Jiaxuan Li

Personal Information

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Research Interests

- Low surface brightness astrophysics: ultra-diffuse (puffy) galaxies, galaxy outskirts, tidal debris, 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

Publications

1. **Li J.**, Melchior P., Hahn C., Huang S., PopSED: Population-Level Inference for Galaxy Properties from Broadband Photometry with Neural Density Estimation, ApJ Submitted. arXiv:2309.16958.
2. **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).
3. **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).
4. **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).
5. 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.

6. 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* submitted.
7. Greene J. et al. (including **Li J.**), ELVES III: Environmental Quenching by Milky Way-Mass Hosts, *ApJ* 949, 94 (2023).
8. Greene J. et al. (including **Li J.**), The Nature of Low Surface Brightness Galaxies in the Hyper Suprime-Cam Survey, *ApJ* 933, 150 (2022).
9. Shi J., et al. (including **Li J.**), Cold Gas in Massive Galaxies as A Critical Test of Black Hole Feedback Models, *ApJ*, 927, 2 (2022).
10. 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).
11. 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).
12. 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.
13. 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).
14. 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).
15. 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

1. **Li J.**, Melchior P., Hahn C., Huang S., Population-Level Inference for Galaxy Properties from Broadband Photometry, accepted to 2023 ICML ML4Astro workshop.

Honors and Awards

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

Observation Experience

Clay/LDSS3 on Magellan telescope: 1 dark night spectroscopy — PI, 2022B

Title: Redshift confirmation of Ultra-Diffuse Galaxies hosted by Milky-Way analogs at $0.01 < z < 0.04$

Clay/IFU-M on Magellan telescope: 1 dark night spectroscopy — Co-I, 2023A

Title: 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 — 2021-2023

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, MaNGA, IllustrisTNG
- 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 (> 70 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
- Teaching Assistant of AST 303 (Research Methods in Astrophysics) — 2022 Fall
- Co-advised Vivek Vijayakumar (undergraduate student, Princeton) — 2022 Summer
- Co-organizer of the HSC + PFS + Rubin 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 12$^{\text{th}}$ IOAA.
- Invited to a television show "Voice" (开讲啦) on CCTV-1 as a youth representative. I talked about the public outreach of astronomy in China and the future of Chinese astronomy.

Talks and Presentations

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