

# Marina M. Dunn

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## Profile

Highly enthusiastic, motivated, determined Data Science Graduate Student with a strong background in Astrophysics, computing, telescope operations, & technical troubleshooting. Experience working in corporate, government, & academic environments. Passionate about problem solving, data analysis & visualization, STEM outreach, and Machine Learning research with astrophysics applications.

## Education

### M.Sc. Engineering: Data Science

SPRING 2023 (EXPECTED)

University of California, Riverside (Riverside, CA)

Advisor: Dr. Bahram Mobasher

Coursework: Data Science, Statistical Computing, Research Design, Data Mining, Machine Learning, Engineering Principles

### Additional Course in Data Science (Non-Degree Seeking)

SUMMER 2020

University of California, Berkeley (Berkeley, CA)

Coursework: Data Science

### B.Sc. Astronomy

MAY 2018

University of Arizona Steward Observatory (Tucson, AZ)

Coursework: Classical & Quantum Physics, Theoretical & Observational Astrophysics, Orbital Dynamics, Computational Programming (including Astrophysics Applications, i.e. Galactic Data Modeling & Analysis), Mathematics

## Skills

- Python, Unix, Linux, SQL, HTML
- TensorFlow, Scikit-learn, PyTorch, Apache Spark
- Jupyter, Numpy, Pandas, Matplotlib, Plotly, AWS S3, Git
- Astronomy Software: IRAF, SAOImage/DS9, Aladin
- Github, GitLab
- Microsoft Office Suite, Apple iWork, Confluence, Slack
- Certifications: Apple Certified iOS Technician, Systems Tool Kit
- Data Science, AI/ML, Deep Learning, Data Visualization & Analysis
- Cloud-based Technologies for Earth Science Datasets
- Telescope Operations, Astronomical Image Processing
- Web Design & Development, Digital Art
- Developing Research Proposals, Technical Reports & Presentations
- Excellent Oral & Written Communication
- Virtual & In-Person Collaboration
- Problem Solving, Decision Making, Public Speaking
- Event Planning & Fundraising, Public Outreach
- Retail, Customer Service, Customer Experience
- Rapport-Building, Active Listening, Empathy, Conflict Resolution

## Work Experience

### Data Science Graduate Intern – NASA Langley Research Center

AUGUST 2022 - PRESENT

- Developing simplified, cloud-based, read-to-try Machine Learning models and visualization tools for NASA scientists to evaluate potential of using Machine Learning approaches for their research.

### Computing Scholar, Data Science Summer Institute – Lawrence Livermore National Laboratory

MAY 2022 - AUGUST 2022

- Developed tool for visualizing model optimization for the scalable Gaussian Process method MuiGPs, used to predictively fill in gaps of observations of orbital debris.
- Researched various ML approaches using molecular descriptors and 3D atomic representations to rapidly screen drug-like compounds targeting SARS-CoV-2 in an effort to identify which may best treat the virus.

### Graduate Intern – Biospheric Sciences Laboratory, NASA Goddard Space Flight Center

AUG 2021 - MAY 2022

- Researched how to optimally migrate NASA Earth Science data and models to cloud-optimized, analysis-ready formats.
- Developed improved interactive visualization/analysis dashboards for NASA fire & vegetation data.

### Data Science Engineer – Apple Inc.

JAN 2021 - JUNE 2021 (6-month Program)

- Developed data pipeline with Python that utilizes web APIs to create & maintain records of “high priority/VIP” consumer information to prevent possible unwarranted internal searches by Apple employees, & send a weekly team report with statistics (i.e. recent-additions, global page visits, commonality, etc.).

### Data Engineer – Apple Inc.

JAN 2020 - JULY 2020 (7-month Program)

- Developed & deployed code that utilizes Apache Spark, Python, and SQL to create interactive historical table of active iOS devices that transmit diagnostics & usage analytics data to Apple with statistics (i.e. current OS), which informs other Apple teams about device populations used for business-critical reports, & allows for less-expensive lookups.

**Technical Expert (Previously Technical Specialist) – Apple Inc.****OCT 2018 - AUG 2021**

- Resolved customer technical issues at the Apple Store Genius Bar, including software troubleshooting & hardware repairs, & re-built customer relationships by de-escalating & approaching situations with empathy & practical, ethical problem-solving.
- Provided exceptional customer experience, demonstrated ability to be flexible and knowledgeable in a high-pressure, fast-paced environment as products & services evolve.
- Supported additional departments, including in-house technology diagnostics & troubleshooting, visual merchandising, leading creative sessions (i.e. coding, visual art), & inventory operations.

**Chief Telescope Operator – University of Arizona Steward Observatory****AUG 2014 - MAY 2018**

- Oversaw weekly operations of multiple on-campus telescopes, led nightly public astronomy talks, and managed a team of student telescope operators. Organized local private & educational STEM outreach events.
- Assisted astronomy professors with teaching assistant-like tasks, such as grading & class preparation.

**Instructional Specialist – University of Arizona Steward Observatory (Supervisor: Dr. Don McCarthy)****JUNE 2015, 2018, 2019**

- Developed educational content (including computational astronomy projects) & oversaw operations for middle school students at the annual Astronomy Camp. Educated students in basic principles of astronomy, physics, engineering, environmental science, and computing using inquiry-based learning techniques.
- Facilitated all-night astronomy observing sessions with professional telescopes and educated students about large-aperture telescopes, electronic instrumentation, & astronomy image processing software.
- Administered medical care, worked extended & irregular hours, & managed large groups of students for 8 consecutive days/nights at Kitt Peak, Mt. Graham, & Mt. Lemmon Observatories.

**Research Experience****Graduate Researcher – University of California, Riverside (Advisor: Dr. Bahram Mobasher)****SEP 2021 - PRESENT**

- Currently researching Deep Learning methods for improved data discovery and analysis for future astronomical surveys using Bayesian Neural Networks to classify early galaxy morphologies using both real and simulated data from the Hubble Space Telescope and LSST.

**Undergraduate Research Assistant – University of Arizona Steward Observatory (Advisor: Dr. Chris Walker)****JUNE 2016 - SEP 2017**

- Wrote proposals for a high resolution, spherical, space-based, inflatable observatory Terahertz Space Telescope. Presented proposal at the 2017 American Astronomical Society conference in Grapevine, TX.
- Built and tested radio telescope antenna prototypes in a welding shop, presented preliminary results for the Office of Naval Research (ONR), resulting in full project funding.
- Wrote significant proposal components, procured institutional letters of intent and instrument estimates, and managed large budgets for two NASA missions: the balloon-borne observatory GUSTO, and the Europa Ice and Ocean Structure Seismometer (SIOS).
- Supported weekly meetings with team of scientists and engineers, and organized preparations for the 2017 NASA site visit, marking project transition into the next mission phase, and \$40 million in funding.
- Analyzed sub-millimeter astronomy data of molecular transitions, created visual maps of gas within a giant molecular clouds using Python, and confirmed previous hypotheses about suspected ongoing star formation.

**Undergraduate Researcher – University of Arizona Astronomy Club (Advisor: Dr. Yancy Shirley)****JAN 2015 - MAY 2018**

- Observed 101 dense, dark molecular clouds with the 12-Meter Arizona Radio Observatory Telescope on Kitt Peak, AZ, and mathematically determined which ones were actively collecting enough material to produce future stars.
- Published research in the Astrophysical Journal in 2018.

**Undergraduate Researcher – University of Arizona Steward Observatory/LPL (Advisor: Dr. Robert Zellem)****AUG 2014 - DEC 2016**

- Observed transiting exoplanets and operated the Kuiper 61" Telescope on Mt. Bigelow, AZ, and analyzed observational data in multiple wavelengths to determine the composition of their atmospheres.
- Determined which data reduction techniques better reveal atmospheric characteristics, such as using brighter nearby reference stars.
- Presented research at the 2016 American Astronomical Society conference in Kissimmee, FL

**Volunteer & Outreach Experience****Astronomer – Vanderbilt University Dyer Observatory****JUNE 2009 - PRESENT**

- At age 13, began volunteering as an astronomer and space camp counselor at Vanderbilt Dyer Observatory, operating professional telescopes, leading monthly telescope evening lectures and tours, teaching school groups about astronomy/physics concepts, and performing science outreach experiments.

**University of Arizona Astronomy Club****AUG 2014 - MAY 2018****Outreach Coordinator****JAN 2016 - JAN 2017****President****JAN 2017 - JAN 2018**

- Presented engaging content weekly for undergraduate students passionate about Astrophysics.
- Organized club meetings, fundraisers, and professional research opportunities.

- Partnered with local Tucson schools to provide more than 300 events with telescope viewings and STEM activities at no cost.
- Established the free Astronomy Tutoring of Majors & Minors (ATOMM) tutoring service for upper-division astronomy and physics classes.

#### **TIMESTEP Student Leader – University of Arizona**

**AUG 2015 - MAY 2018**

- Led discussion groups for Tucson Initiative for Minority Engagement in Science and Technology Program (TIMESTEP) focused on topics such as how to be successful in academia, and how to retain underrepresented individuals in STEM fields.
- 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.
- As of 2022, continue to lead panel discussions about my own experiences navigating my degree and career in industry and government.

#### **Awards & Distinctions**

Grace Hopper Celebration Student Scholar (2022) - [AnitaB.org](https://anitaB.org)

WE22 Conference Grant (2022) - Society of Women Engineers

Uncertainty Quantification for Machine Learning Integrated Physics Modeling Travel Award (2022) - NSF & Sandia Laboratories

Astronomy Department Scholarship (2018) - University of Arizona Steward Observatory

Honors College Alumni Legacy Grant (2016) - The University of Arizona Honors College

Langadas Astronomy Department Scholarship (2017) - University of Arizona Steward Observatory

Arizona Excellence Scholarship (2014) - The University of Arizona

#### **Past & Present Professional Memberships & Service**

AMERICAN ASTRONOMICAL SOCIETY, WOMEN IN PHYSICS, DATA PREVIEW 0.2 DELEGATE (LSST),

ASSOCIATION FOR COMPUTING MACHINERY, DEEP SKIES LAB, UCR WOMEN IN COMPUTING, SOCIETY OF WOMEN ENGINEERS,

INFORMATICS AND STATISTICS SCIENCE COLLABORATION OF THE RUBIN OBSERVATORY LEGACY SURVEY OF SPACE AND TIME (LSST),

GALAXIES SCIENCE COLLABORATION OF THE RUBIN OBSERVATORY LEGACY SURVEY OF SPACE AND TIME (LSST),

TUCSON INITIATIVE FOR MINORITY ENGAGEMENT IN SCIENCE AND TECHNOLOGY PROGRAM (TIMESTEP)

#### **Conference/Poster Presentations**

Dunn, M. M., Lesser, D., O'Dougherty, S., Swift, B., Pat, T., Cortez, G., Smith, S., Goldsmith, P., & Walker, C. K. (2017). Terahertz Space Telescope (TST). *American Astronomical Society Meeting Abstracts #229*, 229, 238.30.

Dunn, M. M., Walker, C. K., Pat, T., Sirsi, S., Swift, B. J., & Peters, W. L. (2018). Submillimeter Spectroscopy of the R Coronae Australis Molecular Cloud Region. *American Astronomical Society Meeting Abstracts #231*, 231, 247.21.

Dunn, M. M., Lesser, D., O'Dougherty, S., Swift, B., Pat, T., Cortez, G., Smith, S., Goldsmith, P., & Walker, C. K. (2017). Terahertz Space Telescope (TST). *2017 APS Conference for Undergraduate Women in Physics (CUWiP)*, Los Angeles, CA.

Peters-Lidard, C., Shiklomanov, A., Kumar, S., & Felikson, D. (2021, November 12). *Analysis-ready Fire, Freshwater, and Sea Level Change Products*. NASA@Supercomputing Conference 2021. Retrieved April 25, 2022, from <https://www.nas.nasa.gov/SC21/research/project41.html>

Ryleigh Fitzpatrick, M., Pearson, K., Griffith, C. A., Dunn, M., Montiel, N. J., Zelle, R. T., Calahan, J., Chance, Q., Henrici, A., Sanchez, D., & AzGOE. (2016). A Study of the Effects of Underlying Assumptions in the Reduction of Multi-object Photometry of Transiting Exoplanets. *American Astronomical Society Meeting Abstracts #227*, 227, 138.07.

#### **Publications**

Calahan, J. K., Shirley, Y. L., Svoboda, B. E., Ivanov, E. A., Schmid, J. R., Pulley, A., Lautenbach, J., Zawadzki, N., Bullivant, C., Cook, C. W., Gray, L., Henrici, A., Pascale, M., Bosse, C., Chance, Q., Choi, S., Dunn, M., Jaime-Frias, R., Kearsley, I., ... Robinson, D. R. (2018). Searching for Inflow toward Massive Starless Clump Candidates Identified in the Bolocam Galactic Plane Survey. In *The Astrophysical Journal* (Vol. 862, Issue 1, p. 63). American Astronomical Society. <https://doi.org/10.3847/1538-4357/aabfea>

Nguyen, D. M. T., Chazaro Cortes, J., Dunn, M. M., & Shiklomanov, A. N. (2022). Optimal Chunking Strategies for Cloud-based Storage of Geospatial Data Using Zarr. [Unpublished manuscript]. <https://doi.org/10.1002/essoar.10511054.1>

#### **Press & Contributions**

Dunn, M., Fulmer, L., & Gagliano, A. (2018, May 6). *How to Land a Post-Baccalaureate Research Experience*. Retrieved from [https://docs.google.com/document/d/1yQFGidu6PL\\_Oif5jYfK4p1Xx7jXq96QYScjdI8zGV8](https://docs.google.com/document/d/1yQFGidu6PL_Oif5jYfK4p1Xx7jXq96QYScjdI8zGV8)

Lewis, B. (2021, December 3). *Bringing Together Art & the Cosmos*. Astrobits. Retrieved from <https://astrobits.org/2021/12/02/bringing-together-art-the-cosmos/>

Million STEM. (2020, May 18). *Marina Madeline Dunn*. Million STEM. Retrieved from <https://www.1mwis.com/profiles/Marina-Madeline-Dunn>