Jamila Taaki

My research improves the detection of exoplanets through new data science techniques.

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github.com/xiaziyna

Education

Schmidt AI in Science Postdoctoral Fellow | **University of Michigan** 2024 -
Michigan Institute for Data & AI in Society
Advisors: Prof. Lia Corrales and Prof. Alfred Hero

PhD | **Electrical and Computer Engineering** 2017 - 2024
University of Illinois Urbana-Champaign
Advisors: Prof. Farzad Kamalabadi and Prof. Athol Kemball
Thesis title: Signal Models and Computational methods for Robust Exoplanet Detection

M.Sc. (UK equivalent of MS+BS) | **Astrophysics** 2011 – 2015
Royal Holloway University of London
Advisors: Prof. Glen Cowan and Prof. Stewart Boogert

Refereed Publications

"A Search for Exoplanet Candidates in TESS 2min Light Curves using Joint Bayesian Detection" 2025
Taaki, Kamalabadi, Kemball | accepted with revisions to *The Astronomical Journal*

"Robust Detrending of Spatially Correlated Systematics in Kepler Light Curves Using Low-Rank Methods" 2024
Taaki, Kamalabadi, Kemball | *The Astronomical Journal* | Vol. 167, No. 2

"Bayesian Methods for Joint Exoplanet Transit Detection and Systematic Noise Characterization" 2020
Taaki, Kamalabadi, Kemball | *The Astronomical Journal* | Vol. 159, No. 6

Other Publications

"Efficient exoplanet imaging simulations of the Habitable Worlds Observatory" 2025
Taaki, Kamalabadi, Kemball, Corrales, Hero | in preparation for *The Astronomical Journal*

"PyStarshade: simulating high-contrast imaging of exoplanets with starshades" 2025
Taaki, Kamalabadi, Kemball | under review *the Journal of Open Source Software*

"Starshade: A Broad-Band, High-Throughput Mission for ExoEarth Discovery and Characterization" 2025
S. Seager, K. A. Bennett, **J. Taaki**, G. Kaur, R. Hu, S. Shaklan | NASA DARES astrobiology whitepaper

Proposals

Search for New Exoplanets in the TESS Data using Joint Signal Estimation 2021
Illinois Blue Waters supercomputer allocation: 250K node hours (estimated value $155,075) Co-Investigator

Presentations

University of Michigan 2024
Astronomy Colloquium: Finding Low SNR Exoplanets in Data with Complete Signal Models

Indiana University 2024
Invited Talk: Finding Hidden Exoplanets in Noisy Data with Complete Signal Models

Illinois Astrofest 2022
Talk: Searching for Exoplanet Transits in TESS (2-min) Raw Lightcurves

Outreach/Service

NASA Panel 2023
Served on a NASA panel as student executive secretary

Mentoring students on a project for graduate GPU-programming class (ECE 508) 2023
Develop optimizations of CUDA transit detection kernel

Teaching Assistant: Digital Imaging (ECE 558 spring semester) 2023
Deliver lectures, office hours and grading.

Software projects

PyStarshade: github.com/xiaziyna/PyStarshade 2023
Fourier optical modeling of external occulters for direct exoplanet imaging

spatial-detrend: github.com/xiaziyna/spatial-detrend 2023
Python library for detrending spatially correlated Kepler lightcurves

Efficient GPU computation of Bayesian transit detection 2024
Design and implementation of CUDA codes for Bayesian transit detection search. (ongoing)

Travel awards

HWO Spectral Retrieval Workshop 2024
STSci Baltimore, MD

NASA Heliophysics Summer School 2024
Living with a Star: Comparative Heliophysics Boulder, CO

NASA Sagan Summer Workshop 2024
Advances in Direct Imaging: From Young Jupiters to Habitable Earths. Pasadena, CA

Posters

Michigan Institute for Data & AI in Society 2024
Efficient parallel-processing to detect low SNR exoplanets embedded in complex noise UMich

NASA Sagan Summer Workshop 2024
PyStarshade: A Python starshade simulation tool for modeling contrast with exoplanetary scenes Pasadena, CA

Internships

Internship: Mars Climate Lab (the Open University) 2015
Advised by Prof. Stephen Lewis, simulated entry landing and descent profiles for landers

Technical Skills

Programming: Python (NumPy, SciPy, PyTorch, JAX, Sklearn, Matplotlib, Pandas, Astropy, Lightkurve), Blue Waters/HPC (400K node hours), CUDA, C, Bash, Git, IDL
Graduate courses: Random processes, detection and estimation theory, computational inference, Fourier optics, advanced signal processing, linear algebra, vector space signal processing, deep learning theory, statistical learning theory, information theory, pattern recognition

Other

Exoplanet of the Day (twitter.com/exoplanet_day): This Twitter bot posts an animation of a lightcurve and associated star-planet pair once a day, providing insight into the transit detection method and the catalog of known exoplanets.