-ray Transient, 2025, *ApJL*, 988, L13.
- Y. Yao et al. (incl. **C. Liu**), A Massive Black Hole 0.8 kpc from the Host Nucleus Revealed by the Offset Tidal Disruption Event AT2024tvd, 2025, *ApJL*, 985, L48.
- N. Rehemtulla et al. (incl. **C. Liu**), The BTSbot-nearby discovery of SN 2024jlf: rapid, autonomous follow-up probes interaction in an 18.5 Mpc Type IIP supernova, 2025, *ApJ*, 985, 241.
- M. Singh et al. (incl. **C. Liu**), Photometry and Spectroscopy of SN 2024pxl: A Luminosity Link Among Type Iax Supernovae, 2025, *submitted to ApJ*.
- K. Das et al. (incl. **C. Liu**), Low-Luminosity Type IIP Supernovae from the Zwicky Transient Facility Census of the Local Universe. I: Luminosity Function, Volumetric Rate, 2025, *PASP*, 137, 044203.
- L. Harvey et al. (incl. **C. Liu**), ZTF SN Ia DR2: High-velocity components in the Si II λ 6355, 2025, *A&A*, 695, A264.
- T. Eftekhari et al. (incl. **C. Liu**), The Massive and Quiescent Elliptical Host Galaxy of the Repeating Fast Radio Burst 20240209A, 2025, *ApJL*, 979, L22.
- G. Dimitriadis et al. (incl. **C. Liu**), ZTF SN Ia DR2: The diversity and relative rates of the thermonuclear supernova population, 2024, *A&A*, 694, A10.
- Z. Wu et al. (incl. **C. Liu**), Gaia22dkvLb: A Microlensing Planet Potentially Accessible to Radial-Velocity Characterization, 2024, *AJ*, 168, 62.
- K. Das et al. (incl. **C. Liu**), SN 2023zaw: an ultra-stripped, nickel-poor supernova from a low-mass progenitor, 2024, *ApJL*, 969, L11.
- P. Chen et al. (incl. **C. Liu**), A 12.4 Day Periodicity in a Close Binary System after a Supernova, 2023, *Nature*, 625, 7994, 253-258.
- G. Dimitriadis et al. (incl. **C. Liu**), SN 2021zny: an early flux excess combined with late-time oxygen emission suggests a double white dwarf merger event, 2023, *MNRAS*, 521, 1162.

Telescope Experience

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| Observing Runs | Keck I (LRIS 7 n, MOSFIRE 1 n), Keck II (DEIMOS 1 n), Magellan (FIRE 2 n) | 2023 – 2025 |
| PI | 10 m Keck Telescopes, Northwestern 1.5 n | 2025B |
| PI | 6.5 m Magellan Baade Telescope, Northwestern 1 n | 2025B |
| PI | 2.56 m Nordic Optical Telescope (NOT), NOIRLab 8 hr | 2025B |
| PI | 6.5 m Magellan Baade Telescope, Northwestern 1 n | 2025A |
| PI | 2.56 m Nordic Optical Telescope (NOT), NOIRLab 6 hr | 2025A |
| PI | 4.1 m Southern Astrophysical Research (SOAR) Telescope, NOIRLab 10 hr | 2025A |

Talks & Posters

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| Poster Open SkAI 2025 | Chicago, US Sep 2025 |
| Poster CIERA Fellows at 15 | Evanston, US Aug 2025 |
| Talk One Hundred Years of Supernova Science | Saltsjöbaden, Sweden Aug 2025 |
| Talk Cosmic Lighthouses: Astrophysical and Cosmological Challenges with SNe Ia | Cambridge, UK Jul 2025 |
| Seminar DESI Special Seminar | Berkeley, US Jun 2025 |
| Poster Center for Decoding the Universe Annual Conference | Stanford, US Jun 2025 |
| Seminar University of California, Santa Cruz | Santa Cruz, US Jun 2025 |
| Poster CoDEx: Symposium for Computation and Data Intensive Research | Evanston, US Apr 2025 |
| Poster Transients from Space | Baltimore, US Mar 2025 |
| Talk LS4 Team Meeting | Evanston, US Mar 2025 |
| Poster Rise_Time 2024 | West Lafayette, US Aug 2024 |
| Talk 243rd AAS Meeting | New Orleans, US Jan 2024 |
| Talk The 32nd Texas Symposium on Relativistic Astrophysics | Shanghai, China Dec 2023 |
| Seminar Peking University | Beijing, China Dec 2023 |
| Talk ZTF Science Meeting | Pasadena, US Oct 2023 |
| Poster Keck Science Meeting | Berkeley, US Sep 2023 |
| Seminar Shanghai Jiao Tong University | Shanghai, China Jun 2023 |
| Talk SPOKEN-WERRD 2022 Symposium | Virtual Nov 2022 |
| Talk ZTF Science Meeting | Evanston, US Oct 2022 |
| Talk Astro-Coffee@Princeton | Princeton, US Sep 2022 |
| Talk PKU-DoA Undergraduate Astronomy Symposium | Beijing, China Sep 2020 |

Advising and Teaching

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| CIERA Scientist Mentor REACH Further (Independent Research Experience for REACH Students) | Aug 2023 |
| • Mentee: Isabella Chen | |
| Teaching Assistant ASTRON 103-0-1 (Solar System) | Mar 2023 – Jun 2023 |
| Teaching Assistant PHYSICS 130-2 (College Physics) | Jan 2023 – Mar 2023 |
| Teaching Assistant PHYSICS 333-2 (Advanced Electricity & Magnetism) | Sep 2022 – Dec 2022 |

Professional Service

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| Referee | Astrophysical Journal |
| Referee | Astrophysical Journal Letters |

Outreach

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| Presenter | Evanston, US |
| RESEARCH EXPERIENCE IN ASTRONOMY AT CIERA FOR HIGH SCHOOL STUDENTS (REACH) | Jul 2023 |
| Invited Speaker (<i>supernovae: from the past to the future</i>) | Beijing, China |
| PEKING UNIVERSITY YOUTH ASTRONOMY SOCIETY (PKU-YAS) | Apr 2021 |
| Volunteer | Beijing, China |
| SUMMER CAMP OF ASTRONOMY FOR HIGH SCHOOL STUDENTS, PEKING UNIVERSITY | Jul 2018 |

References

Prof. Adam A. Miller

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