

# Chang Liu

TIME-DOMAIN ASTRONOMER

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## Education

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**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

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- Exploring the transient sky with time-domain surveys (Zwicky Transient Facility – **ZTF**; La Silla Schmidt Southern Survey – **LS4**), and merging observations with data science & numerical simulations
- **Type Ia supernovae (SNe Ia)**: constraining their ignition mechanism and progenitor systems by (i) investigating the most peculiar individual events; (ii) inferring population-level properties of normal SNe Ia in a data-driven way
- **Tidal disruption events (TDEs)**: modeling bizarre repeaters that are periodically stripped by massive black holes using hydrodynamical simulations

## Publications

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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. Gordon et al. (incl. **C. Liu**), Mapping the Spatial Distribution of Fast Radio Bursts within their Host Galaxies, 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, *accepted by MNRAS*.
- J. Pearson et al. (incl. **C. Liu**), Mid-Infrared Dust Evolution and Late-time Circumstellar Medium Interaction in SN 2017eaw, 2025, *accepted by ApJ*.

- 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.
- A. A. Miller et al. (incl. **C. Liu**), The La Silla Schmidt Southern Survey, *2025, submitted to PASP*.
- L. Harvey et al. (incl. **C. Liu**), ZTF SN Ia DR2: High-velocity components in the Si II $\lambda$ 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 FRB 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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|-----------------------|---|-------------|
| <b>Observing Runs</b> | Keck I (LRIS    7 n, MOSFIRE    1 n), Keck II (DEIMOS    1 n), Magellan (FIRE    2 n) | 2023 – 2025 |
| <b>PI</b>             | 10 m Keck Telescopes, Northwestern    1.5 n   | 2025B       |
| <b>PI</b>             | 6.5 m Magellan Baade Telescope, Northwestern    1 n                                   | 2025B       |
| <b>PI</b>             | 2.56 m Nordic Optical Telescope (NOT), NOIRLab    8 hr                                | 2025B       |
| <b>PI</b>             | 6.5 m Magellan Baade Telescope, Northwestern    1 n                                   | 2025A       |
| <b>PI</b>             | 2.56 m Nordic Optical Telescope (NOT), NOIRLab    6 hr                                | 2025A       |
| <b>PI</b>             | 4.1 m Southern Astrophysical Research (SOAR) Telescope, NOIRLab    10 hr              | 2025A       |
| <b>PI</b>             | 10 m Keck Telescopes, Northwestern    2 n   | 2024B       |

## Talks & Posters

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|----------------|---|----------------------|----------|
| <b>Poster</b>  | CIERA Fellows at 15   | Evanston, US         | Aug 2025 |
| <b>Talk</b>    | One Hundred Years of Supernova Science                                    | Saltsjobaden, Sweden | Aug 2025 |
| <b>Talk</b>    | Cosmic Lighthouses: Astrophysical and Cosmological Challenges with SNe Ia | Cambridge, UK        | Jul 2025 |
| <b>Seminar</b> | DESI special seminar  | Berkeley, US         | Jun 2025 |
| <b>Poster</b>  | Center for Decoding the Universe Annual Conference                        | Stanford, US         | Jun 2025 |
| <b>Seminar</b> | University of California, Santa Cruz                                      | Santa Cruz, US       | Jun 2025 |
| <b>Poster</b>  | Transients from Space   | Baltimore, US        | Mar 2025 |

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| <b>Talk</b> LS4 Team Meeting  | Evanston, US Mar 2025       |
| <b>Poster</b> Rise_Time 2024  | West Lafayette, US Aug 2024 |
| <b>Talk</b> 243rd AAS meeting   | New Orleans, US Jan 2024    |
| <b>Talk</b> The 32nd Texas Symposium on Relativistic Astrophysics     | Shanghai, China Dec 2023    |
| <b>Seminar</b> Peking University                                      | Beijing, China Dec 2023     |
| <b>Talk</b> ZTF 5th Science Meeting                                   | Pasadena, US Oct 2023       |
| <b>Poster</b> Keck Science Meeting                                    | Berkeley, US Sep 2023       |
| <b>Seminar</b> Tsung-Dao Lee Institute, Shanghai Jiao Tong University | Shanghai, China Jun 2023    |
| <b>Talk</b> SPOKEN-WERRD 2022 Symposium                               | Virtual Nov 2022            |
| <b>Talk</b> ZTF 3rd Science Meeting                                   | Evanston, US Oct 2022       |
| <b>Talk</b> PKU-DoA Undergraduate Astronomy Symposium                 | Beijing, China Sep 2020     |

## Skills

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| <b>Programming</b> | <b>Proficient:</b> Python <b>Experienced:</b> Shell, Fortran, SQL  |
|                    | • HostSub_GP ( <b>developer</b> ): removing host galaxy background in transient spectroscopy                 |
| <b>Softwares</b>   | • BayeSpecFit ( <b>developer</b> ): fitting blended supernova spectroscopic features with Bayesian inference |
|                    | • Pyepit: optical/NIR spectrum reduction   |

## Advising and Teaching

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

## Professional Service

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| <b>Referee</b> | Astrophysical Journal         |
| <b>Referee</b> | Astrophysical Journal Letters |

## Outreach

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

## References

|                                  |  |
|----------------------------------|--|
| <b>Prof. Adam A. Miller</b>      | Evanston, US   |
| ✉ AMILLER@NORTHWESTERN.EDU       | Department of Physics and Astronomy, Northwestern University |
| <b>Prof. Enrico Ramirez-Ruiz</b> | Santa Cruz, US   |
| ✉ ENRICO@UCOLICK.ORG             | Department of Astronomy and Astrophysics, UC Santa Cruz      |
| <b>Prof. Xian Chen</b>           | Beijing, China   |
| ✉ XIAN.CHEN@PKU.EDU.CN           | Department of Astronomy, Peking University                   |