Abigail J. Lee

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Education

University of Chicago — Chicago, IL
Ph.D. Student, Astronomy & Astrophysics — *Expected 2024*
Advisor: Wendy Freedman

University of Pennsylvania — Philadelphia, PA
B.A., Physics (with Honors); Minors in Mathematics and Classical Studies, summa cum laude — *May 2019*
Senior Thesis: Reconstructing Lognormal Density Fields using Hamiltonian Monte Carlo Techniques
Advisor: Gary Bernstein

Awards & Fellowships

LSST Coorporation Data Science Fellowship — 2021
LSST Corporation

Chambliss Astronomy Achievement Award — 2021
237th Meeting of the American Astronomical Society

McCormick Fellowship — 2019 – 2021
University of Chicago

Elaine K. Bernstein Women in Science Award — 2019
University of Chicago

NASA Pennsylvania Space Grant Undergraduate Scholarship — 2018
NASA

University Scholars Research Grant — 2016, 2017
University of Pennsylvania

Research Positions

UChicago, Graduate Research Assistant — 2019 – Present

- Developed a new local distance indicator, the JAGB method

Penn, Cosmology Undergraduate Research Assistant — 2017 – 2019

- Developed code to reconstruct dark matter density fields from galaxy fields using Hamiltonian Monte Carlo Techniques for applications in next-generation galaxy surveys

Stanford KIPAC, Summer Undergraduate Research Assistant — 2018

- Identified main catalysts for subhalo disruption in galaxy clusters using zoom-in simulations

Max Planck Institute for Gravitational Physics, Summer Undergraduate Research Assistant — 2017

- Modeled noise artifacts in LIGO data using gravitational wave parameter estimation techniques

NASA Jet Propulsion Laboratory, Summer Intern — 2017

- Developed statistical models for a terrestrial remote sensing mission by quantifying the effects of seasonality and precipitation levels on radio backscatter

Penn, Experimental Condensed Matter Undergraduate Research Assistant — 2016 – 2017

- Fabricated graphene field-effect transistors for bio-sensing applications

Publications

1. Freedman, W. L., Madore, B. F., **Lee, A. J.** *Astrophysical Distance Scale IV. Preliminary Zero-Point Calibration of the JAGB Method in the HST/WFC3-IR Broad J-Band (F110W) Filter.* 2021, submitted to ApJ.

2. **Lee, A. J.**, Freedman, W. L., Madore, B. F., Owens, K. A., Monson, A. J., Hoyt, T. J. *The Astrophysical Distance Scale III: Distance to the Local Group Galaxy WLM using Multi-Wavelength Observations of the Tip of the Red Giant Branch, Cepheids, and JAGB Stars.* 2021, ApJ, 907 112.

3. Vishnubhotla, R., Ping. J., Gao, Z., **Lee, A.**, Saouaf, O., Vrudhula, A., Johnson, A. T. C. *Scalable Graphene Aptasensors for Drug Quantification* 2017, AIP Advances 7, 115111.

Successful Proposals

Co-I: JWST Cycle 1 (PI: Wendy Freedman & Barry Madore) 2021
Answering the Most Important Problem in Cosmology Today: Is the Tension in the Hubble Constant Real?

Co-I: HST Cycle 28 (PI: Wendy Freedman) 2020
An Independent Appraisal of the Cepheid Distance Scale

Co-I: HST Cycle 28 (PI: Wendy Freedman) 2020
Absolute Magnitude Calibration of SNe Ia at 1%: Doubling the Sample of TRGB Host-Galaxy SN Calibrators

Teaching Experience

Guest Lecturer, UChicago, *Galaxies* 2020
Teaching Assistant, UChicago, *Galaxies* 2020
Teaching Assistant, UChicago, *Stars* 2019
Teaching Assistant, Penn, *Classical Mechanics* 2019
Observing Labs Teaching Assistant, Penn, *Survey of the Universe* 2018, 2019
Teaching Assistant, Penn, *E&M, Optics, and Modern Physics* 2018
Lab Teaching Assistant, Penn, *Classical Mechanics* 2017
Tutor, Penn Physics Department 2016, 2017

Observing Experience

Public data – significant experience with data from HST, Gaia, 2MASS
Magellan-Baade Fourstar - 1 night (virtual due to COVID-19) 2021

Press

UChicago News, *Aging stars provide a new cosmological yardstick* 2021
Penn Today, *Women in Physics Group inspires the next generation of physicists and astronomers* 2019

Contributed Talks

Distance to WLM Using Observations of the TRGB, Cepheids, and JAGB Stars 2021
237th Meeting of the American Astronomical Society

Characterizing the temporal variability of backscatter in prep. for the NISAR mission 2017
2017 AGU Fall Meeting

Characterizing Backscatter Variability using UAVSAR 2017
2017 Gulf Coast Undergraduate Research Symposium

Improved Performance in Graphene & MoS_2 FETs using a BN Isolation Layer 2017
2017 Emerging Researchers National Conference in STEM

Professional Service

Climate Survey Committee Member, UChicago 2021 – Present
Graduate Student Peer Mentorship Program Organizer, UChicago 2019 – Present
Advising & Mentoring Working Group Member, UChicago 2020 – Present
Inclusion, Diversity and Equity in Astronomy Club Member, UChicago 2019 – Present
Faculty Meeting Graduate Student Representative, UChicago 2019 – 2020
Society of Physics Students Board Member, Penn 2018 – 2019

Outreach

Guest Lecturer on "Mentorship in Academia", UChicago Physics of Stars class 2021
Space Explorers Winter Institute Instructor, UChicago 2020
Observing Nights Organizer, Penn 2018 – 2019
Astronomy Tutor for Veterans, Penn Veterans Upward Bound 2018 – 2019