

# Marina M. Dunn

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## Profile

Developer-driven, highly motivated graduate student with a strong background in astronomy, computing, outreach, telescope operations, and technical troubleshooting. Currently researching Deep Learning methods for astrophysics surveys such as LSST, specifically for early galaxy morphology classification. Passionate about enabling a more supportive environment for marginalized groups in STEM.

## Education

### M.Sc. Engineering: Data Science

MAR 2023 (EXPECTED)

University of California, Riverside (Riverside, CA)

Advisor: Dr. Bahram Mobasher

Coursework: Data Science, Statistics, 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, APIs
- Astronomy Software: IRAF, SAOImage/DS9, astroML, Aladin
- Github, GitLab, Microsoft Office Suite, Apple iWork, Confluence, Slack
- Apple Certified iOS Technician, Systems Tool Kit (STK)
- Data Science, Machine Learning, Deep Learning (Convolutional & Bayesian Neural Networks, Gaussian Processes)
- Data Visualization, Analytics
- Cloud-based Technologies for Earth Science datasets
- Telescope Operations, Astronomical Image Processing
- Scientific and Educational Outreach
- Technical Troubleshooting
- Web Design & Development, Digital Art
- Research Proposal Development, Preparing Technical Reports
- Quantitative Research, Analysis
- Clear Oral and Written Communication
- Virtual and In-Person Collaboration
- Problem Solving, Decision-making
- Public Speaking, Technical Presentations
- Event Planning and Fundraising
- Mentoring, Leadership
- Retail, Customer Service, Customer Experience
- Rapport-building, Active Listening, Empathy, Conflict Resolution

## Work Experience

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

MAY 2022 - PRESENT

- Research and develop visualization applications for the scaleable Gaussian Process hyper-parameter estimation method MuiGPs and relevant astronomical applications, such as LSST research on galaxy blend classification and weak lensing shear.

### 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 user-friendly visualization/analysis dashboards for improved near-real-time fire emissions forecasting, and data pipeline for the Surface Biology and Geology hyper-spectral imaging campaign SHIFT.

### Data Science Engineer – Strategic Data Systems (SDS), Apple Inc. (Corporate)

JAN 2021 - JUNE 2021 (6-month Program)

- Developed data pipeline with Python that utilizes web APIs to regularly identify, extract, parse and update records of “high priority/VIP” consumer information to prevent possible unwarranted internal searches by Apple employees, and send a weekly team report with statistics (i.e. recent names added, how many times the individual’s page is visited globally, how common name is, etc.).

### Data Engineer – Data Analytics Server Engineering, Apple Inc. (Corporate)

JAN 2020 - JULY 2020 (7-month Program)

- Developed and deployed code that utilizes Apache Spark, Python, and SQL to create interactive historical table of active iOS devices that transmit diagnostics and usage analytics data to Apple with characteristics such as current software version; informs other Apple development and executive teams about device populations used for business-critical reports, and allows for less-expensive lookups.

- Technical Expert (Previously Technical Specialist) – Apple Inc. (Retail)** **OCT 2018 - AUG 2021**
- Resolved customer technical issues at the Apple Store Genius Bar, including software troubleshooting and hardware repairs. De-escalated and approached situations with empathy and practical, ethical problem-solving, re-building consumer relationships.
  - Provided exceptional customer experience, demonstrated ability to be flexible and knowledgeable in a high-pressure, fast-paced environment as products and services evolve.
  - Supported additional retail areas as needed, including in-house technology diagnostics and troubleshooting, visual merchandising, leading creative sessions (coding and visual art), and inventory operations.
- Chief Telescope Operator – University of Arizona Steward Observatory** **AUG 2014 - MAY 2018**
- Oversaw weekly operations of 21" and 16" Cassegrain on-campus telescopes, led nightly public astronomy talks, and managed a team of student telescope operators.
  - Organized both private and educational STEM outreach events in the local Tucson community.
  - Assisted astronomy professors with teaching assistant-like tasks, such as grading and class preparation.
- Instructional Specialist – University of Arizona Steward Observatory (Supervisor: Dr. Don McCarthy)** **JUNE 2015, 2018, 2019**
- Developed educational content (including computational astronomy projects) and 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, and astronomy image processing software.
  - Administered medical care, worked extended and irregular hours, and managed large groups of students full-time for periods as long as eight consecutive days/nights at both Kitt Peak National Observatory and Mt. Lemmon Sky Observatory.

### **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 Researcher – 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 data of carbon monoxide molecular transitions, created maps of the gas within a giant molecular cloud using Python. Confirmed previous hypotheses that a young nearby star's emissions are generating 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 Scholarship (2022) - [AnitaB.org](https://www.anitaB.org)

Data Preview 0.2 (DP0.2) Delegate (2022) - Vera C. Rubin Observatory (LSST)

Astronomy Department Graduate School Application 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, AMERICAN PHYSICAL SOCIETY, OUT IN STEM, DEEP SKIES LAB, UCR WOMEN IN COMPUTING, SOCIETY OF WOMEN ENGINEERS, SOCIETY OF PHYSICS STUDENTS, INFORMATICS AND STATISTICS 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., Zellem, 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>

Dunn, M. (2023). Classifying Galaxy Morphologies Using Bayesian Neural Networks to Support Future Astronomical Surveys. [Unpublished Master's thesis]. University of California, Riverside.

Nguyen, D. M. T., Chazaro Cortes, J., Dunn, M. M., & Shiklomanov, A. N. (2022). Optimal Strategies for Storing Earth Science Datasets in the Commercial Cloud. *Wiley*. <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\\_Oif5jYfK4p1Xx7jXq96QYScjd18zGV8](https://docs.google.com/document/d/1yQFGidu6PL_Oif5jYfK4p1Xx7jXq96QYScjd18zGV8)

Lewis, B. (2021, December 3). *Bringing Together Art & the Cosmos*. Astrobites. Retrieved from <https://astrobites.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>

#### **References Available Upon Request**