

Chang Liu

TIME-DOMAIN ASTRONOMER

Department of Physics and Astronomy, Northwestern University, 2145 Sheridan Rd., Evanston, IL 60208, US

✉ ptg.cliu@u.northwestern.edu | 🌐 <https://slowdiveptg.github.io> | 📺 slowdivePTG

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

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

Seminar Carnegie arXiv Tea, Carnegie Observatories	Pasadena, US Sep 2025
Seminar Astronomy Tea Talk, California Institute of Technology	Pasadena, US Sep 2025
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 (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

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 (<i>supernovae: from the past to the future</i>)	Beijing, China
PEKING UNIVERSITY YOUTH ASTRONOMY SOCIETY (PKU-YAS)	Apr 2021

Volunteer

SUMMER CAMP OF ASTRONOMY FOR HIGH SCHOOL STUDENTS, PEKING UNIVERSITY

Beijing, China

Jul 2018

References

Prof. Adam A. Miller

✉ AMILLER@NORTHWESTERN.EDU

Evanston, US

Department of Physics and Astronomy, Northwestern University

Prof. Enrico Ramirez-Ruiz

✉ ENRICO@UCOLICK.ORG

Santa Cruz, US

Department of Astronomy and Astrophysics, UC Santa Cruz

Prof. Peter Nugent

✉ PENUGENT@LBL.GOV

Berkeley, US

Department of Astronomy, University of California, Berkeley

Prof. Kate Maguire

✉ KATE.MAGUIRE@TCD.IE

Dublin, Ireland

School of Physics, Trinity College of Dublin, The University of Dublin

Prof. Xian Chen

✉ XIAN.CHEN@PKU.EDU.CN

Beijing, China

Department of Astronomy, Peking University