

Anowar J. Shajib

CONTACT INFORMATION

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RESEARCH INTERESTS

Gravitational Lensing, Observational Cosmology

EDUCATION

University of California, Los Angeles, USA

Ph.D. Candidate, Astronomy, March 2017 (expected graduation date: June 2020)

- Dissertation Topic: “Mapping the expansion history of the Universe with strong-lensing time-delays”
- Advisor: Prof. Tommaso Treu

M.S., Astronomy, June 2016

- Advisor: Prof. Edward L. Wright

The University of Tokyo, Japan

B.S., Physics, March 2014

HONORS AND AWARDS

Dissertation Year Fellowship, UCLA, 2019-2020, \$20,000

Graduate Student Travel Stipend, MIAPP, 2018, €500

Graduate Student Travel Grant, UCLA, 2017, \$2000

Graduate Division Fellowship, UCLA, 2014-2015, \$18,000

MEXT¹ Scholarship, 2009-2014 (equivalent to \$92,000)

PUBLICATION STATISTICS

13 total refereed/under-review papers. **4 first-author and 1 single-author** papers (4 refereed, 1 under-review). **8 co-authored** papers (6 refereed, 2 under-review). Publication list at the end.

SEMINAR TALKS

1. Astrophysics seminar, University of California, Irvine, USA, October 2019.
2. Thursday lunch seminar, Princeton University, New Jersey, USA, October 2019.
3. Galaxy lunch talk, Yale University, Connecticut, USA, October 2019.
4. Galaxies and Cosmology Seminar, Center for Astrophysics, Harvard & Smithsonian, Massachusetts, USA, October 2019.
5. Galaxy journal club, STScI, Maryland, USA, October 2019.
6. Particle Astrophysics Seminar, Fermilab, Illinois, USA, October 2019.
7. Lunch talk, Carnegie Observatories, California, USA, September 2019.
8. Astronomy seminar. University of California, Riverside, USA, May 2019.
9. MPA Lensing Group Seminar, Munich, Germany, June 2018 (invited).

¹Ministry of Education, Culture, Sports, Science and Technology, Government of Japan

CONTRIBUTED
TALKS

1. Non-Standard Cosmology Probes, Aspen Center of Physics, Colorado, USA, August 2019.
2. Tensions between the Early and the Late Universe. Kavli Institute for Theoretical Physics, UCSB, USA, July 2019.
3. Keck Science Meeting. Caltech, USA, September 2018.
4. Extragalactic distance scale in the *GAIA* era, MIAPP workshop. Munich, Germany, June 2018.
5. Shedding Light on the Dark Universe with Extremely Large Telescopes. UCLA, USA, April 2018.
6. Strong Lensing by Galaxies and Clusters. Aosta, Italy, June 2017.

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, UCSB, USA, August 2019.

APPROVED
OBSERVING
PROPOSALS (CoI)

1. *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.
2. 2-m Himalayan Chandra Telescope (2018). PI: Courbin. Photometric monitoring of the quadruply lensed quasar PS0J0147+4630.
3. Very Large Telescope, MUSE NFM Science Verification (2018, 103A). PI: Zanella. From cosmology to star-forming regions: two compelling cases for MUSE NFM.
4. Keck U053(2017A), U032(2017B), U011(2018A), U011(2018B), U029(2019A), U065(2019B). PI: Treu. Dark energy with gravitational time-delay: OSIRIS spectroscopy of lensing galaxies.

APPROVED
COMPUTING
PROPOSALS (Co-PI)

1. XSEDE Startup Allocation, 200,000 CPU hours (TG-AST190038, 2019). PI: Treu. Highly-detailed strong-gravitational lens modeling to measure the Hubble constant.

WORKSHOPS

1. Non-Standard Cosmology Probes, Aspen Center of Physics, Colorado, USA, August–September 2019.
2. TMT Early Career Initiative Workshop, Los Angeles, December 2018.
3. Extragalactic distance scale in the *GAIA* era, MIAPP, Germany, June–July 2018.
4. Mary Lea & C. Donald Shane Observational Astronomy Workshop, UCO/Lick Observatory, October 2014.

OBSERVING
EXPERIENCE

OSIRIS, Keck I, 13.5 nights,
NIRC2, Keck II, 3 nights,
MOSFIRE, Keck I, 3 nights,
Shane telescope PFCam, Lick Observatory, 0.5 nights,
Nickel telescope imager, Lick Observatory, 0.5 nights.

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.

COMPUTER SKILLS

Programming Languages: Python, C, C++, PHP, SQL, JavaScript
Astronomy software: Lenstronomy, IRAF, PyRAF, SExtractor, DS9
Software/Framework: TensorFlow, Flask

COLLABORATION MEMBERSHIP	<ul style="list-style-type: none"> • Co-PI, STRong-lensing Insights into Dark Energy Survey (STRIDES), an external collaboration of the Dark Energy Survey (DES) • H_0 Lenses in COSMOGRAIL's Wellspring (H0LiCOW)
PROFESSIONAL SERVICE	<ul style="list-style-type: none"> • Referee for MNRAS and ApJ • Graduate admission committee member (2019), Division of Astronomy, UCLA
MENTORING	<ul style="list-style-type: none"> • Eden Molina: UCLA undergraduate, completing a project to model doubly-imaged lensed quasars from NIRC2 imaging data. Mentored since Fall 2018. • Vedant Sahu: UCLA undergraduate, working on a project to apply machine learning techniques in modelling quadruply-lensed quasars. Mentored since Summer 2019.
TEACHING	<p>University of California, Los Angeles, USA</p> <p><i>Guest Lecturer</i></p> <ul style="list-style-type: none"> • Physics 127 - General Relativity (Spring 2015) • Astro 81 - Astronomy I: Stars and Nebulae (Winter 2016) <p><i>Teaching Assistant</i></p> <ul style="list-style-type: none"> • 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)
OUTREACH	<p>Cal-Bridge program, hosted a workshop at UCLA for California State University undergraduates on Graduate admission preparation, March, 2019.</p> <p>Lecturer at Astronomy Live! summer workshop for high school students, 2018.</p> <p>Astronomy Live!, visited K-12 schools to perform various demos as part of the UCLA Astronomy outreach program.</p> <p>Exploring Your Universe, performed various demos in UCLA's annual science festival, 2014-17.</p> <p>Star show, UCLA Planetarium, 2014-2016.</p> <p>Public talk, UCLA Planetarium, 2014.</p>
PUBLICATIONS	<p>First-author Refereed/Under-review Publications</p> <ol style="list-style-type: none"> 1. Shajib, A. J., et al. STRIDES: A 3.9 per cent measurement of the Hubble constant from the strong lens system DES J0408-5354. arXiv:1910.06306, 2019. 2. Shajib, A. J. Unified lensing and kinematic analysis for <i>any</i> 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. 4. Shajib, A. J., Treu, T., and Agnello, A. Improving time-delay cosmography with spatially resolved kinematics. MNRAS, 473, 210-226, 2018.

5. **Shajib, A. J.** and Wright, E. L. Measurement of the integrated Sachs-Wolfe effect using the AllWISE data release. *ApJ*, 827:116 (9pp), 2016.

Co-authored Refereed/Under-review Publications

1. Wong, C. K., et al. H0LiCOW XIII. A 2.4% measurement of H_0 from lensed quasars: 5.3σ tension between early and late-Universe probes. *arXiv:1907.04869*, 2019.
2. Chen, G. C.-F., et al. A SHARP view of H0LiCOW: H_0 from three time-delay gravitational lens systems with adaptive optics imaging. *MNRAS*, stz2547, 2019.
3. Taubenberger, S., et al. The Hubble Constant determined through an inverse distance ladder including quasar time delays and Type Ia supernovae. *A&A*, 628, L7, 2019.
4. Rusu, C. E., et al. H0LiCOW XII. Lens mass model of WFI2033-4723 and blind measurement of its time-delay distance and H_0 . *arXiv:1905.09338*, 2019.
5. Sluse, D., et al. H0LiCOW XI: Spectroscopic/imaging survey and galaxy-group identification around the strong gravitational lens system WFI2033-4723. *MNRAS*, stz2483, 2019.
6. Birrer, S., et al. H0LiCOW - IX. Cosmographic analysis of the doubly imaged quasar SDSS 1206+4332 and a new measurement of the Hubble constant. *MNRAS*, 484, 4726-4753, 2019.
7. Chen, G. C.-F., et al. Constraining the microlensing effect on time delays with new time-delay prediction model in H_0 measurements. *MNRAS*, 481, 1115-1125, 2018.
8. Williams, P. R., et al. Discovery of three strongly lensed quasars in the Sloan Digital Sky Survey. *MNRAS: Letters*, 477, L70-L74, 2018.

Non-Refereed papers

1. Beaton, R. L., et al. Measuring the Hubble Constant Near and Far in the Era of ELT's. *BAAS* 51(3) 456, 2019.
2. Ding, X., Treu, T., **Shajib, A. J.**, et al. Time Delay Lens Modeling Challenge: I. Experimental Design. *arXiv:1801.01506*, 2018.