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
Softwares	• HostSub_GP (**developer**): removing host galaxy background in transient spectroscopy • 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 IIλ6355, *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

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*

PI 10 m Keck Telescopes, Northwestern ‖ 2 n *2024B*

Talks & Posters

Talk Keck Science Meeting *Los Angeles, US Sep 2025*
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

CIERA Scientist Mentor REACH Further (Indepdent Reseach 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

Referee Astrophysical Journal
Referee Astrophysical Journal Letters

Outreach

Presenter *Evanston, US*
Research Experience in Astronomy at CIERA for High School Students (REACH) *Jul 2023*
Invited Speaker (*supernovae: from the past to the future*) *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 — *Evanston, US*
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Prof. Enrico Ramirez-Ruiz — *Santa Cruz, US*
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