

# 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

1. 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", *AAS Journals*, submitted

## Manuscript in Preparation

1. **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 parameters 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 nested sampler, and algorithmically analyze the inferred posteriors.
- Program parallel computing tools to improve computation efficiency on advanced scientific computing servers.
- Employ the stellar parameters 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**

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

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**Louis-Gregory Strolger**

Deputy Head, Instruments Division, Space Telescope Science Institute

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