Michael A. Reefe

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Education

Ph.D., Physics **2022 – Present**
Massachusetts Institute of Technology, Cambridge, MA

B.S., Physics | Concentration in Astrophysics **2018 – 2022**
With Honors, *Summa cum laude* GPA: 4.00
George Mason University, Fairfax, VA

Research Experience

Undergraduate Research Assistant **Sept. 2019 – July 2022**
George Mason University Fairfax, VA

- Analyzing and modeling photometric transits and spectroscopic radial velocity data to validate exoplanets and model for characteristics, i.e. planet mass, radius, and orbital period.
- Using Python coding for data analysis of integrated field unit spectroscopy and complete hardware automation of the GMU campus telescope.
- Analyzing galaxy spectra to search for active galactic nuclei via coronal line emission.

Observational Data Collector **Sept. 2019 – Aug. 2021**
George Mason University Fairfax, VA

- Used ground-based instruments to gather astronomical observational data for analysis.
- Facilities used: NASA Infrared Telescope Facility (iSHELL spectrograph), GMU Telescope

Teaching Experience

Learning Assistant **June 2020 – May 2020**
George Mason University Fairfax, VA

- Introductory electricity & magnetism course
- Attended classes and answered students' questions, helping them with problems
- Held personal office hours to work through examples
- Created a presentation to summarize the lessons learned from participating in this position.

Honors & Awards

NSF Graduate Research Fellowship **2022 – 2027**
$34,000 stipend & $12,000 educational allowance per year for 3 years. Competitive national research fellowship for prospective graduate students across all science & math disciplines that requires a detailed 3-year research proposal plan.

Dean's Award for Excellence in Academics and Research **2022**
$1,250 award. GMU College of Science award for excellence in academics and/or research.

Outstanding Undergraduate Research Award **2022**
GMU Physics & Astronomy department recognition of exceptional undergraduate research.

Outstanding Graduating Senior Award **2022**
GMU Physics & Astronomy department recognition of an exceptional graduating senior.

Outstanding Learning Assistant Award **2021**
$150 award. Recognition of outstanding leadership as a learning assistant.

Osher Lifelong Learning Institute Scholarship **2020**
$500 award. Recognition of academic excellence for GMU students.

George Mason University Distinction Scholarship **2018 – 2022**
$2,000 per year. Merit based scholarship for academically distinguished GMU students.

Dean's List **2018 – 2022**
Cumulative GPA above 3.5 at GMU.

Refereed Publications

First & Second Author

4. **Reefe, M.**, Satyapal, S., Sexton, R., *et al.* CLASS: Coronal Line Activity Spectroscopic Survey. *ApJ.* In review (2022).
3. **Reefe, M.**, Luque, R., Gaidos, E., *et al.* A Close-in Puffy Neptune with Hidden Friends: The Enigma of TOI 620. *AJ* **163,** 269 (2022).
2. **Reefe, M.**, Alfaro, O., Foster, S., *et al.* Asynchronous object-oriented approach to the automation of the 0.8-meter George Mason University campus telescope in Python. *JATIS* **8,** 027002 (2022).
1. Cale, B. L., **Reefe, M.**, Plavchan, P., *et al.* Diving Beneath the Sea of Stellar Activity: Chromatic Radial Velocities of the Young AU Mic Planetary System. *AJ* **162,** 295 (2021).

Coauthor

8. Wittrock, J. M., Dreizler, S., **Reefe, M.**, *et al.* Transit Timing Variations for AU Microscopii b and c. *AJ* **164,** 27 (2022).
7. Rodriguez, J. E., Quinn, S. N., Vanderburg, A., *et al. inc.* **Reefe, M.**, Another Shipment of Six Short-Period Giant Planets from TESS. *arXiv e-prints.* arXiv: 2205.05709 (2022).
6. Gilbert, E. A., Barclay, T., Quintana, E. V., *et al. inc.* **Reefe, M.**, Flares, Rotation, and Planets of the AU Mic System from TESS Observations. *AJ* **163,** 147 (2022).
5. El Mufti, M., Plavchan, P. P., Isaacson, H., *et al. inc.* **Reefe, M.**, TOI 560 : Two Transiting Planets Orbiting a K Dwarf Validated with iSHELL, PFS and HIRES RVs. *arXiv e-prints.* arXiv: 2112.13448 (2021).
4. Osborn, A., Armstrong, D. J., Cale, B., *et al. inc.* **Reefe, M.**, TOI-431/HIP 26013: a super-Earth and a sub-Neptune transiting a bright, early K dwarf, with a third RV planet. *MNRAS* **507,** 2782–2803 (2021).
3. Teske, J., Wang, S. X., Wolfgang, A., *et al. inc.* **Reefe, M.**, The Magellan-TESS Survey. I. Survey Description and Midsurvey Results. *ApJS* **256,** 33 (2021).
2. Fukui, A., Korth, J., Livingston, J. H., *et al. inc.* **Reefe, M.**, TOI-1749: an M dwarf with a Trio of Planets including a Near-resonant Pair. *AJ* **162,** 167 (2021).
1. Dreizler, S., Crossfield, I. J. M., Kossakowski, D., *et al. inc.* **Reefe, M.**, The CARMENES search for exoplanets around M dwarfs. LP 714-47 b (TOI 442.01): populating the Neptune desert. *A&A* **644,** A127 (2020).

Conferences & Presentations

240th Meeting of the American Astronomical Soceity — **12–17 June 2022**
iPoster — Pasadena, CA
CLASS: Coronal Line Activity in the Sloan Digital Sky Survey [ADS]

TESS Science Conference II — **2–6 Aug. 2021**
Poster — Virtual
A Flexible Python Observatory Automation Framework for the George Mason University Campus Telescope [zenodo]
Poster (Coauthor)
Methods of Data Analysis on TESS Observations [zenodo]
Poster (Coauthor)
Transit Timing Variations for AU Microscopii b & c [zenodo]

GMU College of Science Undergraduate Research Colloquium — **22 Apr. 2021**
Poster — Virtual
Automation of TESS Follow-up Observations with the GMU Campus Telescope

237th Meeting of the American Astronomical Society — **11–15 Jan. 2021**
iPoster — Virtual
An Asynchronous Object-Oriented Approach to Automation of the 0.8-meter George Mason University Campus Telescope in Python [ADS]

Proposals

Contributor
Gemini Observatory: MAROON-X Instrument, 24+ nights requested — 2021B

Keck Observatory: HIRES Instrument, 5 nights requested	2021B
NASA IRTF: iSHELL Instrument, 50 nights requested	2021B
Gemini Observatory: MAROON-X Instrument, 24+ nights requested	2022A

COMMUNITY OUTREACH

Graduation Speaker **May 2022**
GMU College of Science Fairfax, VA
Chosen to be the student speaker for the College of Science's Spring 2022 graduation event.

Undergraduate Representative **Jan. 2022**
GMU Hiring Committee, for an Astronomy Professor Fairfax, VA
Attended a mock lecture and research colloquium presented by each candidate, as well as interviews, and provided feedback to the faculty hiring committee from the undergraduate student perspective.

President **July 2021 – Aug. 2022**
Spectrum Fairfax, VA
Planning talks, discussions, fundraisers, and other events, as well as managing website and budgetary concerns and working with the College of Science Faculty to improve diversity at GMU for student-led group Spectrum, which promotes the enhancement of under-represented groups in STEM.

Peer Mentor **Dec. 2020 – Aug. 2022**
Spectrum Fairfax, VA
Providing academic and personal tutoring for students in physics and astronomy at GMU through Spectrum.

SCIENCE OUTREACH

Graduate Student Panelist **Aug. 2022**
Aspiring Scientists' Summer Internship Program (ASSIP) Fairfax, VA
Served on a panel of graduate students for a Career Day event hosted by GMU's ASSIP program, answering high school students' questions about a career in academia.

NSF GRFP Cohort Workshop Panelist **July 2022**
GMU Office of Fellowships Fairfax, VA
Served on a panel of NSF GRFP recipients and reviewers to answer students' questions about the application and review process.

Competition Judge **Oct. 2020**
MathCounts Fairfax, VA
Scored math exams based on the answer key for middle school students participating in the competition.

Research Mentor **Summer 2020, 2021**
Aspiring Scientists' Summer Internship Program (ASSIP) Fairfax, VA
Taught high school interns about the academic research done in our group, and tutored them on how to perform it themselves to synthesize a presentable project by the end of the summer.

COMPUTER SKILLS

Python: Over 3 years of experience working with data analysis, simulations, modeling, and a full-scale automation project of the GMU telescope observations. Packages: Numpy, Numba, Scipy, Astropy, Pandas, Matplotlib, Plotly, Emcee, PyAstronomy, Corner.
MATLAB & Mathematica: 2 years of experience with numerical computations for classes.
Bash / Shell: 2 years of experience in unix terminal environments
Git: Basic source code management with Git and GitHub
Astronomy Programs: AstroImageJ, DS9
Document Creation: LaTeX, Vim, Microsoft Office

REFERENCES

Dr. Peter P. Plavchan: George Mason University, Associate Professor, Research advisor.
Dr. Shobita Satyapal: George Mason University, Professor, Research advisor.
Dr. Joseph C. Weingartner: George Mason University, Associate Professor, Academic advisor.