

Anowar J. Shajib

CONTACT INFORMATION	Department of Astronomy and Astrophysics The University of Chicago 5640 South Ellis Avenue Chicago, IL 60637 <i>E-mail:</i> ajshajib@uchicago.edu <i>Website:</i> https://ajshajib.github.io
RESEARCH INTERESTS	Observational cosmology, galaxy evolution, strong gravitational lensing, statistical methods, and machine learning
PROFESSIONAL POSITIONS	KICP Fellow , Kavli Institute of Cosmological Physics, September 2021 – present. NHFP Einstein Fellow , Department of Astronomy and Astrophysics, The University of Chicago, September 2021 – August 2024. Postdoctoral Scholar , Department of Astronomy and Astrophysics, The University of Chicago, November 2020 – August 2021.
EDUCATION	University of California, Los Angeles, USA Ph.D., Astronomy & Astrophysics, September 2020. <ul style="list-style-type: none">• Dissertation title: “The Hubble constant and The ΛCDM cosmology: A Magnified View using Strong Lensing”• Advisor: Prof. Tommaso Treu M.S., Astronomy, June 2016 <ul style="list-style-type: none">• Advisor: Prof. Edward L. Wright The University of Tokyo, Japan B.S., Physics, March 2014
AWARDS, FELLOWSHIPS, AND HONORS	NASA Hubble Fellowship Program, Einstein Fellowship , 2021 Rodger Doxsey Travel Prize for dissertation talk, 235 th American Astronomical Society Meeting, Hawaii, USA, 2020 Dissertation Year Fellowship from UCLA Graduate Division, 2019-2020 Graduate Student Travel Stipend, Munich Institute for Astro- and Particle Physics, 2018 Graduate Division Fellowship , UCLA, 2014-2015 Full-tuition Undergraduate Scholarship from Government of Japan, Ministry of Education, Culture, Sports, Science, and Technology, 2009-2014
PUBLICATION STATISTICS	51 total published/submitted papers (listed at the end of CV). 13 first-author, 6 second-author, and 32 other co-authored papers. First author citations: 632, total citations: 4,347, h-index: 27 (11/26/2024, ADS).
APPROVED PROPOSALS & GRANTS (PI/CO-PI)	<ol style="list-style-type: none">1. <i>JWST</i> GO-2974 (2023). The Hubble constant at 1.9% from spatially resolved kinematics of gravitational lens.2. <i>Hubble Space Telescope</i> Schedule Gap Program SNAP-17307 (2023). A Legacy Library of 500 Strong Gravitational Lenses.3. <i>Hubble Space Telescope</i> AR-16149 (2020). Systematics in H_0 from lensing: a comprehensive study of internal structure in elliptical galaxies. Grant: ~\$100K.

APPROVED
COMPUTING
PROPOSALS
(PI/Co-PI)

1. UChicago Midway2 Research Allocation, 1,000,000 CPU hours. First semester, 2022–23.
2. UChicago Midway2 Research Allocation, 371,800 CPU hours. Second semester, 2021–22.
3. UChicago Midway2 Research Allocation, 352,00 CPU hours. First semester, 2021–22.
4. XSEDE Startup Allocation, 200,000 CPU hours (TG-AST190038, 2019). Highly-detailed strong-gravitational lens modeling to measure the Hubble constant.

APPROVED
OBSERVING PRO-
POSALS/GRANTS
(CoI)

1. *JWST* DD-6549. PI: Pierel. Lensed Supernova Encore at $z=2$! The First Galaxy to Host Two Multiply-Imaged Supernovae.
2. Nancy Grace Roman Space Telescope Research and Support Participation Opportunities (2023). PI: Pierel. Enhancing the Roman Cosmology Program with Strongly Lensed Supernovae.
3. *Hubble Space Telescope* GO-17474 (2023). PI: Pierel. Pioneering Precision: Advancing Cosmology with the First Statistical Sample of Gravitationally Lensed Supernovae
4. *Hubble Space Telescope* GO-17437 (2023). PI: Barone. When does the initial mass function become heavy? A unique view of two massive galaxies at $z = 1$.
5. *Hubble Space Telescope* GO-17130 (2022). A 4% determination of the Hubble constant from gravitational time delays with maximally flexible lens mass profile. **Grant managed by Shajib: ~\$40K.**
6. Very Large Telescope, MUSE, P110 (2022). PI: Zanella. From cosmology to star-forming regions: two compelling cases for MUSE narrow-field mode.
7. *JWST* GO-1794 (Cycle 1, 2021). PI: Suyu. 100% gain in precision and accuracy of H_0 measurement from *JWST* stellar kinematics of a lens galaxy.
8. Very Large Telescope, MUSE, P108 (2021). PI: Zanella. From cosmology to star-forming regions: two compelling cases for MUSE narrow-field mode.
9. *Hubble Space Telescope* GO-16773 (2021). PI: Glazebrook. A SNAPshot Legacy Survey of Bright Gravitational Lenses. **Grant managed by Shajib: ~\$120K.**
10. *Hubble Space Telescope* GO-15652 (2018). PI: Treu. H_0 , the stellar initial mass function, and other dark matters from a large sample of quadruply imaged quasars.
11. 2-m Himalayan Chandra Telescope (2018). PI: Courbin. Photometric monitoring of the quadruply lensed quasar PS0J0147+4630.
12. Very Large Telescope, MUSE NFM Science Verification (2018, 103A). PI: Zanella. From cosmology to star-forming regions: two compelling cases for MUSE NFM.
13. Keck Observatory, U053(2017A), U032(2017B), U011(2018A), U011(2018B), U029(2019A), U065(2019B), U021(2021A), U030(2022B), U028(2023B), U077(2024A). PI: Treu.
14. Subaru Telescope, S21A-0128N, S22B-0102N, S23B-0057N, S24A-0046N. PI: Wong.
15. Gemini South Telescope, 2022B-Q-230, 2023A, 2023B-986125, 2024A-Q-320. PI: Buckley-Geer.

COLLABORATION
MEMBERSHIP

- Rubin Observatory LSST’s Dark Energy Science Consortium (DESC), **co-convener (April 2023–present)** of Strong-Lensing Topical Team (SLTT)
- STRong-lensing Insights into Dark Energy Survey (STRIDES), an external collaboration of the Dark Energy Survey (DES), **Co-PI**
- Time-delay Cosmography (TDCOSMO), **co-chair** of environment analysis subgroup, 2021–2023.
- H_0 Lenses in COSMOGRAIL’s Wellspring (H0LiCOW)
- Rubin Observatory LSST’s Strong Lensing Science Consortium (SLSC)

- **LensWatch**

PROFESSIONAL
SERVICE

- TAC member for NASA, 2023–2024
- SOC member, NHFP symposium, 2022
- Subject-matter expert reviewer in a NASA peer review, 2022
- Future Leader participant, AURA annual meeting, 2021
- Referee for Monthly Notices of the Royal Astronomical Society, The Astrophysical Journal, and Astronomy & Astrophysics.
- Graduate admission committee member (2019), Division of Astronomy, UCLA

CONFERENCE
ORGANIZING

1. SOC chair of KICP workshop. Lensing at Different Scales: strong, weak, and synergies between the two, 2023. \$15K grant from KICP, UChicago.

INVITED
CONFERENCE TALKS

1. Royal Society Meeting on Multi-messenger Gravitational Lensing, UK, March 2024.
2. IAUS 381: Strong gravitational lensing in the era of big data. Italy, June 2023.
3. Workshop on Bridging Gaps between Dynamical Probes of Galaxies, Lorentz Center, Netherlands, April 2022.
4. Dark Energy Survey meeting plenary talk, May 2020.

COLLOQUIA AND
SEMINAR TALKS
(* INVITED)

1. *Seminar, National Astronomical Observatories of China, Beijing, China, June 2024.
2. *Seminar, Department of Astronomy, Beijing Normal University, Beijing, China, June 2024.
3. *Seminar, Department of Astronomy, Tsinghua University, Beijing, China, June 2024.
4. *Seminar, Department of Physics, University of Tokyo, Tokyo, Japan, June 2024.
5. Seminar, National Astronomical Observatories of Japan, Tokyo, Japan, June 2024.
6. *Colloquium, Institute of Cosmology and Gravitation, University of Portsmouth, UK, March 2024.
7. *Seminar, Institute for Astronomy, University of Hawai'i, February 2024.
8. *Colloquium, Institute for Astronomy, University of Hawai'i, February 2024.
9. *Colloquium, Dept. of Astrophysics and Planetary Sciences, University of Colorado Boulder, February 2024.
10. *Seminar, Dept. of Physics & Astronomy, Michigan State University, January 2024.
11. *Seminar (virtual), Dept. of Physics, The University of Hong Kong, December 2023.
12. *Seminar, Dept. of Physics & Astronomy, University of California, Davis, May 2023.
13. *Seminar, Dept. of Astronomy, Boston University, March 2023.
14. *Seminar, Dept. of Physical Sciences, Independent University, Bangladesh, March 2023.
15. *Seminar, Dept. of Physics & Astronomy, Johns Hopkins University, February 2023.
16. *Astrophysics Symposium, Physics Department, Yale University, USA, January 2022.
17. *Astronomy Colloquium, Indiana University, Bloomington, USA, January 2022.
18. Virtual Astronomy Software Talk (VAST), virtual, December 2022.
19. *Astronomy Lunch Seminar (virtual), Kavli IPMU, University of Tokyo, Japan, November 2022.
20. *KICC Cosmology Group Seminar, Cambridge University, UK, March 2022.

21. *Physics Web-colloquium Series, Pabna University of Science and Technology, Bangladesh, July 2021.
22. *Argonne National Lab–UChicago Joint Cosmology Meeting, USA, May 2021.
23. *Open seminar by Dvorkin Group, Harvard University, USA, April 2021.
24. Survey Science Group Meeting, University of Chicago, USA, October 2020.
25. *Colloquium (remote), Institute of Cosmology and Gravitation, University of Portsmouth, UK, April 2020.
26. FLASH Friday talk, University of California, Santa Cruz, California, USA, December 2019.
27. Science talk, Infrared Processing and Analysis Center, California Institute of Technology, USA, November 2019.
28. Astrophysics Seminar, Jet Propulsion Laboratory, California, USA, November 2019.
29. Cosmology seminar, Berkeley Center For Cosmological Physics, University of California, Berkeley, USA, November 2019.
30. *Cosmology seminar, Kavli Institute for Particle Astrophysics and Cosmology, Stanford University, USA, November 2019.
31. Journal club seminar, Center for Astrophysics and Space Sciences, University of California, San Diego, USA, November 2019.
32. Astrophysics seminar, University of California, Irvine, USA, October 2019.
33. Thursday lunch seminar, Princeton University, USA, October 2019.
34. Galaxy lunch talk, Yale University, USA, October 2019.
35. Galaxies and Cosmology Seminar, Center for Astrophysics, Harvard & Smithsonian, USA, October 2019.
36. Galaxy journal club, Space Telescope Science Institute, USA, October 2019.
37. Particle Astrophysics Seminar, Fermilab, USA, October 2019.
38. Lunch talk, Carnegie Observatories, Pasadena, USA, September 2019.
39. Astronomy seminar. University of California, Riverside, USA, May 2019.
40. *MPA Lensing Group Seminar, Munich, Germany, June 2018.

CONTRIBUTED TALKS

1. ELT Science in the Light of *JWST*, University of Tohoku, Sendai, Japan, June 2024.
2. NHFP Fellows' Symposium, Center for Astrophysics, Harvard & Smithsonian, Boston, USA, September 2023.
3. The Extragalactic Distance Scale and Cosmic Expansion in the Era of Large Surveys and the *JWST*. MIAPbP workshop, Garching, Germany, July 2023.
4. 241st American Astronomical Society Meeting, USA, January 2023.
5. NHFP Fellows' Symposium. STScI, Baltimore, USA, September 2022.
6. Boom! workshop on Explosive Transients with LSST. The University of Illinois at Urbana-Champaign, USA, July 2022.
7. NHFP Fellows' Symposium, remote, October 2021.
8. Spatially Resolved Spectroscopy with Extremely Large Telescopes, University of Oxford, UK, September 2021.
9. 237th American Astronomical Society Meeting, USA, January 2021.
10. Dissertation talk, 235th American Astronomical Society Meeting, Hawaii, USA, January 2020.
11. Dark Energy Survey meeting, University of Sussex, UK, November 2019.

12. Non-Standard Cosmology Probes, Aspen Center of Physics workshop, Colorado, USA, August 2019.
13. Tensions between the Early and the Late Universe. Kavli Institute for Theoretical Physics, University of California, Santa Barbara, USA, July 2019.
14. Keck Science Meeting. Caltech, USA, September 2018.
15. Extragalactic distance scale in the *GAIA* era, Munich Institute for Astro- and Particle Physics workshop. Germany, June 2018.
16. Shedding Light on the Dark Universe with Extremely Large Telescopes. UCLA, USA, April 2018.
17. Strong Lensing by Galaxies and Clusters. Aosta, Italy, June 2017.

WORKSHOPS
(* INVITED)

1. *16th IAU-Abdul Jabbar Astronomy Workshop. Rajshahi University (remote), Rajshahi, Bangladesh, July 2024.
2. *Beyond the Main Lens Workshop. University of Montpellier, France, May 2024.
3. The Extragalactic Distance Scale and Cosmic Expansion in the Era of Large Surveys and the JWST. MIAPbP, Garching, Germany, July 2023.
4. *International Space Science Institute (ISSI) workshop on Strong Lensing, Switzerland, July 2022.
5. *Bridging Gaps between Dynamical Probes of Galaxies, Lorentz Center, Netherlands, April 2022.
6. Non-Standard Cosmology Probes, Aspen Center of Physics, Colorado, USA, August–September 2019.
7. TMT Early Career Initiative Workshop, Los Angeles, December 2018.
8. Extragalactic distance scale in the *GAIA* era, MIAPP, Garching, Germany, June–July 2018.
9. Mary Lea & C. Donald Shane Observational Astronomy Workshop, UCO/Lick Observatory, October 2014.

MEDIA COVERAGE

1. Siegel, E., “Astronomically Rare ‘Double Lens’ Yields Best Single System Measurement Of Cosmic Expansion”, [Forbes](#), 2019.

POSTER
PRESENTATION

1. Cosmic Controversies. Kavli Institute for Cosmological Physics, University of Chicago, USA, October 2019.
2. Tensions between the Early and the Late Universe. Kavli Institute for Theoretical Physics, University of California, Santa Barbara, USA, August 2019.



OBSERVING
EXPERIENCE

OSIRIS, Keck I, 18.5 nights,
NIRC2, Keck II, 3 nights,
MOSFIRE, Keck I, 3 nights,
Shane telescope PFCam and Nickel telescope imager, Lick Observatory, 1 night.

DATA ANALYSIS
EXPERIENCE

Hubble Space Telescope (WFC3), W. M. Keck Observatory (OSIRIS, NIRC2), Very Large Telescope (MUSE), *Wide-field Infrared Survey Explorer*, *Wilkinson Microwave Anisotropy Probe*, *Planck*, Sloan Digital Sky Survey.

SCIENTIFIC
SOFTWARE
DEVELOPMENT

- Lead developer of lens-modeling automator DOLPHIN .
- Co-developer and maintainer for the lens-modeling software LENSTRONOMY , an [affiliated package](#) of ASTROPY.

COMPUTER SKILLS **Programming Languages:** Python, C, C++, PHP, SQL, JavaScript
Other Software/Framework: TensorFlow, Flask

MENTORING

- **Eden Molina:** UCLA undergraduate student, completed a project to model doubly-imaged lensed quasars from NIRC2 imaging data. Mentored Fall 2018–Winter 2020. Coauthored and published a paper ([Shajib, Molina, et al., 2021](#)). Went on to industry.
- **Vedant Sahu:** UCLA undergraduate student, worked on a project to apply machine learning techniques in modeling quadruply-lensed quasars. Mentored Summer 2019–Spring 2021. Went on to a Data Science Masters program at Stanford University.
- **Chin Yi Tan:** UChicago graduate student, working on a project to build an automated pipeline for modeling galaxy–galaxy lenses. Mentored Winter 2021–Winter 2024, leading to the paper [Tan, Shajib, et al., 2024](#). *Supported through an HST grant with myself being the PI.*
- **Hannah Skobe:** UChicago post-baccalaureate scholar, working on a project to upscale lower-resolution astronomical images using machine learning. Mentored since Spring 2021–Summer 2024. *Supported through an HST grant with myself being the grant PI.* Went on to the PhD program at Carnegie Mellon University.
- **Aidan Cloonan:** UChicago undergraduate student, working on a project to compare structural properties of strong lensing galaxies and the parent population of elliptical galaxies. Mentored Summer 2021–Summer 2022. Went on to the PhD program at UMass Amherst.
- **Pierre Boccard:** EPFL master’s student on an exchange program to UChicago, worked on and defended master’s thesis to measure the dark energy parameter w using a compound lens system. Mentored in Winter 2023–Summer 2024. Went on to a PhD program at the Center of Particle Physics of Marseille (CPPM).
- **Xianzhe Tang:** Stony Brook University undergraduate student. Co-mentored with Prof. Simon Birrer. Worked on including line-of-sight structures in the strong lensing simulation pipeline for the Rubin Observatory’s LSST. Summer 2023. Went on to the PhD program at Boston University.
- **William Sheu:** UCLA PhD student. Co-mentored with Prof. Tommaso Treu in Fall 2023 – Summer 2024 on a project leading to the publication [Sheu, Shajib, et al. 2024](#).
- **Nafis Sadik Nihal:** Postbaccalaureate researcher after completing undergraduate from the Islamic University of Technology, Bangladesh. Mentored in Summer 2024 on a machine learning project for automated lens modeling.
- **AstroBridge program:** I have mentored 19 undergraduate, post-baccalaureate, and Master’s students from Bangladesh in the same research project under the AstroBridge program. This project culminated into a paper co-authored by all the students (Adnan, ..., Shajib et al. 2024).
- **Ruizhe Feng, Yan Liang, Xincheng Zhu:** Tsinghua University PhD students. Co-mentoring with Prof. Dandan Xu since Summer 2024, on a project to simulate highly realistic mock observations of strong lenses.

TEACHING

University of Illinois, Chicago, USA

Guest Lecturer

- GE course on Astronomy & Universe (Spring 2023, Prof. Cecilia Gerber)

University of Chicago, USA

Guest Lecturer

- Astro 285 - Science with Large Astronomical Surveys (Spring 2024, Prof. Alex Drlica-Wagner)

- Astro 285 - Science with Large Astronomical Surveys (Spring 2023, Prof. Alex Drlica-Wagner)
- Astro 298 - Undergraduate Research Seminar (Spring 2022, Prof. Hsiao-Wen Chen)
- Graduate course on Gravitational Lensing (Fall 2020, Prof. Chihway Chang)

University of California, Los Angeles, USA

Guest Lecturer

- Physics 127 - General Relativity (Spring 2015, Dr. Slava Turyshev)
- Astro 81 - Astronomy I: Stars and Nebulae (Winter 2016, Prof. Andrea Ghez)

Teaching Assistant

- Astronomy 3 - Nature of Universe (Fall 2014)
- Physics 1C - Electrodynamics, Optics and Special Relativity (Winter 2015)
- Physics 127 - General Relativity (Spring 2015)
- Physics 6C - Physics for Life Sciences Majors: Light, Fluids, Thermodynamics, Modern Physics (Fall 2015)
- Astronomy 81 - Astrophysics I: Stars and Nebulae (Winter 2016)
- Astronomy 140 - Stellar Systems and Cosmology (Spring 2016)
- Physics 12 - Physics of Sustainable Energy (Winter 2017)

INCLUSION & ACCESS

Founder and Coordinator of **Astro Bridge**, a bridge program for undergraduate students from countries lacking research opportunities at the undergraduate level.

Mentor of an Astronomy research workshop for Bangladeshi undergraduate/master's students with 35 participants, under the **Astro Bridge** program. February 2023–present.

OUTREACH

Program Coordinator of **Lifelong Learning Outreach program**, KICP, 2022–23.

Public talk, Shahjalal University of Science & Technology, Bangladesh, March 2023.

Speaker at **Lifelong Learning Talk series**, multiple talks at the Chicago Public Library and senior centers, 2022.

Cal-Bridge program, hosted a workshop at UCLA for California State University undergraduates on Graduate admission preparation, March 2019.

Lecturer at **Astronomy Live! Summer workshop** for high school students, 2018.

Astronomy Live!, visited K-12 schools to perform various demos as part of the UCLA Astronomy outreach program.

Exploring Your Universe, performed various demos in UCLA's annual science festival, 2014-17.

Star show presenter, UCLA Planetarium, 2014-2016.

Public talk, UCLA Planetarium, 2014.

PUBLICATIONS

First-author publications

† Mentee

14. **Shajib, A. J.** and Frieman, J. A. Evolving dark energy models: Current and forecast constraints. **Submitted to PRD, 2025.**
13. **Shajib, A. J.**, et al. TDCOSMO: XVIII. First spatially resolved kinematics of the lens galaxy obtained using JWST/NIRSpec to improve time-delay cosmography. To be submitted in March, 2024.
12. **Shajib, A. J.**, et al. Strong gravitational lenses from the Vera C. Rubin Observatory. Invited review, **submitted to Phil. Trans. A, 2024.**

11. **Shajib, A. J.**, et al. Strong Lensing by Galaxies. Invited review article, *Space Science Reviews*, **220**, 8, 87, 2024.
10. **Shajib, A. J.**, et al. TDCOSMO. XII. Improved Hubble constant measurement from lensing time delays using spatially resolved stellar kinematics of the lens galaxy. *A&A*, **673**, A9, 2023.
9. **Shajib, A. J.**, et al. LensingETC: a tool to optimize multi-filter imaging campaigns of galaxy-scale strong lensing systems. *ApJ*, **938**, 141, 2022.
8. **Shajib, A. J.**, et al. TDCOSMO. IX. Systematic comparison between lens modelling software programs: time delay prediction for WGD 2038–4008. *A&A*, **667**, A123, 2022.
7. **Shajib, A. J.**, et al. Dark matter haloes of massive elliptical galaxies at $z \sim 0.2$ are well described by the Navarro–Frenk–White profile. *MNRAS*, **503**, 2, 2380–2405, 2021.
6. **Shajib, A. J.**, Molina, E.†, et al. High-resolution imaging follow-up of doubly imaged quasars. *MNRAS*, **503**, 2, 1557–1567, 2021.
5. **Shajib, A. J.**, et al. STRIDES: A 3.9 per cent measurement of the Hubble constant from the strong lens system DES J0408–5354. *MNRAS*, **494**, 6072–6102, 2020.
4. **Shajib, A. J.** Unified lensing and kinematic analysis for *any* elliptical mass profile. *MNRAS*, **488**, 1387–1400, 2019.
3. **Shajib, A. J.**, et al. Is every strong lens model unhappy in its own way? Uniform modelling of a sample of 13 quadruply+ imaged quasars. *MNRAS*, **483**, 5649–5671, 2019.
2. **Shajib, A. J.**, Treu, T., and Agnello, A. Improving time-delay cosmography with spatially resolved kinematics. *MNRAS*, **473**, 210–226, 2018.
1. **Shajib, A. J.** and Wright, E. L. Measurement of the integrated Sachs-Wolfe effect using the AllWISE data release. *ApJ*, **827**:116 (9pp), 2016.

Second-author or mentee-led publications

† Mentee

7. Hogg, N., **Shajib, A. J.**, et al. Line-of-sight shear in SLACS strong lenses. *Submitted to MNRAS*, 2025.
6. Adnan, S. M. R.†, Hasan, M. J.†, Al-Imtiaz, A.†, Robin, S. H.†, Shwadhin, F. R.†, **Shajib, A. J.**, Nahid, M. H.†, Tanver, M. H.†, Akter, T.†, Jahan, N.†, Jafar, Z.†, Rashid, M.†, Biswas, A.†, Chowdhury, A. A.†, Feardous, J.†, Rahaman, A.†, Ridwan, M.†, Sharma, R. D.†, Chowdhury, Z.†, Hossain, M. S.†. Investigating the relation between environment and internal structure of massive elliptical galaxies using strong lensing. *arXiv:2412.00361*, 2024.
5. Sheu, W.†, **Shajib, A. J.**, et al. Project Dinos II: Redshift evolution of dark and luminous matter density profiles in strong-lensing elliptical galaxies across $0.1 < z < 0.9$. *arXiv:2408.10316*, 2024.
4. Tan, C. Y.†, **Shajib, A. J.**, et al. Project Dinos I: A joint lensing–dynamics constraint on the deviation from the power law in the mass profile of massive ellipticals. *MNRAS*, **530**, 2, 2024.
3. Treu, T. and **Shajib, A. J.** Strong Lensing and H_0 . *arXiv:2307.05714*, 2023.
2. Birrer, S., **Shajib, A. J.**, et al. lenstronomy II: A gravitational lensing software ecosystem. *Journal of Open Source Software*, **6**(62), 3283, 2021.
1. Birrer, S., **Shajib, A. J.**, et al. TDCOSMO IV: Hierarchical time-delay cosmography – joint inference of the Hubble constant and galaxy density profiles. *A&A* **643**, A165, 2020.

Other co-authored publications

34. Birrer, S., et al. Challenges and Opportunities for time-delay cosmography with multi-messenger gravitational lensing. *Accepted by PTRSA*, 2025.

33. Morishita, T., et al. Metallicity Scatter Originating from Sub-kiloparsec Starbursting Clumps in the Core of a Protocluster at $z = 7.88$. [Submitted to ApJ, 2025](#).
32. Dux, F., et al. J1721+8842: The first Einstein zig-zag lens. [arXiv:2411.04177, 2024](#).
31. Larison, C., et al. LensWatch: II. Improved Photometry and Time Delay Constraints on the Strongly-Lensed Type Ia Supernova 2022qmx ("SN Zwicky") with HST Template Observations. [arXiv:2409.17239, 2024](#).
30. Erickson, S., et al. Lens Modeling of STRIDES Strongly Lensed Quasars using Neural Posterior Estimation. [arXiv:2410.10123, 2024](#).
29. Knabel, S., Treu, T., Cappellari, M., **Shajib, A. J.**, et al. Spatially Resolved Kinematics of SLACS Lens Galaxies. I: Data and Kinematic Classification. [arXiv:2409.10631, 2024](#).
28. Wong, K., Dux, F., **Shajib, A. J.**, et al. TDCOSMO. XVII. Measurement of the Hubble Constant from the Lensed Quasar WGD2038–4008. [A&A, 689, A168, 8, 2024](#).
27. Fagin, J., et al. Measuring the Substructure Mass Power Spectrum of 23 SLACS Strong Galaxy-Galaxy Lenses with Convolutional Neural Networks. [MNRAS, 532, 2, 2024](#).
26. Sahu, N., Tran, K.-V., Suyu, S., **Shajib, A. J.**, . . . , Skobe, H.† et al. AGEL: Is the Conflict Real? Investigating Galaxy Evolution Models using Strong Lensing at $0.3 < z < 0.9$. [ApJ, 970, 1, 86, 2024](#).
25. Keerthi Vasan, G. C., Jones, T., **Shajib, A. J.**, et al. Spatially Resolved Galactic Winds at Cosmic Noon: Outflow Kinematics and Mass Loading in a Lensed Star-Forming Galaxy at $z = 1.87$. [arXiv:2402.00942, 2024](#).
24. Birrer, S., Millon, M., Sluse, D., **Shajib, A.**, et al. Time-Delay Cosmography: Measuring the Hubble Constant and other cosmological parameters with strong gravitational lensing. [Space Science Reviews, 220, 5, 48, 2024](#).
23. Gomer, M. R., et al. Ellipticity parameterization for an NFW profile: an overlooked angular structure in strong lens modeling. [A&A, 679, A128, 2023](#).
22. Sonnenfeld, A., et al. Strong lensing selection effects. [A&A, 678, A4, 2023](#).
21. Pierel, J. D. R., et al. LensWatch: I. Resolved HST Observations and Constraints on the Strongly-Lensed Type Ia Supernova 2022qmx ("SN Zwicky"). [ApJ, 948, 2, 115, 2023](#).
20. Zaborowski, E., et al. Identification of Galaxy-Galaxy Strong Lens Candidates in the DECam Local Volume Exploration Survey Using Machine Learning. [ApJ, 954, 1, 68, 2023](#).
19. Mozumdar, P., et al. TDCOSMO. XII. New lensing galaxy redshift and velocity dispersion measurements from Keck spectroscopy of eight lensed quasar systems. [A&A, 672, A20, 2023](#).
18. Ertl, S., et al. TDCOSMO XI. Automated Modeling of 9 Strongly Lensed Quasars and Comparison Between Lens Modeling Software. [A&A, 672, A2, 2023](#).
17. Lemon, C., et al. Gravitationally lensed quasars in Gaia – IV. 150 new lenses, quasar pairs, and projected quasars. [MNRAS, 520, 3, 3305-3328, 2023](#).
16. Schmidt, T., Treu, T., Birrer, S., **Shajib, A. J.**, et al. STRIDES: Automated uniform models for 30 quadruply imaged quasars. [MNRAS, 518, 1, 1260-1300, 2023](#).
15. Morgan, R., et al. DeepZipper II: Searching for Lensed Supernovae in Dark Energy Survey Data with Deep Learning. [ApJ, 943, 1, 19, 2023](#).
14. Akhazhanov, A., et al. Finding quadruply imaged quasars with machine learning. I. Methods. [MNRAS, 513, 2, 2407-2421, 2022](#).
13. Birrer, S., Dhawan. S., and **Shajib, A. J.** The Hubble constant from strongly lensed supernovae with standardizable magnifications. [ApJ, 924, 1, 2, 2022](#).
12. Ding, X., et al. Time Delay Lens Modelling Challenge. [MNRAS, 503, 1096-1123, 2021](#).

11. Buckley-Geer, E. J., et al. STRIDES: Spectroscopic and photometric characterization of the environment and effects of mass along the line of sight to the gravitational lenses DES J0408–5354 and WGD 2038–4008. *MNRAS*, 498, 3, 3241–3274, 2020.
10. Lemon, C., et al. The STRong lensing Insights into the Dark Energy Survey (STRIDES) 2017/2018 follow-up campaign: Discovery of 10 lensed quasars and 10 quasar pairs. *MNRAS*, 494, 3, 3491–3511, 2020.
9. Millon, M., et al. TDCOSMO - I. An exploration of systematic uncertainties in the inference of H_0 from time-delay cosmography. *A&A*, 639, A101, July 2020.
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