Jiaxuan Li

Personal Information

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Research Interests

- Dwarf galaxies: satellites in the Local Volume, ultra-diffuse (puffy) galaxies.
- Low surface brightness astronomy: galaxy outskirts, tidal debris, data reduction, instrumentation.
- Stellar population: star formation history, semi-resolved galaxies, initial mass function, photo-z.
- Galaxy evolution: quenching, scaling relations, galaxy-halo connection.
- Statistical methods and machine learning in astrophysics.

Education

Graduate Student, Department of Astrophysical Sciences, Princeton University, U.S.A. — Aug 2021 – Now
Advisor: Jenny E. Greene

Master of Arts, Department of Astrophysical Sciences, Princeton University, U.S.A. — Aug 2021 – May 2023

Bachelor of Science (highest honor), Department of Astronomy, Peking University, China — Sept 2016 – July 2020
Major: Astrophysics GPA: 3.80/4.00 Rank: 2 / 28
Thesis: *Probing low surface brightness features in the NGC 1052 field with Dragonfly Telephoto Array*
Advisors: Pieter van Dokkum & Luis C. Ho

Research Positions

Research Assistant, KIAA, Peking University, China	Sept 2020 – Aug 2021
Undergraduate Research Intern, Yale University, U.S.	June 2019 – Sept 2019
Undergraduate Research Fellow, University of California, Santa Cruz, U.S.	Oct 2018 – Jan 2019
Undergraduate Research Assistant, Peking University, China	July 2017 – June 2020

References

Prof. Jenny Greene	Princeton University
Prof. Yingjie Peng	Kavli Institute for Astronomy and Astrophysics, Peking University
Prof. Alexie Leauthaud	University of California, Santa Cruz
Prof. Song Huang	Tsinghua University
Prof. Shany Danieli	Tel Aviv University

Publications

1. **Li J.**, Greene J., Carlsten S., Danieli S., Hedgehog: An Isolated Quiescent Dwarf Galaxy at 2.4 Mpc, ApJL 975, L23 (2024).
   * *This work is highlighted in AAS Nova.*
2. **Li J.**, Melchior P., Hahn C., Huang S., PopSED: Population-Level Inference for Galaxy Properties from Broadband Photometry with Neural Density Estimation, *AJ* 167, 16 (2024).
3. **Li J.**, Greene J., Greco J., Beaton R., Danieli S., Goulding A., Huang S., Kado-Fong E., Beyond Ultra-Diffuse Galaxies II: Environmental Quenching of Mass-Size Outliers Among the Satellites of Milky Way Analogs, *ApJ* 955, 2 (2023).
4. **Li J.**, Greene J., Greco J., Huang S., Melchior P., Beaton R., Casey K., Danieli S., Goulding A., Joseph R., Kado-Fong E., Kim J., MacArthur L., Beyond Ultra-Diffuse Galaxies I: Mass-Size Outliers Among the Satellites of Milky Way Analogs, *ApJ* 955, 1 (2023).

5. **Li J.**, Huang S., Leauthaud A., Moustakas J., Danieli S., Greene J., Abraham R., Ardila F., Kado-Fong E., Lokhorst D., Lupton R., Price P., Reaching for the Edge I: Probing the Outskirts of Massive Galaxies with HSC, DECaLS, SDSS, and Dragonfly, *MNRAS* 515, 4 (2022).
6. Dou J., Peng Y., et al. (including **Li J.**), The HI Reservoir in Central Spiral Galaxies and the Implied Star Formation Process, ApJL, 973, 1 (2024).
7. Danieli S., et al. (including **Li J.**), Merian: A Wide-Field Imaging Survey of Dwarf Galaxies at $z \sim 0.06 - 0.10$, *ApJ* submitted.
8. Mintz A., Greene J., Kado-Fong E., Danieli S., **Li J.**, et al., A non-parametric morphological analysis of Hα emission in bright dwarfs using Merian Survey, *ApJ* accepted.
9. Nemer A., Hahn C., **Li J.**, Melchior P., Goodman J., Constraining Protoplanetary Disk Winds from Forbidden Line Profiles with Simulation-based Inference, *ApJ* 965, 157 (2024).
10. Luo Y. et al. (including **Li J.**), The Merian Survey: Design, Construction, and Characterization of a Filter Set Optimized to find Dwarf Galaxies and Measure their Dark Matter Halo Properties with Weak Lensing, *MNRAS* 530, 4 (2024).
11. Greene J. et al. (including **Li J.**), ELVES III: Environmental Quenching by Milky Way-Mass Hosts, *ApJ* 949, 94 (2023).
12. Greene J. et al. (including **Li J.**), The Nature of Low Surface Brightness Galaxies in the Hyper Suprime-Cam Survey, *ApJ* 933, 150 (2022).
13. Shi J., Peng Y., et al. (including **Li J.**), Cold Gas in Massive Galaxies as A Critical Test of Black Hole Feedback Models, *ApJ*, 927, 2 (2022).
14. Danieli S., et al. (including **Li J.**), NGC5846-UDG1: A galaxy formed mostly by star formation in massive, extremely dense clumps of gas, *ApJL* 927, 2 (2022).
15. Liu Q., Abraham R., Gilhuly C., van Dokkum P., Martin P. G., **Li J.**, Greco J. P., et al., A Method To Characterize the Wide-Angle Point Spread Function of Astronomical Images, *ApJ* 925, 2 (2022).
16. Keim M. A., van Dokkum P., Danieli S., Lokhorst D., **Li J.**, Shen Z., Abraham R., et al., Tidal Distortions in NGC1052-DF2 and NGC1052-DF4: Independent Evidence for a Lack of Dark Matte, arXiv:2109.09778, ApJ submitted.
17. Miller T. B., van Dokkum P., Danieli S., **Li J.**, Abraham R., Conroy C., Gilhuly C., Greco J. P., Liu Q., Lokhorst D., Merritt A., The Dragonfly Wide Field Survey. II. Accurate Total Luminosities and Colors of Nearby Massive Galaxies and Implications for the Galaxy Stellar Mass Function, *ApJ*, 909, 74 (2021).
18. van Dokkum P., Lokhorst D., Danieli S., **Li J.**, Merritt A., Abraham R., Gilhuly C., Greco J. P., Multi-resolution filtering: an empirical method for isolating faint, extended emission in Dragonfly data and other low resolution images, *PASP*, 132, 1013 (2020).
19. Danieli S. et al. (including **Li J.**), The Dragonfly Wide Field Survey. I. Telescope, Survey Design, and Data Characterization, *ApJ*, 894, 2 (2020).

Conference papers and white papers

1. **Li J.**, Melchior P., Hahn C., Huang S., Population-Level Inference for Galaxy Properties from Broadband Photometry, accepted to 2023 ICML ML4Astro workshop.
2. Han J. et al. (including **Li J.**), NANCY: Next-generation All-sky Near-infrared Community surveY, white paper for the Roman Core Community Survey, June 2023.

Honors and Awards

AAS 243 Chambliss Astronomy Achievement Student Award	Jan 2024
Outstanding Undergraduate Thesis Award in Beijing (北京市本科优秀毕业论文)	Sept 2020
Weiming Bachelor ("未名学士" 称号)	June 2020
Outstanding Graduate of General Colleges and Universities in Beijing (北京市普通高校优秀毕业生)	June 2020
Outstanding Graduate of Peking University (北京大学优秀毕业生)	June 2020

PKU Scholar in Physics (未名物理学子) 2017 – 2020
Tang Li-Xin Scholarship (10,000 RMB per year, most competitive scholarship in PKU) May 2019
AEON Scholarship, Peking University (10,000 RMB, 2/202) Sept 2018
Leo KoGuan Scholarship, Peking University (10,000 RMB, 4/202) Oct 2017
Lin-bridge Prize for Excellent Undergraduate Research (2,800 RMB, endowed by Prof. Douglas Lin) Sept 2018
Merit Student, Peking University 2017, 2018
First Prize, 8th China Undergraduate Physicists Tournament Aug 2017
Meritorious Winner in Mathematical Contest In Modeling (MCM/ICM) Apr 2018
Silver Medal, 9th International Olympiad on Astronomy and Astrophysics (IOAA) Aug 2015
Gold Medal & Best Result, China National Astronomy Olympiad 2014, 2015
Gold Medal (3rd place), 1st Princeton University Physics Competition Jan 2015

Observing Experience

Baade/IMACS on Magellan telescope: 7 dark nights imaging PI: 2024A, 2024B
ELVES-Dwarf: Probing the satellite population of dwarf galaxies in the Local Volume
WIYN telescope: 8 dark nights imaging PI: 2024A, 2024B
ELVES-Dwarf: Probing the satellite population of dwarf galaxies in the Local Volume
WIYN telescope: 2 dark nights Hα imaging PI, 2024B
Probing star formation in low-density environments with deep Hα imaging (Co-PI: Jiayi Sun)
Clay/LDSS3 on Magellan telescope: 1 dark night spectroscopy PI, 2022B
Redshift confirmation of Ultra-Diffuse Galaxies hosted by Milky-Way analogs at $0.01 < z < 0.04$
Baade/MagE on Magellan telescope: 2 dark nights spectroscopy Co-I: 2024B
Clay/IFU-M on Magellan telescope: 2 dark nights spectroscopy Co-I, 2023A
High-resolution Hα rotation curves of star-forming ultra-diffuse galaxies with the new IFU-M spectrograph (PI: Shany Danieli)
Clay/IFU-M on Magellan telescope: 1 dark night spectroscopy Co-I, 2023A
Spatially Resolved Stellar Populations of Nearby Ultra-Diffuse Galaxies hosted by Milky-Way analogs (PI: Meng Gu)
Merian Survey with 4-m Blanco telescope and DECam: 12 nights 2021-2024
Shane 3-m Telescope, UCO Lick Observatory: 2 nights observation of spectroscopy. Jan 2019
Xinglong 2.16-m Telescope (NAOC): 2 nights observation of photometry. Oct 2019
Peking University 40-cm Telescope (PKUFT): photometry and spectroscopy 2017 – 2019

Computer Skills

Skilled in: Python, LaTeX, Mathematica, Shell/Bash, Git.

Experienced with:
- Significant experience with HSC, DECaLS, Dragonfly, Magellan/IMACS, WIYN/ODI
- Manipulating catalogs, analyzing dataset and visualization
- Photometry for galaxies and low surface brightness features
- Probabilistic programming, machine learning, neural network.

Software Contributions:
- `smplotlib`: Matplotlib template for SuperMongo style (> 100 stars)
- `mrf`: Multi-Resolution Filtering – a method for isolating faint extended emission in Dragonfly data and other low resolution images
- `kungpao`: Photometric analysis library for Hyper Suprime-Camera images
- `unagi`: For searching and downloading data from Hyper Suprime-Camera
- More work can be found on my GitHub: `@AstroJacobLi`

Teaching, Advising, and Service Experience

- Reviewer for AJ 2 papers
- Teaching Assistant of AST 303 (Research Methods in Astrophysics) 2022 Fall
- Co-advised Vivek Vijayakumar (undergraduate student, Princeton) 2022 Summer

- Organizer of the Survey Science Discussion at Princeton 2022 Fall – now
- Co-organizer of the tea time for Princeton graduate students 2021 Fall – 2022 Fall

Outreach Experience

- President of Peking University Youth Astronomy Society (largest academic student association at PKU). I organized and also gave public talks on topics in astrophysics.
- Mentor of the Chinese Astronomy Olympiad National Team, and wrote a textbook on Astronomy Olympiad. I also helped design the problems of the 12$^{\text{th}}$ IOAA.
- Invited to a television show "Voice" (开讲啦) on CCTV-1 as a youth representative. I talked about public outreach regarding astronomy in China and the future of Chinese astronomy.

Talks and Presentations

Talk at Yale's Astro × Data Science seminar (*invited*) Nov 2024
PopSED: Population-level inference for galaxy properties from broadband photometry

Talk, "Small Galaxies, Cosmic Questions. II", Durham, UK Aug 2024
ELVES-Dwarf, Hedgehog, and future SBF survey

Poster, "Dwarf Galaxies, Star Clusters, and Streams in the LSST Era", Chicago, Illinois July 2024
Hedgehog: An Isolated Quiescent Dwarf Galaxy at 2.4 Mpc

Talk, the 243rd meeting of the American Astronomical Society, New Orleans, Louisiana Jan 2024
The Merian Survey: Mapping Classical Dwarf Galaxies at $z = 0.05 - 0.1$ with HSC-SSP + Blanco/DECam

Poster, the 243rd meeting of the American Astronomical Society, New Orleans, Louisiana Jan 2024
PopSED: Population-level inference for galaxy properties from broadband photometry

Talk at Tsinghua DoA ML Session (*invited*) Nov 2023
PopSED: Population-level inference for galaxy properties from broadband photometry

Poster, Machine Learning for Astrophysics, International Conference on Machine Learning, Hawaii July 2023
Population-Level Inference for Galaxy Properties from Broadband Photometry

Talk, "Galactic Frontiers: Dwarf Galaxies in the Local Volume and Beyond", New York City July 2023
Ultra-puffy galaxies among satellites of Milky Way analogs

Seminar, Kavli Institute for Astronomy and Astrophysics, Peking University, Beijing June 2023
Ultra-puffy galaxies among satellites of Milky Way analogs: from definition to environmental quenching

Seminar, Department of Astronomy, Tsinghua University, Beijing June 2023
Ultra-puffy galaxies among satellites of Milky Way analogs: from definition to environmental quenching

Poster, Roman Science Inspired by JWST Results, STScI, Baltimore June 2023
Surface Brightness Fluctuations of Nearby Dwarf Galaxies in the Roman Era

Morning Coffee talk about ultra-puffy galaxies, Institute for Advanced Study Dec 2022

Low surface brightness galaxies and `scarlet`, Princeton HSC+PFS+Rubin discussion May 2022