Marina M. Dunn

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Education

M.S. Engineering: Data Science - University of California, Riverside   **June 2023**

UCR Bourns College of Engineering Commencement Graduate Student Marshal (2023), UCR Grad Slam Finalist (2023)
Society of Women Engineers (SWE) Wanda Munn Scholarship (offered, 2023), SWE WE Local Collegiate Competition Finalist (2023),
American Astronomical Society FAMOUS Travel Grant (2023), SWE WE22 Conference Grant (2022), AnitaB.org Grace Hopper Celebration
Student Scholar (2022), Uncertainty Quantification for Machine Learning Integrated Physics Modeling Travel Award (NSF/Sandia Labs, 2022)

B.S. Astronomy - University of Arizona   **May 2018**

Honors College Alumni Legacy Grant (2016), Arizona Excellence Scholarship (2014), Angelos C. Langadas Astronomy Scholarship (2017)

Skills

Programming: Python, R, MATLAB, HTML, C, LaTEX, Markdown

Libraries: TensorFlow, Keras, PyTorch, scikit-learn, Numpy, Pandas, Matplotlib, Plotly, SciPy, OpenCV, PySpark

Version Control: Git/GitHub/GitLab; **IDEs/Editors:** Jupyter, Visual Studio Code, R Studio, Vim

Other: Telescope Operations, Web Design & Development, STEM Outreach, Digital Art, Technical Troubleshooting & Repairs

Research Projects

Graduate Researcher, Deep Skies Lab; University of California, Riverside (September 2021 - Present)

Thesis: "Galaxy Morphology Classification Using Bayesian Neural Networks for the Legacy Survey of Space and Time (LSST)"

- Investigated application of Bayesian Neural Networks and transfer learning methods to classify galaxy morphologies in simulated imaging dataset representing different observing years with LSST to explore the impact of observational realism, including noise, on performance of classification models.

CRESST II Research Assistant, NASA Goddard Space Flight Center (January 2023 - Present)

Project: "Detection and Segmentation of Ice Blocks in Europa's Chaos Regions Using Deep Learning"

- Utilized deep learning techniques (including Mask R-CNNs and transfer learning) to detect individual ice blocks within the complex "chaos terrain" regions of Jupiter's moon, Europa.

Data Science Graduate Intern, NASA Langley Research Center (August 2022 - December 2022)

Project: "The Machine Learning (ML) Showroom"

- Developed user-friendly, cloud-based ML models, visualization tools and a website for NASA teams to evaluate using ML for their work.

Computing Scholar – Data Science Summer Institute, Lawrence Livermore National Laboratory (May 2022 - August 2022)

Projects: "Visualizing Model Optimization for Orbital Debris Characterization," "Machine Learning Methods to Screen Compounds Targeting COVID-19"

- Created visualization tool for optimizing the Gaussian process method "MuyGPs" to predict missing observations of orbital debris. Investigated ML methodologies utilizing chemical molecular descriptors and 3D atomic representations for rapid screening of drug-like compounds targeting COVID-19.

Graduate Intern, NASA Goddard Space Flight Center (August 2021 - May 2022)

Projects: "Optimizing Data Formats for Earth Information System Fire Portal", "Cloud-Optimized Tools for the Surface Biology & Geology High-Frequency Time Series Campaign"

- Researched strategies for efficient migration and storage of NASA Earth science data and models in commercial cloud environments. Designed and implemented a data pipeline for the NASA SHIFT AVIRIS-NG campaign.

Undergraduate Researcher - University of Arizona (2014 - 2018)

- Wrote proposals, built and tested antenna prototypes, presented results, managed budgets, secured institutional letters of intent, and organized key meetings and site visits for the TeraHertz Space Telescope, NASA GUSTO and SIIOS missions. Analyzed sub-millimeter astronomy data, generated visual maps of gas flows within giant gas clouds using Python, confirmed active star formation.
- Observed and analyzed dense gas clouds to determine those actively accumulating enough material for future star formation.
- Conducted observations of transiting exoplanets and analyzed data to determine atmospheric compositions.

Work Experience

Data Science Engineer – Strategic Data Solutions Team, Apple Inc. (January 2021 - June 2021; 6-month Program)

- Developed a Python-based data pipeline utilizing web APIs to identify & track "high risk/priority" customers, effectively mitigating unwarranted personal information access.

Data Engineer – Data Analytics Server Engineering Team, Apple Inc. (January 2020 - July 2020; 7-month Program)

• Developed code utilizing Apache Spark, Python & SQL to provide iOS device analytics, enhancing business-critical reporting capabilities.

Technical Expert (October 2018 - August 2021)

• Resolved complex technical issues through software troubleshooting and hardware repairs, while delivering exceptional customer service and maintaining adaptability in a dynamic environment.

Instructional Specialist – University of Arizona, Astronomy Camp (June 2015, 2018, 2019)

• Managed operations and care, facilitated telescope observing sessions, and developed and delivered educational STEM content for students during week-long astronomy camps on remote mountaintop observatories.

Chief Telescope Operator – University of Arizona Steward Observatory (August 2014 - May 2018)

• Led operations for multiple on-campus telescopes, organized public outreach events, and managed team of student operators.

Publications

Ryleigh Fitzpatrick, M. *et al.* (2016). *A Study of the Effects of Underlying Assumptions in the Reduction of Multi-Object Photometry of Transiting Exoplanets*. *227*, 138.07. https://ui.adsabs.harvard.edu/abs/2016AAS...22713807R

Calahan, J. K. *et al.* (2018). Searching for Inflow toward Massive Starless Clump Candidates Identified in the Bolocam Galactic Plane Survey. *The Astrophysical Journal*, *862*(1), 63. https://doi.org/gkvm47

Nguyen, D. M. T., Cortes, J. C., Dunn, M. M., & Shiklomanov, A. N. (2023). Impact of Chunk Size on Read Performance of Zarr Data in Cloud-based Object Stores. *ESS Open Archive*. https://doi.org/10.1002/essoar.10511054.2

Dunn, M., Ćiprijanović, A., Nord, B., & Mobasher, B. (2023). *Galaxy Morphology Classification Using Bayesian Neural Networks for LSST*. 55, 105.13. https://ui.adsabs.harvard.edu/abs/2023AAS...24110513D

Dunn, M. M. *et al.* (2023). *Detection and Segmentation of Ice Blocks in Europa's Chaos Regions Using Deep Learning*. 2023 Outer Planets Assessment Group Meeting, John Hopkins University, Laurel, MD, USA. https://ui.adsabs.harvard.edu/abs/2023LPICo2992.6005D

Leadership

Vanderbilt University Dyer Observatory (June 2009 - Present)

• Led public astronomy telescope viewings, lectures, and tours, educating diverse audiences on STEM concepts and operating telescopes.

University of Arizona Astronomy Club (August 2014 - May 2018)

Outreach Coordinator (2016 - 2017), President (2017 - 2018)

• Curated engaging weekly content for undergraduate students, organized club meetings, fundraisers, and research opportunities.

• Organized 300+ free telescope viewings & STEM activities at local school events, strengthening community impact.

• Established the free Astronomy Tutoring of Majors & Minors (ATOMM) tutoring program to support students in upper-division astrophysics classes.

TIMESTEP Student Leader, University of Arizona (August 2015 - May 2018)

• Led panels & discussion groups for Tucson Initiative for Minoritized Student Engagement in Science and TEchnology Program (TIMESTEP), focused on topics such as successfully navigating academic degrees, STEM careers in industry & government, and retaining underrepresented individuals in STEM.

• Coordinated hands-on workshops for topics such as battling persistent stereotypes in STEM, developing professional skills to achieve career goals, how to be a better advocate and challenges faced by marginalized groups in STEM.