



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 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"](#)

- Led research developing an advanced deep learning approach for identifying and tracking individual ice blocks within the intricate "chaos terrain" regions of Jupiter's moon, Europa, in order to deepen our understanding of geophysical properties and processes, and provide crucial insights to guide future mission planning efforts.

Data Science Graduate Intern, NASA Langley Research Center

August 2022 - December 2022

Project: "The Machine Learning (ML) Showroom"

- Designed and developed components aimed at empowering NASA teams to learn about, and engage with, machine learning, evaluating its use in their research, including a collection of interactive, cloud-based coding notebooks featuring simplified ML models built with scikit-learn, TensorFlow, etc., an internal Microsoft SharePoint site with educational resources, and a forum for questions and feedback.
- Successfully contributed to mitigating complexity and reluctance towards ML, leading to quicker, broader adoption throughout the agency.

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"](#)

- Developed visualization tools aimed at optimizing models, such as the scalable Gaussian Process method "MuyGPs," utilized to predictively fill observation gaps in orbital debris.
- Simultaneously, researched various machine learning approaches, leveraging molecular descriptors and 3D atomic representations, to screen drug-like compounds targeting SARS-CoV-2 (COVID-19) to identify those with the potential to effectively treat or prevent the virus.

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"](#)

- Conducted research focused on optimizing the migration and storage of NASA Earth Science data and models in commercial cloud environments.
- Developed enhanced, interactive, and cloud-optimized analysis-ready dashboards, specifically tailored to various datasets, including those related to wildfire emissions.
- Engineered a sophisticated data pipeline adhering to NASA STAC Catalog specifications, facilitating seamless data processing for the NASA SHIFT AVIRIS-NG campaign.

Projects: [TeraHertz Space Telescope](#), [NASA GUSTO](#), [Seismometer to Investigate Ice and Ocean Structure \(SIOS\)](#), ["Submillimeter Spectroscopy of the R Coronae Australis Molecular Cloud Region"](#), ["The University of Arizona Exoplanet Project"](#)

- Authored comprehensive proposals, designed, constructed, and tested antenna prototypes, managed associated budgets, secured crucial institutional letters of intent, orchestrated and facilitated critical meetings and site visits, and presented preliminary findings for several key missions.
- Performed detailed analysis of sub-millimeter astronomy data, utilizing Python to generate intricate visual mappings of gas flows within giant gas clouds. Provided vital insights into internal dynamics of these clouds, and confirmed active star formation processes.
- Conducted observational studies of dark, dense gas clouds using the 12-meter Arizona Radio Observatory Telescope on Kitt Peak, AZ, throughout the academic year. Employed radiative transfer models to determine which are promising candidates for future star formation.
- Conducted comprehensive observations of transiting exoplanets utilizing the Kuiper 61" Telescope on Mt. Bigelow, AZ. Employed a multi-wavelength approach to analyze observational data and discern the composition of their atmospheres. Investigated various data reduction techniques, including the incorporation of brighter nearby reference stars, to enhance the revelation of atmospheric characteristics.

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 2019 - August 2021)

Technical Specialist, Apple Inc. (October 2018 - July 2019)

Apple Certified iOS Technician (ACiT) - Issued July 2019

- 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. 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>

Dunn, M., Ćiprijanović, A., Nord, B., & Mobasher, B. (2023, January 8-12). *Galaxy Morphology Classification Using Bayesian Neural Networks for LSST* [Poster session]. 241st American Astronomical Society Meeting, Seattle, WA, USA. <https://ui.adsabs.harvard.edu/abs/2023AAS...24110513D>

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

M. M. Dunn et al. (2017, January 3-7). *TeraHertz Space Telescope (TST)* [Poster session]. 229th American Astronomical Society Meeting, Grapevine, TX, USA. <https://ui.adsabs.harvard.edu/abs/2017AAS...22923830D>

M. Ryleigh Fitzpatrick et al. (2016, January 3-8). *A Study of the Effects of Underlying Assumptions in the Reduction of Multi-Object Photometry of Transiting Exoplanets* [Poster session]. 227th American Astronomical Society Meeting, Kissimmee, FL, USA. <https://ui.adsabs.harvard.edu/abs/2016AAS...22713807R>

Publications

- 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. https://ml4physicalsciences.github.io/2023/files/NeurIPS_ML4PS_2023_156.pdf
- 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>
- 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/10.3847/1538-4357/aabfea>

Invited Talks & Panels

- Panelist, *UCR Graduate Student Panel*, UCR Graduate Division Open House, Virtual, October 18, 2023.
- Panelist, *Data Reconstruction: AI/ML's Place in NASA's Future*, NASA Langley Research Center, Virtual, November 29, 2022.
- Panelist, *Gap Year Planning*, University of Arizona Tucson Initiative for Minoritized Student Engagement in Science and TEchnology Program (TIMESTEP), Virtual/Tucson, AZ, February 16, 2022.
- Panelist, *Gap Year Planning and Industry Careers*, University of Arizona Tucson Initiative for Minoritized Student Engagement in Science and TEchnology Program (TIMESTEP), Virtual/Tucson, AZ, February 5, 2020.
- Panelist, *Navigating the First Two Years of Physics/Astronomy Programs*, University of Arizona Tucson Initiative for Minoritized Student Engagement in Science and TEchnology Program (TIMESTEP), Tucson, AZ, September 6, 2017.

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)