Michele Woodland

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Summary: Astronomy and Astrophysics PhD Student. Interests are focused on FRBs, specifically those with high dispersion measures, with a passion for outreach initiatives and science communication.

RESEARCH EXPERIENCE

Astronomy and Astrophysics PhD Student | University of California Santa Cruz. Sept 2024-Present
Advisor: Dr. Bryan Gaensler

- Performing a population study of the subpopulation of FRBs with high dispersion measures (DMs) with the CHIME/FRB collaboration

Post-Baccalaureate Research Assistant | NASA Goddard Space Flight Center Sept 2023-Sept 2024
Advisor: Dr. Neil Zimmerman, Exoplanets and Stellar Astrophysics Laboratory
Employed by Southeastern Universities Research Association (SURA)

- Characterized the performance of a tunable filter for an upcoming test campaign for the coronagraph instrument of the Nancy Grace Roman Space Telescope using custom-written Python code
- Determined and improving upon capability gaps for existing models for the spectroscopy mode of the coronagraph instrument, including the integration of parameters such as filter transmission
- Contributed to the development of the Python-based data pipeline to calibrate exoplanet spectral data for community use after launch

NSF Post-Baccalaureate Research Fellow | Maria Mitchell Observatory September 2022-Sept 2023
Advisor: Dr. Regina Jorgenson

- Investigated Fast Radio Burst (FRB) properties and progenitor sources through optical and infrared follow-up of FRB host galaxies with the Fast and Fortunate for FRB Follow-Up (F^4) collaboration
- Reduced and analyzed optical imaging data of FRB host galaxies from instruments such as Gemini South Adaptive Optics Imager (GSAOI) using Python-based data reduction pipelines, specifically using GALFIT to determine their structure and morphology
- Led and performed feasibility study of the suitability of adaptive optics ground-based imaging for measuring high redshift host galaxy properties in comparison with HST by developing Python code to measure photometry, morphology, and stellar mass surface density of host galaxies
- Led a remote Keck/NIRC2 observing run and two remote Keck/DEIMOS observing runs, as well as participated in an in-person Keck/LRIS observing run at Keck Headquarters in Waimea, HI
- Wrote and submitted proposals for Keck/NIRC2, GSAOI and HST to help further my team's research goals

NSF REU Intern | Maria Mitchell Observatory May 2021-August 2021
Advisor: Dr. Rodolfo Montez (Smithsonian Astrophysical Observatory)

- Utilized resources such as TOPCAT, SQL, and Vizier to crossmatch tables and query databases to study Asymptotic Giant Branch Stars and how their complex surface dynamics affect *Gaia* parallax measurements
- Created data visualizations and compared various multiwavelength datasets using Python

Undergraduate Research Assistant | UMass Lowell January 2020-December 2021
Advisor: Dr. Robert Giles, Biomedical Terahertz Technology Center

- Refined a 75 GHz radar system to create an imaging system to image wind turbine blades and detect defects in these blades before installation
- Created an imaging system to image a phantom torso (NIH Grant) with this same radar system with the application of correcting for patient motion during medical imaging
- Wrote LabVIEW code to operate the radar system and used MATLAB to perform Fourier transforms, plot range profiles and create 3D images of objects in the scene
- Constructed an anechoic chamber to reduce scattering in the lab
- Developed and solved radar problem sets using MATLAB for the curriculum of a course Dr. Robert Giles taught at Raytheon titled "Developing Radar Signal Processing Software"

EDUCATION

University of California, Santa Cruz September 2024-Present
PhD, Astronomy and Astrophysics (In Progress)

University of Massachusetts Lowell, Lowell, MA December 2021
Bachelor of Science, Physics (Minors: Mathematics, Spanish)**;** GPA: 3.812 (*Magna Cum Laude*)

PUBLICATIONS

- **Woodland, M. N.**, Mannings, A. G., Prochaska, J. X., Ryder, S. D., et al. 2024., "The Environments of Fast Radio Bursts Viewed Using Adaptive Optics," *ApJ* 973 64, [DOI: 10.3847/1538-4357/ad643c].

- Deller, A. T., Ryder, S. D., Marnoch, L., **Woodland, M. N.** in prep., "Three nearby Fast Radio Bursts localised to spiral host galaxies."

- Groff, T. D., Zimmerman, N. T., Bray, E. **Woodland, M. N.** et al. in prep., "CGI Spectroscopy and Polarization Design and Flight Instrument Calibration."

- **Woodland, M.** and Montez Jr., R. "Commotion in their Motions: Proper Motion Anomalies of Nearby AGB Stars," 2022 *Res. Notes AAS* 6 142; [DOI: 10.3847/2515-5172/ac7f46].

PRESENTATIONS

Conferences

- Research Poster: "Exploring the Nature of Highly Dispersed Fast Radio Bursts (FRBs)," *245rd American Astronomical Society Meeting* in National Harbor, Maryland (upcoming; Jan 2025)

- Research Poster: "The Environments of Fast Radio Bursts Viewed Using Adaptive Optics," *243rd American Astronomical Society Meeting* in New Orleans, Louisiana (10 Jan 2024)

- Research Poster: "Commotion in their Motion: AGB Stars in the *Gaia* Database," *240th American Astronomical Society Meeting* in Pasadena, CA (15 June 2022); https://ui.adsabs.harvard.edu/abs/2022AAS...24030516W

- Invited Talk: **Michele N. Woodland**, Shanice B. Kelly, C. R. Abell, Clifford Lindsay, Cecil S. Joseph, and Robert H. Giles, "Millimeter-wave radar patient motion tracking technologies for medical imaging applications," *Proc. SPIE PC12000*, Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XV, PC120000D (Presented at SPIE OPTO: January 26, 2022; Published: 7 March 2022); https://doi.org/10.1117/12.2616740.6295510814001

- Invited Talk: S. B. Kelly, **M. N. Woodland**, and Robert H. Giles "Millimeter-wave radar imaging of wind turbine blades", *Proc. SPIE 11685*, Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XIV, 1168510 (5 March 2021); https://doi.org/10.1117/12.2591169

Public Talks

- "Commotion in their Motion: Giant Stars in the *Gaia* Database," Maria Mitchell Association Science Speaker Series (https://youtu.be/dxd3SA-EGOU?t=1087 Timestamp: 18:06)

- "UMass Lowell's Astronomical Observatory," *Epic ICED Innovation Sessions* at Nipmuc High School (9 November 2019)

OUTREACH/DEIA

Observatory Assistant | Maria Mitchell Observatory September 2022-August 2023

- Ran public and private open nights at Loines Observatory June 2021-August 2021
- Gave viewers a tour of the night sky with a 24" Schmidt-Cassegrain telescope and an 8" Alvan Clark refracting telescope and presented astronomical images taken on previous nights
- Hosted thousands of visitors as a Post-Bacc and REU intern
- Trained REU interns in telescope operations and public observing night procedures during my time as Post-Bacc
- Prepared and presented educational materials for Look Up Open Nights, free observing nights offered to the Nantucket public that are focused towards children

Nantucket 97.7 ACK-FM Radio Station Star Report October 2022-June 2023

- Wrote and performed biweekly radio segments to communicate popular topics in astronomy to the public

Observatory Fellow | UMass Lowell Schueller Observatory October 2019-December 2021
Advisor: Dr. Silas Laycock

- Trained students in observatory operations, including using TheSkyX, as well as tour material and best practices for observing
- Led tours and gave presentations during public observing nights using the 14" Schmidt-Cassegrain telescope
- Effectively communicated complex astrophysical concepts to diverse audiences (e.g., children, students, faculty, general public)
- Maintained and developed content for the observatory website and social media pages

Website Assistant | Lowell Center for Space Science and Technology October 2019-December 2021
Advisor: Dr. Ofer Cohen

- Updated and maintained the LoCSST website using SDL Tridion (based in HTML)
- Maintained and developed content for the LoCSST social media pages

American Physical Society Inclusion, Diversity, and Equity Alliance March 2021-December 2021

- Invited to participate in APS-IDEA at UMass Lowell to gauge attitudes of students regarding diversity and inclusion within the department and create action items to improve environments
- Attended workshops and held informal discussions with students

Urban Massachusetts Louis Stokes Alliance for Minority Participation February 2021-May 2021

- Met throughout the semester to ensure myself and other members felt supported in their research and within the department
- Participated in listening sessions as well as discussions with invited speakers on available resources and areas for improvement

LEADERSHIP/MENTORING

Mentee | NASA-PEER Constellation Mentorship Program September 2023-Present

- Assist in building a community and supporting my peers while also receiving mentorship from early career mentors

Mentor | Maria Mitchell Observatory June 2023

- Mentored 6 NSF-REU Interns as the MMO Post-Bacc
- Gave advice on research and graduate school related subjects

Assistant Coach | Nantucket High School Varsity Softball Team April-June 2023

- Led drills and team building exercises at practices and gave guidance during games to players

Founder and President | UMass Lowell Astronomy Club January 2019-December 2021

- Founded the UMass Lowell Astronomy Club and served as its President

Secretary | UMass Lowell Society of Physics Students (SPS) April 2021-December 2021

- Organized events for the physics students at UMass Lowell
- Assisted in creating a sense of comradery amongst the department during semesters affected by COVID-19

AWARDS AND ACCOLADES (>$8000)

- NSF Graduate Research Fellowships Program (2024), Honorable Mention
- Massachusetts Space Grant Consortium Summer 2021 Fellowship, $3000
- C. Daniel Cole Endowed Physics Scholarship Fund (Outstanding Physics Major) (2021), $2607
- Urban Massachusetts Louis Stokes Alliance for Minority Participation Research Grant (2021), $1500
- Honors Fellowship (2020), $1200
- Commonwealth Honors College Scholar at UMass Lowell
- Dean's List (6 semesters)

SKILLS

Programming: Python, MATLAB, LabVIEW, Mathematica, C, HTML
OS: Linux, macOS, Windows
Other: Microsoft Office (Word, Excel, PowerPoint, Teams), GitHub/GitLab, TheSkyX, LaTeX, SQL, Vizier, Adobe
Scientific Visualization: DS9, TOPCAT
Languages: English (Native), Spanish (Advanced)