

Lizhou Sha

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EDUCATION	University of Wisconsin–Madison <i>2020–present</i> <i>PhD candidate in Astronomy, MS in Astronomy (2022)</i> Advisors: Andrew Vanderburg (MIT, research), Ellen Zweibel (academic)
	Massachusetts Institute of Technology <i>2014–2018</i> <i>SB in Physics (2018)</i>
RESEARCH INTERESTS	Evolution and demographics of hot gas giant planetary systems Search for and dating of young planets in nearby open clusters
SUMMARY OF PUBLICATIONS	20 refereed journal articles, 967 ADS citations (2 first-author, 20 citations) 2 non-refereed publications, 329 citations
AWARDS	NASA Silver Achievement Medal (as part of the <i>TESS</i> Project Team) <i>2019</i>
EMPLOYMENT	Summer Science Program Online (due to COVID-19) <i>Teaching Assistant and Residential Mentor, Astrophysics Program</i> <i>Summer 2020</i>
	Massachusetts Institute of Technology Cambridge, MA <i>TESS Quick Look Pipeline Engineer</i> <i>2018–2020</i>
	Google Seattle, WA <i>Software Engineering Intern</i> <i>Summer 2017</i>
TEACHING	<i>University of Wisconsin–Madison</i> The Evolving Universe: Stars, Galaxies, and Cosmology (TA) <i>Spring 2023</i> Introductory astronomy course for non-majors; 6 discussion sections of ~190 students
ACCEPTED PROPOSALS	JWST Cycle 2 GO-03385 (Co-I; PI: Chelsea X. Huang). “The first comparative atmospheric study of a Jovian planet and a sub-Neptune in the TOI-1130 system”. USD 200,000 , 30 h, 2023
	ESO HARPS, 112.25WB (Co-I; PI: Chelsea X. Huang). “Characterising the architecture of TOI-2000: a ‘hybrid’ Saturn system with 4 planets”. 2 nights , 2023
	NOIRLab CHIRON, 2020A-0125 (Co-I; PI: Avi Shporer). “Radial Velocity Confirmation of TESS Warm Jupiter Candidates”. 30 h , 2020
PUBLICATIONS, REFEREED OR UNDER REVIEW	[1] L. Sha et al. “Confirming the Tidal Tails of the Young Open Cluster Blanco 1 with TESS Rotation Periods”. <i>Submitted to Astrophys. J.</i> (2024). [2] L. Sha et al. “TESS spots a mini-neptune interior to a hot saturn in the TOI-2000 system”. <i>Mon. Not. R. Astron. Soc.</i> 524, 1 (2023), pp. 1113–1138. DOI: 10.1093/mnras/stad1666. arXiv: 2209.14396. [3] L. Sha et al. “TOI-954 b and K2-329 b: Short-period Saturn-mass Planets that Test whether Irradiation Leads to Inflation”. <i>Astron. J.</i> 161, 2, 82 (2021). DOI: 10.3847/1538-3881/abd187. arXiv: 2010.14436. [4] M. Badenas-Agusti et al. “cecilia: A Machine Learning-Based Pipeline for Measuring Metal Abundances of Helium-rich Polluted White Dwarfs”. <i>Mon. Not. R. Astron. Soc. (accepted)</i> (2024). DOI: 10.1093/mnras/stae421. arXiv: 2402.05176.

- [5] J. Korth et al. “TOI-1130: A photodynamical analysis of a hot Jupiter in resonance with an inner low-mass planet”. *Astron. Astrophys.* 675, A115 (2023). DOI: 10 . 1051 / 0004 - 6361/202244617. arXiv: 2305 . 15565.
- [6] M. Kunitomo et al. “The TESS Faint-star Search: 1617 TOIs from the TESS Primary Mission”. *Astrophys. J. Suppl. Ser.* 259, 2, 33 (2022). DOI: 10 . 3847 / 1538 - 4365 / ac5688. arXiv: 2112 . 02176.
- [7] M. Fausnaugh et al. “The TESS Mission Target Selection Procedure”. *Publ. Astron. Soc. Pac.* 133, 1027, 095002 (2021). DOI: 10 . 1088 / 1538 - 3873 / ac1d3f. arXiv: 2109 . 02665.
- [8] J. Dong et al. “Warm Jupiters in TESS Full-frame Images: A Catalog and Observed Eccentricity Distribution for Year 1”. *Astrophys. J. Suppl. Ser.* 255, 1, 6 (2021). DOI: 10 . 3847 / 1538 - 4365 / abf73c. arXiv: 2104 . 01970.
- [9] N. M. Guerrero et al. “The TESS Objects of Interest Catalog from the TESS Prime Mission”. *Astrophys. J. Suppl. Ser.* 254, 2, 39 (2021). DOI: 10 . 3847 / 1538 - 4365 / abefe1. arXiv: 2103 . 12538.
- [10] T. Daylan et al. “TESS Observations of the WASP-121 b Phase Curve”. *Astron. J.* 161, 3, 131 (2021). DOI: 10 . 3847 / 1538 - 3881 / abd8d2. arXiv: 1909 . 03000.
- [11] M. M. Fausnaugh et al. “Early-time Light Curves of Type Ia Supernovae Observed with TESS”. *Astrophys. J.* 908, 1, 51 (2021). DOI: 10 . 3847 / 1538 - 4357 / abcd42. arXiv: 1904 . 02171.
- [12] T. G. Beatty et al. “The TESS Phase Curve of KELT-1b Suggests a High Dayside Albedo”. *Astron. J.* 160, 5, 211 (2020). DOI: 10 . 3847 / 1538 - 3881 / abb5aa. arXiv: 2006 . 10292.
- [13] I. Wong et al. “Systematic Phase Curve Study of Known Transiting Systems from Year One of the TESS Mission”. *Astron. J.* 160, 4, 155 (2020). DOI: 10 . 3847 / 1538 - 3881 / ababad. arXiv: 2003 . 06407.
- [14] D. J. Armstrong et al. “A remnant planetary core in the hot-Neptune desert”. *Nature* 583, 7814 (2020), pp. 39–42. DOI: 10 . 1038 / s41586 - 020 - 2421 - 7. arXiv: 2003 . 10314.
- [15] R. Cloutier et al. “TOI-1235 b: A Keystone Super-Earth for Testing Radius Valley Emergence Models around Early M Dwarfs”. *Astron. J.* 160, 1, 22 (2020). DOI: 10 . 3847 / 1538 - 3881 / ab9534. arXiv: 2004 . 06682.
- [16] C. X. Huang et al. “TESS Spots a Hot Jupiter with an Inner Transiting Neptune”. *Astrophys. J. Lett.* 892, 1, L7 (2020). DOI: 10 . 3847 / 2041 - 8213 / ab7302. arXiv: 2003 . 10852.
- [17] R. I. Dawson, C. X. Huang, J. J. Lissauer, K. A. Collins, **L. Sha**, et al. “TOI-216b and TOI-216 c: Two Warm, Large Exoplanets in or Slightly Wide of the 2:1 Orbital Resonance”. *Astron. J.* 158, 2, 65 (2019). DOI: 10 . 3847 / 1538 - 3881 / ab24ba. arXiv: 1904 . 11852.
- [18] J. E. Rodriguez et al. “An Eccentric Massive Jupiter Orbiting a Subgiant on a 9.5-day Period Discovered in the Transiting Exoplanet Survey Satellite Full Frame Images”. *Astron. J.* 157, 5, 191 (2019). DOI: 10 . 3847 / 1538 - 3881 / ab11d9. arXiv: 1901 . 09950.
- [19] D. Dragomir et al. “TESS Delivers Its First Earth-sized Planet and a Warm Sub-Neptune”. *Astrophys. J. Lett.* 875, 2, L7 (2019). DOI: 10 . 3847 / 2041 - 8213 / ab12ed. arXiv: 1901 . 00051.
- [20] C. X. Huang et al. “TESS Discovery of a Transiting Super-Earth in the pi Mensae System”. *Astrophys. J. Lett.* 868, 2, L39 (2018). DOI: 10 . 3847 / 2041 - 8213 / aaef91. arXiv: 1809 . 05967.
- [21] I. J. M. Crossfield et al. “A TESS Dress Rehearsal: Planetary Candidates and Variables from K2 Campaign 17”. *Astrophys. J. Suppl. Ser.* 239, 1, 5 (2018). DOI: 10 . 3847 / 1538 - 4365 / aae155. arXiv: 1806 . 03127.

**PUBLICATIONS,
NON-REFEREED**

- [N1] C. X. Huang, A. Vanderburg, A. Pál, **L. Sha**, L. Yu, et al. “Photometry of 10 Million Stars from the First Two Years of TESS Full Frame Images: Part II”. *Res. Notes Am. Astron. Soc.* 4, 11, 206 (2020). DOI: 10.3847/2515-5172/abca2d. arXiv: 2011.06459.
- [N2] C. X. Huang, A. Vanderburg, A. Pál, **L. Sha**, L. Yu, et al. “Photometry of 10 Million Stars from the First Two Years of TESS Full Frame Images: Part I”. *Res. Notes Am. Astron. Soc.* 4, 11, 204 (2020). DOI: 10.3847/2515-5172/abca2e. arXiv: 2011.06459.

**CONFERENCE
TALKS**

- [C1] L. Sha. “Rotational periods verify the tidal tails of the young open cluster Blanco 1”. *Great Lakes Exoplanets Area Meeting*. Bloomington, IN, Oct. 2023.
- [C2] L. Sha. “TESS Spots a Mini-Neptune Interior to a Hot Saturn in the TOI-2000 System”. *TESS Science Team Meeting #30*. Online, Dec. 2022.
- [C3] L. Sha. “TESS Spots a Mini-Neptune Interior to a Hot Saturn in the TOI-2000 System”. *Great Lakes Exoplanets Area Meeting*. Columbus, OH, Nov. 2022.
- [C4] L. Sha. “TESS Spots a Mini-Neptune Interior to a Hot Saturn in the TOI-2000 System”. *Emerging Researchers in Exoplanet Science VII*. State College, PA, Aug. 2022.
- [C5] L. Sha et al. “A new TESS discovery refines the occurrence rate of inner companions to hot Jupiters”. *American Astronomical Society Meeting Abstracts*. Vol. 235. Honolulu, HI, Jan. 2020, 349.08.
- [C6] L. Sha, C. X. Huang, and A. Vanderburg. “Does WASP-47 e Have Friends? Occurrence Rate of Inner Companions to Hot Jupiters with TESS FFI Data”. *TESS Science Conference I*. Cambridge, MA, July 2019.
- [C7] L. Sha et al. “The MIT Quick Look Pipeline for TESS Full Frame Images: Performance and Early Results”. *Breakout Session: Community Data Products and Early Science from the TESS Mission*. Ed. by T. Barclay and K. Colón. Kepler and K2 Science Conference V. Glendale, CA, Mar. 2019.
- [C8] L. Sha et al. “The MIT Quick Look Pipeline for TESS Full Frame Images”. *TESS Data Workshop*. Baltimore, MD, Feb. 2019.
- [C9] L. Sha et al. “TOI 216: A system of two warm, large exoplanets in or near 2:1 resonance”. *Boston Area Exoplanet Science Meeting #5*. Boston, MA, Jan. 2019.

**SEMINARS AND
COLLOQUIA**

1. L. Sha. “Searching TESS Data for Inner Companion to Hot Jupiters” (**invited**). Exoplanet Pizza Lunch, Center for Astrophysics | Harvard & Smithsonian (online). 2020 Oct 19.
2. L. Sha. “TESS Full Frame Images and Hot Massive Planets”. Exoplanet Lunch Talk, Princeton University. 2020 Jan 27.

POSTERS

- [P1] L. Sha, A. Vanderburg, and C. X. Huang. “Most hot jupiters are lonely: An occurrence rate of inner companions to hot jupiters from Kepler, K2, and TESS transit photometry”. *Extreme Solar Systems V*. Christchurch, New Zealand, 2024.
- [P2] L. Sha et al. “Stellar Rotation Periods in Blanco 1: Verifying the Tidal Tails of a Young Open Cluster”. *Emerging Researchers in Exoplanet Science VIII*. New Haven, CT, 2023.
- [P3] L. Sha et al. “Stellar Rotation Periods in Blanco 1: Verifying the Tidal Tails of a Young Open Cluster”. *Gordon Research Conference: Origin of Solar Systems*. South Hadley, MA, 2023.
- [P4] L. Sha. “TESS Spots a Mini-Neptune Interior to a Hot Saturn in the TOI-2000 System”. *Sagan Exoplanet Summer Workshop*. Pasadena, CA, 2022.
- [P5] L. Sha et al. “TESS Discovers A Short-Period Saturn-Mass Planet with an Inner Companion”. *TESS Science Conference II*. Online, 2021, 198. DOI: 10.5281/zenodo.5148845.

- [P6] L. Sha, C. X. Huang, and A. Vanderburg. “Refining the occurrence rate of inner companions to hot Jupiters using *TESS* full-frame image data”. *Extreme Solar Systems IV*. Reykjavík, Iceland, 2019, 309.11.
- [P7] L. Sha, C. X. Huang, and A. Vanderburg. “Photometric performance of the MIT Quick Look Pipeline for the *TESS* full frame data”. *American Astronomical Society Meeting Abstracts*. Vol. 233. Seattle, WA, 2019, 467.08.

LEADERSHIP AND SERVICE

Peer reviewer for *Astron. J.*

Department of Astronomy, University of Wisconsin–Madison

Graduate Admissions Committee, student member (elected)

Fall 2023 – Spring 2024

Graduate Student Outreach Committee

Fall 2021 – Spring 2022

Massachusetts Institute of Technology

Educational Counselor, interviewer for undergraduate admissions

2021–present

Student Information Processing Board, Chair ’16, Secretary ’15

2014–2018

Student volunteer and computer club that runs several campus IT infrastructure services.

Ham Radio Operator, Boston Marathon

2017–2018

OUTREACH

Universe in the Park, *University of Wisconsin–Madison*

2023

Public talk and stargazing session in state parks across Wisconsin, USA.

Washburn Observatory, *University of Wisconsin–Madison*

2021–present

Public talk and stargazing with the historical 15.6-inch refractor.

Exoplanet Excavation for MIT *Splash!* and *Spark!*

2014–2019

1-hour lecture for high and middle schoolers, covering exoplanet detection methods.

Exoplanet Explorer for MIT *HSSP*

Summer 2018

7 weekly lectures for 7th–12th graders, topics: detection methods, atmospheres, habitability.

Quirky Quaternions for MIT *Splash!*

2015–2019

2-hour lecture for high schoolers, introducing a non-commutative algebra with vectors.

Science as Social Practice for MIT *Splash!*

2019

2-hour seminar for high schoolers, discussing science as a community of practice

SKILLS

PROGRAMMING Python, Go, C, JavaScript, Java, bash, Mathematica, Julia

PYTHON LIBRARIES Astropy, Emcee, Matplotlib, Numpy, Scipy, Pandas, Pymc

LANGUAGES Chinese (native speaker), English (native-level speaker)

Last updated: 2024-04-19 (UTC)