Marina M. Dunn

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Education

Master of Science in Engineering: Data Science **June 2023**
University of California, Riverside 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 **May 2018**
The University of Arizona Tucson, AZ

Honors & Awards: *Honors 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 - December 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 August 2014 - May 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.

Software Engineer, Apple Inc. (January 2020 - July 2020)

Data Engineering Team, Data Analytics (7-month Program)

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

Technical Expert, Apple Inc. (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.

Posters & Presentations

M. Ryleigh Fitzpatrick 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

M. M. Dunn et al. (2017). *TeraHertz Space Telescope (TST)* [Poster session]. *229*, 238.30. https://ui.adsabs.harvard.edu/abs/2017AAS...22923830D

Dunn, M., Chazaro Cortes, J., Nguyen, D. M. (2021, December 8). *Optimizing Data Formats for Earth Information System Fire Portal* [Poster presentation]. NASA Goddard Space Flight Center.

Dunn, M., Chazaro Cortes, J., Nguyen, D. M. (2022, May 9). *Cloud-Optimized Tools for the Surface Biology & Geology High-Frequency Time Series Campaign* [Poster presentation]. NASA Goddard Space Flight Center.

Dunn, M. (2022, August 4). *Visualizing Model Optimization for Orbital Debris Characterization* [PowerPoint slides]. Data Science Summer Institute, Lawrence Livermore National Laboratory. https://youtu.be/Ru11sTYCk98

Dunn, M., Fletcher, L., Cardenas, M. S., Stephany, R. (2022, August 9). *DSSI Challenge Problem: Machine Learning Methods to Screen Compounds Targeting COVID-19* [PowerPoint slides]. Data Science Summer Institute, Lawrence Livermore National Laboratory.

Dunn, M. , Na, D., Trent, D. M. (2022, November 15-17). *The Machine Learning Showroom* [Conference presentation]. 2022 NASA Data Science Summit, NASA Langley Research Center, Hampton, VA, USA.

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

M. M. Dunn 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

Publications

J. K. Calahan 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

M. M. Dunn et al. (2023, December 15). Detection and Segmentation of Ice Blocks in Europa's Chaos Regions Using Mask R-CNN [Conference paper]. *Machine Learning and the Physical Sciences Workshop*. 37th Conference on Neural Information Processing Systems (NeurIPS), New Orleans, Louisiana, USA.

Invited Talks & Panels

"Navigating the First Two Years of Physics/Astronomy Programs." Panel discussion with Khalid Omer and Kevin Perez, presented for University of Arizona's Tucson Initiative for Minoritized Student Engagement in Science and TEchnology Program (TIMESTEP), Tucson, AZ, September 6, 2017.

"Gap Year Planning & Industry Careers." Panel presentation with Tyler Baines and Junellie Gonzalez-Quiles, presented virtually for University of Arizona's Tucson Initiative for Minoritized Student Engagement in Science and TEchnology Program (TIMESTEP), February 5, 2020.

"Gap Year Planning." Panel presentation with Kaylah McGowan, Jose Perez, and Alex Stoken, presented virtually for University of Arizona's Tucson Initiative for Minoritized Student Engagement in Science and TEchnology Program (TIMESTEP), February 16, 2022.

"Data Reconstruction: AI/ML's Place in NASA's Future." Panel presentation with Grace Goff, Adriana Holst, and Jessica Robinson, presented virtually for NASA, November 29, 2022.

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

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

- Led panels and discussion groups, and coordinated hands-on workshops for Tucson Initiative for Minoritized Student Engagement in Science and TEchnology Program (TIMESTEP), focused on STEM topics such as successfully navigating academic degrees, careers in industry & government, retaining underrepresented individuals, battling persistent stereotypes, developing professional skills to achieve career goals, and how to be a better advocate and challenges faced by marginalized groups.

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)