JAMILA TAAKI

Schmidt Postdoctoral Fellow, University of Michigan — Exoplanet Detection, Signal Processing, Optical Simulation
xiaziyna.github.io

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

M.Sc. (UK equivalent of MS+BS) | **Astrophysics** | **Royal Holloway University of London** 2011 – 2015
Thesis title: Extracting Stellar Properties from Images of Star Clusters
Advisors: Prof. Glen Cowan and Prof. Stewart Boogert

REFEREED PUBLICATIONS

"Efficient exoplanet imaging simulations of the Habitable Worlds Observatory" 2025
Taaki, Kamalabadi, Kemball, Corrales, Hero | *The Astronomical Journal* (to appear)

"PyStarshade: Simulating High-Contrast Imaging of Exoplanets with Starshades" 2025
Taaki, Kamalabadi, Kemball | *Journal of Open Source Software* doi.org/10.21105/joss.07917

"A Search for Exoplanet Candidates in TESS 2min Light Curves using Joint Bayesian Detection" 2025
Taaki, Kamalabadi, Kemball | *The Astronomical Journal* Vol. 170, No. 1

"Robust Detrending of Spatially Correlated Systematics in Kepler Light Curves Using Low-Rank Methods" 2024
Taaki, Kemball, Kamalabadi | *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

"On The Identifiability of Rotating Stellar Surfaces from Astrometric Jitter" 2025
Taaki, Corrales, Hero | *ICASSP 2026* (submitted, in review)

"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 whitepaper (submitted)

PROPOSALS

Schmidt Sciences Model Zoo: A Collaborative Repository for AI in Science 2025
PI: N. Fox, Co-Is: **J. Taaki**, S. Temple $100,000

Search for New Exoplanets in the TESS Data using Joint Signal Estimation 2021
Illinois Blue Waters supercomputer allocation:
PI: A. Kemball, Co-Is: **J. Taaki**, F. Kamalabadi 250K node hours ($155,075)

SOFTWARE PROJECTS

NUFFT-based transit detection: (cuvarbase v1.0) 2025
Merged GPU-accelerated NUFFT transit detection for correlated-noise and gapped data into cuvarbase

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)

OUTREACH/SERVICE

WocCode Hackathon project lead 2025
NASA Space Apps, **Global nominee** in 'Hunting for Exoplanets with AI.'

Undergraduate Research Mentor - Transit Search Methods 2025
Department of Astronomy, University of Michigan

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.

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

PRESENTATIONS

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

Indiana University 2024
(Invited Talk) Finding Hidden Exoplanets in Noisy Data with Complete Signal Models Bloomington

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

POSTERS

Electronic Imaging (IS&T) 2026
(Accepted, upcoming) Arbitrary spatial sampling with the B-FFT for efficient exoplanet imaging simulations CA

Keck Workshop: Hybrid Space-Ground Observatories 2026
(Accepted, upcoming) Evaluating starshade tilt constraints with PyStarshade Caltech

Great Lakes Exoplanet Area Meeting 2025
(Accepted, upcoming) Breaking Degeneracies in Stellar Surface Mapping with Astrometry Wisconsin-Madison

(SciFM) Scientific Discovery in the Age of AI 2025
Fourier spectral zoom for efficient exoEarth imaging simulations Ann Arbor

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 mars landers

TECHNICAL SKILLS

Programming: Python (NumPy, SciPy, PyTorch, JAX, Sklearn, SymPy 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

OUTREACH TOOLS

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.