

Keyi Ding

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Education

Johns Hopkins University, Baltimore, Maryland

2024

B.S., Physics and Computer Science

Minor in Applied Mathematics and Statistics, Mathematics

Cumulative GPA: 3.91/4

Activities: AstroJays Rocketry Club, Society of Physics Students

Publications

- Schmidt, S. P., Schlafman, K. C., **Ding, K.**, et al. 2023, "Verification of Gaia DR3 Single-lined Spectroscopic Binary Solutions With Three Transiting Low-mass Secondaries", *The Astronomical Journal*, accepted

Manuscript in Preparation

- Ding, K.**, Schlafman, K. C., et al., "Accurate, Precise, and Self-consistent Photospheric and Fundamental Stellar Parameters for Solar-type Stars Without the Need for Spectroscopy", *in prep*

Professional Appointments

Undergraduate Research Assistant

2022 - Present

Department of Physics & Astronomy, Johns Hopkins University / Subaru Telescope Prime Focus Spectrograph (PFS) Galactic Archaeology Group
Baltimore, MD.

Advised by Prof. Rosemary F.G. Wyse, Carrie Filion

- Establish a photometry-based machine learning pipeline to distinguish target M-giant stars in M31 from foreground Milky Way M-dwarf stars, for the target selection of the PFS M31 survey.
- Model the HSC narrow-band NB515 filter's sensitivity to stellar parameters and abundances with synthetic photometry of spectra in the MaNGA Stellar Library (MaStar).
- Use theoretical models to simulate observational data for fields centered on M31, containing both foreground and M31 member stars.
- Reduce covariate shift in machine learning by constructing training sets that represents the stellar populations in both the foreground and M31.

Undergraduate Research Assistant

2021 - Present

Department of Physics & Astronomy, Johns Hopkins University

Baltimore, MD.

Advised by Prof. Kevin C. Schlafman, Dr. David Nataf, Dr. Henrique Reggiani

- Test the capability of a novel stellar parameter inference method by fitting multi-wavelength photometry, parallax, and 3-D dust maps to theoretical isochrones on a large scale (10k+ stars).

- Verify the precision and accuracy of the photospheric and fundamental stellar parameter inference with solar-type stars in 7 open clusters and the Kepler field (publication 2).
- Collect and clean photometric data from multiple astronomy databases with the ADQL query language.
- Implement Python scripts to conduct the inference in a Bayesian framework with a nested sampler, and algorithmically analyze the inferred posteriors.
- Program parallel computing tools to improve computation efficiency on advanced scientific computing servers.
- Employ the stellar parameter inference method to study candidate exoplanet host stars and transiting brown dwarfs (publication 1).

Instrument Support Intern

2022 - 2023

Space Telescope Science Institute

Baltimore, MD.

Advised by Dr. Louis-Gregory Strolger, Dr. Amy Jones, Sean Lockwood

- Write [tutorial Jupyter Notebooks](#) for the Hubble Space Telescope Imaging Spectrograph (STIS) data user community.
- Implement Python scripts to address HST Help Desk questions.
- Standardize the coding format of tutorial notebooks and edit documentation for publication.

Honors and Awards

Provost's Undergraduate Research Award (with a \$6000 research grant)	2023
IDIES Summer Student Research Fellowship (with a \$6000 research grant)	2022
HopHacks (a JHU-based hackathon), Second Place	2022
Dean's List (GPA above 3.5/4 for 6/6 semesters)	2020 - 2023

Conferences and Talks

Development of Machine Learning Techniques to Distinguish Giant Stars from Dwarf Stars Using Only Photometry	January 2024 (planning)
<i>243rd AAS Meeting, American Astronomical Society (AAS), New Orleans, LA</i>	
Accurate and Precise Photospheric Stellar Parameters from Rubin ugriz Photometry	August 2023
<i>Rubin Project and Community Workshop (PCW), LSST Cooperation, Tucson, AZ</i>	
Updates on the STIS Jupyter Notebooks Repository	April 2023
<i>The Telescope and Instruments Performance Summary (TIPS), Space Telescope Science Institute, Baltimore, MD</i>	
STIS Jupyter Notebooks	January 2023
<i>241st AAS Meeting, American Astronomical Society (AAS), Seattle, WA</i>	
Laying the Foundation for Large Scale Stellar Parameter Inference in the Field of Exoplanets	October 2022
<i>IDIES Annual Symposium, Institute for Data Intensive Engineering and Science (IDIES), Baltimore, MD</i>	
Determining Stellar Parameters of Stars in Open Clusters using Isochrones Inference	August 2022
<i>CARE Undergraduate Research Talks, JHU Center for Astrophysics Research Experience, Baltimore, MD</i>	

Teaching Experience

AS.171.107 General Physics for Physical Science Majors (Active Learning) I	Fall 2023
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Learning Assistant, with Prof. Rosemary Wyse

(Active learning version of Physics 101 on introductory mechanics for physical science majors)

AS.171.108 General Physics for Physical Science Majors (Active Learning) II

Spring 2023

Learning Assistant, with Prof. Petar Maksimovic

(Active learning version of Physics 102 on introductory electricity and magnetism for physical science majors)

AS.171.101 General Physics: Physical Science Major I

Fall 2022

Learning Assistant, with Prof. Nadia Zakamska

(introductory mechanics for physical science majors)

Technical Skills

- **Programming Languages and Software Tools:** Python, Java, SQL/ADQL, R, MATLAB, C/C++, JavaScript, HTML, Git, L^AT_EX, Markdown, Bash, SLURM, Mathematica
- **Quantitative Research:** Machine Learning, Mathematical Modeling, Bayesian Statistics, Relational Databases, Multi-core Parallelism
- **Communication:** Chinese (Native), English (TOEFL 114/120)

References

Rosemary F.G. Wyse

Alumni Centennial Professor, Department of Physics and Astronomy, Johns Hopkins University

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Kevin C. Schlaufman

Assistant Professor, Department of Physics and Astronomy, Johns Hopkins University

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Louis-Gregory Strolger

Deputy Head, Instruments Division, Space Telescope Science Institute

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