

# Marina M. Dunn

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## Education

### Master of Science in Engineering: Data Science

University of California, Riverside

June 2023

Riverside, CA

*Distinctions:* 2024 Presidential Management Fellow Semi-finalist (Finalist TBD), UCR Bourns College of Engineering Commencement Graduate Student Marshal (2023), [UCR Grad Slam Finalist \(2023\)](#)

*Honors & Awards:* SWE Wanda Munn Scholarship (2023, offered), American Astronomical Society FAMOUS Travel Grant (2023), SWE WE Local Collegiate Competition Finalist (2022), 2022 [AnitaB.org](#) Grace Hopper Celebration Student Scholar, SWE WE22 Conference Grant, Uncertainty Quantification for Machine Learning Integrated Physics Modeling Travel Award (2022, NSF/Sandia Labs)

*Coursework:* Data Science, Data Mining, Statistical Computing, Machine Learning, Engineering Principles, Image Processing

### Bachelor of Science in Astronomy

The University of Arizona

May 2018

Tucson, AZ

*Honors & Awards:* Honors College Alumni Legacy Grant (2016), Arizona Excellence Scholarship (2014), Angelos C. Langadas Scholarship (2017)

*Coursework:* Theoretical, Observational & Computational Astrophysics, Classical & Quantum Physics, Computer Programming, Mathematics

## 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 Experience

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 - July 2023

*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

*Projects:* [TeraHertz Space Telescope](#), NASA GUSTO, "[Submillimeter Spectroscopy of the R Coronae Australis Molecular Cloud Region](#)"

- 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 Seismometer to Investigate Ice and Ocean

Structure (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.

## Additional Work Experience

### Data Science Engineer, Apple Inc. (January 2021 - June 2021)

*Strategic Data Solutions Team (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, Apple Inc. (January 2020 - July 2020)

*Data Analytics Server Engineering Team (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, June 2018, June 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* [Poster session]. 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* [Poster session]. 55, 105.13. <https://ui.adsabs.harvard.edu/abs/2023AAS...24110513D>

Dunn, M. M. et al. (2023, May 2-3). *Detection and Segmentation of Ice Blocks in Europa's Chaos Regions Using Deep Learning* [Conference presentation]. 2023 Outer Planets Assessment Group Meeting, John Hopkins University, Laurel, MD, USA. <https://ui.adsabs.harvard.edu/abs/2023LPICo2992.6005D>

Dunn, M. M. et al. (in press). Detection and Segmentation of Ice Blocks in Europa's Chaos Regions Using Mask R-CNN. *Machine Learning and the Physical Sciences Workshop*. 36th Conference on Neural Information Processing Systems (NeurIPS), New Orleans, Louisiana, USA.

## Leadership

### University of Arizona Astronomy Club

**August 2014 - May 2018**

*President*

**2017 - 2018**

*Outreach Coordinator*

**2016 - 2017**

- 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 and 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.

## Professional Affiliations & Involvement

Academic Data Science Alliance (ADSA), American Astronomical Society (AAS), Association for Computing Machinery (ACM), [Deep Skies Lab](#), Graduate Women in Science (GWIS), Girls in Tech, Out in STEM (oSTEM), Society of Women Engineers (SWE), Rubin Observatory DP0.2 Delegate, Rubin Observatory LSST Science Collaborations (Informatics & Statistics, Galaxies, Solar System)