Marina M. Dunn

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Profile

Highly enthusiastic, motivated, determined Data Science Graduate Student doing interdisciplinary Machine Learning & Astrophysics research. Experience working in industry, government, & academia, and passionate about STEM outreach.

Education

M.Sc. Engineering: Data Science   **JUNE 2023 (EXPECTED)**

University of California, Riverside (Riverside, CA)   GPA: 4.0

Advisors: Dr. Bahram Mobasher, Dr. Aleksandra Ciprijanovic (Fermilab)

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)   GPA: 4.0

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, R
- TensorFlow, Scikit-learn, PyTorch, Apache Spark
- Jupyter, Numpy, Pandas, Matplotlib, Plotly, AWS S3, Git
- Astronomy Software: IRAF, SAOImage/DS9, Aladin
- Microsoft Office Suite, Apple iWork, Confluence, Slack
- Data Science, ML, Deep Learning, Data Visualization & Analysis
- Telescope Operations, Astronomical Image Processing
- Certifications: Apple Certified iOS Technician, Systems Tool Kit

- 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

Research Experience

Graduate Student – University of California, Riverside (Advisors: Drs. Bahram Mobasher & Aleksandra Ciprijanovic)   SEP 2021 - PRESENT

- Currently working collaboratively with Fermilab and Deep Skies Lab to research using Bayesian Neural Networks to accurately classify morphologies of galaxies with simulated mock datasets of different observing years and observational noise levels in preparation for the Legacy Survey of Space & Time.

Data Science Graduate Intern – NASA Langley Research Center   **AUG - DEC 2022**

- As part of the "Machine Learning Showroom" project, developed simplified, cloud-based, "read-to-try" Machine Learning models, visualization tools, and online content for NASA teams to evaluate potential of using Machine Learning approaches for their work.

Computing Scholar, Data Science Summer Institute – Lawrence Livermore National Laboratory   **MAY - AUG 2022**

- Developed tool for visualizing model optimization for the scalable Gaussian Process method MuyGPs, used to predictively fill in gaps of observations of orbital debris.
- Researched various Machine Learning 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 & models to cloud-optimized, analysis-ready formats.
- Developed improved interactive visualization/analysis dashboards for NASA fire data, including for near-real-time fire emissions forecasting, and vegetation data, such as the Surface Biology and Geology hyper-spectral imaging SHIFT campaign.

Undergraduate Research Assistant – University of Arizona Steward Observatory   **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 (SIIOS).
- 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 flows 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
- Mathematically determined which ones were actively collecting enough material to produce future stars. Published research 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

Additional Work Experience

Data Science Engineer – Apple Inc.   JAN 2021 - JUNE 2021 (6-month Program)
- As part of Apple's Strategic Data Solutions team, developed data pipeline using Python that utilizes web APIs to create & maintain records of "high risk/priority" customers to mitigate unwarranted personal information searches by internal employees. Sends weekly team report with critical statistics (i.e. recent-additions, global page visits, commonality, etc.).

Data Engineer – Apple Inc.   JAN 2020 - JULY 2020 (7-month Program)
- As part of Apple's Data Analytics Server Engineering team, developed & deployed code that utilizes Apache Spark, Python, and SQL to create interactive historical table of active iOS devices transmitting diagnostics/usage analytics data with statistics (i.e. current OS version). Informs other Apple teams about device populations used for business-critical reports, and 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 professors with teaching tasks, such as grading, and class/lab preparation for general education astronomy courses.

Instructional Specialist – University of Arizona Steward Observatory   JUNE 2015, 2018, 2019
- Developed educational STEM content (including computational astronomy projects) and oversaw operations for 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, educated students about telescopes, electronic instrumentation, & astronomy image processing software.
- Administered medical care, worked extended/irregular hours, and managed large groups of students for 8 consecutive days/nights at remote observatories such as Kitt Peak, Mt. Graham, & Mt. Lemmon.

Volunteer & Leadership 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.

Outreach Coordinator (2016 - 2017), President (2017 - 2018) – University of Arizona Astronomy Club   AUG 2014 - MAY 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 panels & 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.

Fellowships, Grants & Awards

2023 WE Local Collegiate Competition Finalist (2022) - Society of Women Engineers,

Funds for Astronomical Meetings: Outreach to Underrepresented Scientists (FAMOUS) Travel Grant (2022) - American Astronomical Society,

Grace Hopper Celebration Student Scholar (2022) - AnitaB.org, WE22 Conference Grant (2022) - Society of Women Engineers,

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

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

Arizona Excellence Scholarship (2014), Angelos C. Langadas Astronomy Department Scholarship (2017) - University of Arizona

Past & Present Professional Memberships

Academic Data Science Alliance, American Astronomical Society, Association for Computing Machinery (ACM), ACM SIGHPC, Deep Skies Lab, Out in STEM, UCR Women in Computing, Society of Women Engineers, Rubin Observatory LSST Science Collaborations (Informatics & Statistics, Galaxies) & Data Preview 0.2 Delegate, Graduate Women in Science

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.

Posters & 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)*. [Poster presentation]. *American Astronomical Society Meeting Abstracts #229*, *229*, 238.30. tinyurl.com/zppnpy9p

Dunn, M., Chazaro Cortes, J., Nguyen, D. M. (2021, December 8). *Optimizing Data Formats for Earth Information System Fire Portal*. [PowerPoint presentation]. NASA Goddard Space Flight Center. tinyurl.com/26hk5v89

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. tinyurl.com/3ufmr6us

Dunn, M. (2022, August 4). *Visualizing Model Optimization for Orbital Debris Characterization*. [PowerPoint presentation]. Data Science Summer Institute, Lawrence Livermore National Laboratory. t.co/glpf9kIu55

Dunn, M. (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. tinyurl.com/3v9xed69

Dunn, M. , Na, D., Trent, D. (2022, November 14). *The Machine Learning Showroom*. [PowerPoint presentation]. 2022 NASA Data Science Summit.

Dunn, M., Ciprijanovic, A., Mobasher, B., Nord, B. (2023, January 9). *Galaxy Morphology Classification Using Bayesian Neural Networks for LSST*. [Poster presentation]. *American Astronomical Society Meeting Abstracts #241*.

Ryleigh Fitzpatrick, M., Pearson, K., Griffith, C. A., Dunn, M., Montiel, N. J., Zellem, R. T., … AzGOE. (2016, January). *A Study of the Effects of Underlying Assumptions in the Reduction of Multi-Object Photometry of Transiting Exoplanets*. [Poster presentation]. *American Astronomical Society Meeting Abstracts #227*, 227, 138.07. tinyurl.com/yw5ff28w

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. *The Astrophysical Journal*, *862*(1), 63. doi.org/10.3847/1538-4357/aabfea

Dunn, M. M. (2023, June). *Classifying Galaxy Morphologies Using Bayesian Neural Networks for LSST*. [Unpublished Master's thesis]. University of California, Riverside.

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 [Submitted manuscript].

Press & Contributions

Dunn, M., Fulmer, L., & Gagliano, A. (2018, May 6). *How to Land a Post-Baccalaureate Research Experience*. tinyurl.com/3uzc7x67

Lewis, B. (2021, December 3). *Bringing Together Art & the Cosmos*. Astrobites. tinyurl.com/36muac7c

Million STEM. (2020, May 18). *Marina Madeline Dunn*. Million STEM. tinyurl.com/y8d2kbbt