NATASHA LATOUF

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RESEARCH INTERESTS

Detection and characterization of planetary atmospheres, Bayesian statistics, Bayesian analysis techniques in atmospheric retrievals, future observatory development and design, open-source software development, ethical and effective mentorship practices, culturally responsible mentorship, advocacy-based mentorship, AJEDI (Access, Justice, Equity, Diversity, Inclusion), Arab and Arab-American experiences.

EDUCATION

George Mason University, Virginia ***August 2021 — Present***
Doctor of Philosophy in Physics GPA: 3.87
Thesis Focus: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE) & Effective and Ethical Mentorship Practices in Physics and Astronomy (with focus on Arab Experiences)
Committee Members: Dr. Joseph Weingartner, Dr. Avi Mandell, Dr. Paula Danquah-Brobby, Dr. Geronimo Villanueva, & Dr. Mario Gliozzi

George Mason University, Honors College, Virginia ***August 2017 — May 2021***
Bachelors of Science in Physics, Concentration in Astrophysics GPA: 3.5, Cum Laude
Honors Thesis: Confirmation of Exoplanet Candidates Orbiting Red Dwarf Stars from Transiting Exoplanet Satellite Survey (TESS)

APPOINTMENTS

NSF Graduate Research Fellow, NASA Goddard Space Flight Center ***2021 — Present***
Thesis research dedicated to using Bayesian analysis to quantify detection strength of biosignatures on exoEarths using the Habitable Worlds Observatory (see BARBIE above) & Effective and Ethical Mentorship Practices in Physics and Astronomy

Undergraduate Research Assistant, George Mason University ***2017 — 2021***
Research focusing on quantifying the amount of error induced on radial velocity measurements due to Earth's telluric interference using Python simulations for the EarthFinder probe mission concept study.

OSCAR Researcher, George Mason University ***Summer 2018***
Research focusing on quantifying the amount of error induced on radial velocity measurements due to Earth's telluric interference using Python simulations for the EarthFinder probe mission concept study.

Observer
Facilities Used:
Keck Telescopes - **California Institute of Technology**
NASA's Infrared Telescope using iShell
George Mason University Campus Telescope

PROPOSALS & GRANTS

Sellers Exoplanet Environments Collaboration (SEEC) ***Spring 2024***
Team Member. Title: Constraining what we can learn about habitable planets around K-dwarfs with HWO Spectroscopy using 3D GCM models and PSG.

Sellers Exoplanet Environments Collaboration (SEEC) ***Spring 2024***
Team Member. Title: Training materials for the Planetary Spectrum Generator.

AAS Education & Professional Development Mini-Grant ***Fall 2023***
Award Amount: $3,500
Science PI. Title: **R**evamping **E**ducation on **B**elonging, **E**quity, and **L**eadership (REBEL) Webinars

AAS Education & Professional Development Mini-Grant ***Fall 2022***
Award Amount: $5,000
Team PI. Title: SPECTRUM: Training the next generation of mentors in faculty, staff, and students

National Science Foundation Graduate Research Fellowship ***Spring 2021***
Award Amount: $37,000 Stipend, $12,000 Education Cost
3 years of funding in a 5 year fellowship for an accomplished undergraduate or first year graduate student.

HONORS & AWARDS

** denotes an award or honor for AJEDI or outreach engagement

Lindau Nobel Laureate Conference Attendee ***Summer 2024***
Competitively selected to be among 650 students with fully funded travel to Lindau, Germany, to interact with Nobel Laureates in Physics and learn directly from them.

Forbes 30 under 30 in Science Finalist ***Fall 2023***
Award recognizing 30 people under 30 years old for their accomplishments in multiple categories. While not selected, finalists are selected from approximately 50,000 applications and are moved to the final round of selection (∼60 people per category).

**** Dean's Award for Excellence in AJEDI Engagement** ***Spring 2023***
Award Amount: $1250
Award recognizes excellence in AJEDI (access, justice, equity, diversity, and inclusion) engagement by a student in the College of Science. Given as a result of activities in academic year 2022-2023.

**** Dean's Award for Excellence in Service** ***Spring 2021***
Award Amount: $250
Awarded as a result of Spectrum's significant impact in the Department of Physics and Astronomy, College of Science, and George Mason University during its first year.

Carol Litchfield Endowment Scholarship ***Fall 2019***
Award Amount: $2,400
Award for a notable College of Science undergraduate.

SCI-STEPS Summer Research Program ***Summer 2019***
Award Amount: $5,000
Research assignment for minority undergraduates.

OSCAR Student Research Grant ***Summer 2018***
Award Amount: $5,000
Competitive research award offered through the George Mason Office of Student Scholarship, Creative Activities, and Research (OSCAR) to support undergraduate student research.

Eugenie V. Mielczarek Endowed Scholarship ***Spring 2018***
Award Amount: $2,500
Award given to an accomplished undergraduate in the Department of Physics at George Mason University.

George Mason Excellence Scholarship ***Spring 2017***
Award Amount: $12,000
Renewable yearly for 4 years.

George Mason Green & Gold Scholarship ***Spring 2017***
Award Amount: $1,000

PUBLICATIONS

Where applicable, publications are available in a public ADS library on NASA ADS.

First-Author Publications

Latouf, N., et al., Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE) 4: Exploring New Worlds with KEN, 2024, in prep

Latouf, N., et al., Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE) 3: Introducing the KEN, 2024, in prep

Latouf, N., et al., Effective & Ethical Mentorship in Physics and Astronomy through Grassroots Organizations, 2024, published, BAAS 56, 1, https://doi.org/10.3847/25c2cfeb.31201d9b

Latouf, N., et al., Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE) 2: Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for O_2 & O_3, 2024, published, AJ 167, 1, 27

Latouf, N., et al., Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE) 1: Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for H_2O, 2023, published, AJ 166, 3, 129

Latouf, N., et al., Characterizing and Mitigating Telluric Absorption in Precise Radial Velocities II: Dependence on Spectral Type, 2022, Astronomical Journal, published, AJ 164, 5, 212

Significant Contributions

Stark, C., ... **Latouf, N.**, et al. Paths to Robust Exoplanet Science Yield Margin for the Habitable Worlds Observatory, 2024, submitted

Barclay, T., Sheppard, K., **Latouf, N.**, et al. A First Look at Transmission Spectrum of the Potentially Rocky Planet L 98-59 c, 2024, in revisions

Stark, C., **Latouf, N.**, et al. Optimized Bandpasses for the Habitable Worlds Observatory, 2024, JATIS, published, 10, 1, 014005

Wang, S., **Latouf, N.**, et al. Characterizing and Mitigating Telluric Absorption in Precise Radial Velocities, 2022, published, AJ 164, 5, 211

Plavchan, P., ... **Latouf, N.**, et al. EarthFinder: A Precise Radial Velocity Probe Mission Concept for the Detection of Earth-Mass Planets Orbiting Sun-like Stars, American Astronomical Society Journals, 2018, in press, arXiv:1803.03960 [astro-ph.IM].

Other Refereed Publications

Kofman, V., ... **Latouf, N.**, et al. The pale blue dot: Using the Planetary Spectrum Generator to Simulate Signals from Hyper Realistic exo-Earths, 2024, submitted

Reefe, M., ... **Latouf, N.**, et al. "An asynchronous object-oriented approach to the automation of the 0.8-meter George Mason University campus telescope in Python," 2022, Journal of Astronomical Telescopes, Instruments, and Systems, accepted, arXiv:2206.01780 [astro-ph.IM]

Rodriguez, J., ... **Latouf, N.**, et al. TESS Delivers Five New Hot Giant Planets Orbiting Bright Stars from the Full Frame Images, American Astronomical Society Journals, 2021, in press, arXiv:2101.01726 [astro-ph.EP].

Plavchan, P., ... **Latouf, N.**, et al. Newly Formed Planets within the Debris Disk of the Nearest Pre-Main Sequence Star AU Mic, Nature 582, 497500 (2020). https://doi.org/10.1038/s41586-020-2400-z in press,

Huber, D., ... **Latouf, N.**, et al. A Hot Saturn Orbiting An Oscillating Late Subgiant Discovered by TESS, American Astronomical Society Journals, 2019, in press, arXiv:1901.01643 [astro-ph.EP].

TALKS & POSTERS

Selected presentation slides are available on SpeakerDeck - @nlatouf. * denotes invited; ** denotes AJEDI subject material.

Upcoming

* Carnegie EPL Seminar Series *May 2024*
Title: Exploring New Worlds with BARBIE and KEN

Seminars & Colloqia

* STScI Exoplanets, Stars, and Planet Formation Seminar *May 2024*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE): Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for Molecular Detection

* NASA GSFC Exoplanet Seminar *April 2024*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE): Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for Molecular Detection & Effective and Ethical Mentorship Practices in Physics and Astronomy

* MIT Kavli Institute *February 2024*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE): Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for Molecular Detection

* NASA Director's Seminar *February 2024*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE): Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for Molecular Detection

** "How to Conference" Workshop at AAS *January 2024*
Title: Effective and Ethical Mentorship Practices in Physics and Astronomy

* American University Physics Department *September 2023*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE): Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for Molecular Detection

* Biosignatures Science Task Group, Greenbelt, MD *September 2023*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE): Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for Molecular Detection

* Habitable Worlds Observatory Monthly Meeting, Greenbelt, MD *June 2023*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE) I: Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for H_2O

** BANG! Seminar *February 2023*
Title: Spectrum: Empowering Equitable Excellence

** George Mason University College of Science Faculty Meeting, Virtual *February 2021*
Invited talk to present an introduction of co-founded group Spectrum and successful initiatives

Conference Talks & Flash Talks

AbSciCon, Providence, RI *May 2024*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE): Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for Molecular Detection

243^{rd} American Astronomical Society, New Orleans, LA *January 2024*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE): Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for Molecular Detection
NASA HyperWall Talk Title: The Mentorship Design

Sagan Workshop, Pasadena, CA *July 2023*
Title: Bayesian Analysis for Remote Biosignature Identification on exoEarths (BARBIE) I: Using Grid-Based Nested Sampling in Coronagraphy Observation Simulations for H_2O

** 241^{st} American Astronomical Society, Seattle, WA *January 2023*
Title: Spectrum: Empowering Equitable Excellence
NASA HyperWall Talk Title: Spectrum: Empowering Equitable Excellence

240^{th} American Astronomical Society, Pasadena, CA *June 2022*
Title: Characterizing and Mitigating Telluric Absorption in Precise Radial Velocities: An M2 vs Solar Star Comparison

Twinkle and the Next Generation of Exoplanet Scientists, Virtual *September 2021*
Title: Precise Radial Velocities and Effectiveness of Telluric Mitigation Strategies

Extreme Precision Radial Velocities IV, Grindelwald, Switzerland *March 2019*
Title: Effects of Tellurics in PRVs and Effectiveness of Mitigation Strategies

Conference Posters
243^{rd} American Astronomical Society, New Orleans, LA (January 2024) | Sagan Workshop, Pasadena, CA (July 2023) | Habitable Worlds Observatory and Beyond, Baltimore, MD (July 2023) | Forming and Exploring Habitable Worlds, Edinburgh, Scotland (November 2022) | 237^{th} American Astronomical Society, Virtual (January 2021) | 235^{th} American Astronomical Society, Honolulu, HI (January 2020) | Undergraduate Research Symposium, Fairfax, VA (August 2018)

Conference Attendance
Lindau Nobel Laureate Conference, Lindau, Germany (July 2024) | Code/Astro Workshop, Northwestern University (July 2024) | SEEC Non-Transiting Exoplanets Symposium (April 2024) | APS Advanced Graduate Leadership Conference, Washington, D.C. (August 2022) | Sagan Workshop, Pasadena, CA (July 2018)

PROGRAMMING & COMPUTER SKILLS

Programming Languages: Python, Mathematica, BASH
Python Package Proficiency: Pandas, Astropy, Numpy, Matplotlib

DOMESTIC COLLABORATIONS

Habitable Worlds Observatory (HWO) Living Worlds Working Group, NASA GSFC *Winter 2024 — Present*

HWO Exoplanet Yields Working Group Advisory Committee, NASA GSFC *Winter 2024 — Present*

HWO Exoplanet Yields Survey Strategies Task Group co-Lead, NASA GSFC *Spring 2024 — Present*

ExoSpec Team, NASA GSFC *Summer 2022 — Present*

Planetary Spectrum Generator, NASA GSFC *Summer 2021 — Present*

Exoplanet Research Group, George Mason University *Fall 2017 — Spring 2021*

SERVICE

Co-Founder and Leader of Spectrum ***Summer 2020 — Present***
Organization for enhancement of historically minoritized groups in STEM

- Co-Wrote the Departmental Code of Professional Conduct.
- Created and implemented premier peer mentoring program, including developing mentor/mentee applications, matching mentoring pairs, and advertising opportunity through out Department. Devoloping a funded mentorship training.
- Coordinated and hosted weekly Professional Development Lunch Talk Series, including organizing speakers, advertising event, recording sessions, and uploading to YouTube.
- Personally developed and currently maintaining Spectrum website, including mailing list for members and monthly updated Educate pages.
- Hosted several social events to embolden student community within the department.
- Team PI, Science PI, and lead writer for all Spectrum grant proposals.

The Neuroverse Initiative (TNI) Advisory Board Member ***January 2024 — Present***
Advisory board member to TNI, which aims to improve field standards for Neurodiverse people. Primarily providing expertise on mentorship practices.

Departmental Communications and Outreach Strategist ***Spring 2022 — Present***
Coordinator of prospective student tours, student advisor and guide.

Good Trouble Leadership Team ***January 2023 – Present***
President of the organizing committee for George Mason University's premier Good Trouble Fest and "How to Organize as Students" workshop series.

College of Science AJEDI Advisory Committee (AAC) ***March 2023 – Present***
Member of the advisory committee for the GMU College of Science AAC to advance AJEDI. Also a member of the Professional Development and Community Outreach sub-group.

NASA Goddard Exoplanet Seminar Series Host ***November 2023 – Present***

SEEC Symposium LOC Member ***November 2023 – Present***
Local Organizing Committee (LOC) member for the SEEC Symposium on Pathways to Characterizing Non-Transiting Planets.

Groundwork for Graduate School Panelist ***Spring 2023, Spring 2024***
Served as a panelist in the Groundwork for Graduate School workshop hosted by the GMU Office of Fellowships in the following panels: Mentorship in Graduate School, Graduate Student Experiences, Writing the NSF GRFP, and Undergraduate v. Graduate Research.

NASA Post-Baccalaureate Selection Committee Member ***Spring 2023, Spring 2024***
Aided in the selection of incoming post-baccalaureate scholars for NASA Goddard Space Flight Center, including conducting interviews.

Manuscript Reviewer (*AAS Journals*) ***Winter 2023***

Review Panel Executive Secretary (NASA x3) ***Summer 2023, Spring 2024***

NASA SMD Bridge Program Working Group Member ***October 2022***
Member of the Mentoring Working Group in support of the NASA SMD Bridge Program.

Honors College Dean's Fellow ***Fall 2017 — Spring 2021***
Student liaison to the Dean's office

SCIENCE OUTREACH

Astronomy on Tap Presenter *December 2022, May 2024*
Presented to the public on:

- the AJEDI efforts of Spectrum
- Exploring New Worlds with BARBIE and KEN

Share the Science Training, Module 1: The Essentials *January 2023*
In this module, you will explore different ways of presenting your science to non-expert audiences.

Share the Science Training, Module 2: Small Group Coaching *January 2023*
You will use the strategies developed in the Essentials session, and present your science in Just a Minute with peer and professional feedback.

Share the Science Training, Module 3: Science through Narrative *January 2023*
Building on your previous modules, you will craft your science communication messages into narrative form.

Booth Exhibition in Fairfax Fall Festival *October 2022*
Promoted Spectrum to members of the public, with emphasis on engaging STEM interest in young students.

Booth Exhibition in PTS Spook-walk *October 2022*
Promoted Spectrum and science engagement to young students from surrounding local elementary schools.

Media Appearances

Better Posters Featured Interview *Summer 2023*
Featured interview on how to design better, more engaging scientific posters on Better Posters

American Astronomical Society Education Committee Featured Blog
Wrote invited blog post in the "AAS Education Blog," on mentorship practices. *Summer 2023*

Featured Exoplanet Commentator - STEM in 30 *Spring 2020*
Featured in Emmy-nominated program for students produced by the Smithsonian National Air and Space Museum. Episode 7, Diamonds in the Sky: Stars and Exoplanets.

REFERENCES

Professor Joseph C. Weingartner - George Mason University
Relationship: Professor, Doctoral Committee Chair

Dr. Avi Mandell - NASA Goddard Space Flight Center
Relationship: Research Advisor, Doctoral Committee Co-Chair

Dr. Geronimo Villanueva - NASA Goddard Space Flight Center
Relationship: Research Advisor, Doctoral Committee Member

Michael Reefe - Massachusetts Institute of Technology (MIT)
Relationship: Mentee for 4+ years