Marina M. Dunn

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Profile

Developer-driven, highly motivated graduate student with a strong background in science outreach, telescope operations, hardware & software troubleshooting, and data science. Currently researching Deep Learning applications for astrophysics datasets. Passionate about enabling a better environment for marginalized groups in STEM.

Education

UNIVERSITY OF CALIFORNIA, RIVERSIDE – M.S. ENGINEERING: DATA SCIENCE – RIVERSIDE, CA – SEPTEMBER 2021– PRESENT
UNIVERSITY OF CALIFORNIA, BERKELEY – ADDITIONAL COURSES IN DATA SCIENCE – BERKELEY, CA – JUNE - AUGUST 2020
THE UNIVERSITY OF ARIZONA – BACHELOR OF SCIENCE IN ASTRONOMY – TUCSON, AZ – RECEIVED MAY 2018

Coursework: Classical & Quantum Physics, Theoretical & Observational Astrophysics, Computational programming with astrophysics applications (Galactic data modeling & analysis), Orbital dynamics, Mathematics, Data Science, Machine Learning, Data Mining

Awards & Grants

Astronomy Department Graduate School Application Scholarship (2018) - University of Arizona Steward Observatory
Honors College Alumni Legacy Grant (2016) - University of Arizona Honors College
Langadas Astronomy Department Scholarship (2017) - University of Arizona Steward Observatory
Arizona Excellence Scholarship (2014) - University of Arizona

Skills

- Python, C, Unix/Linux
- SQL
- TensorFlow, Scikit-learn
- Astronomy Software: IRAF, SAO DS9
- Cloud Computing & Storage, AWS
- APIs
- Github, Version Control
- Numpy, Matplotlib, Jupyter, Pandas
- Apache Spark
- Apple Certified iOS Technician (ACiT), Technical
- Microsoft Office 365 Suite, Apple iWork, Confluence, Slack
- Certifications: Systems Tool Kit (STK), HAM Radio

- Community Science & Educational Outreach
- Technical Communication, Public speaking
- Mentoring, Managing Large Teams
- Customer Service
- Preparing technical reports
- Research proposal development
- Technical Presentations
- Export Control Training
- Data Visualization and Analysis
- Machine and Deep Learning
- Clear Communication
- Virtual Collaboration

Work Experience

Computing Scholar, Data Science Summer Institute Intern – Lawrence Livermore National Laboratory   MAY 2022 - PRESENT
- Researching and developing visualization application for the scaleable Gaussian Process hyper-parameter estimation method "MuyGPs"
- Exploring Gaussian Process applications for future astronomical surveys like LSST, and research involving galaxy blend classification and weak lensing shear.

Graduate Intern – NASA Goddard Space Flight Center   AUG 2021 - MAY 2022
- Researched and migrated 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 Surface Biology and Geology hyperspectral imaging

Data Science Engineer – Apple Inc.   JAN 2021 - JUNE 2021
- (6-month program) As part of the Strategic Data Systems (SDS) team, developed and maintained a data pipeline with Python that utilizes web APIs to regularly identify, extract, parse and update records of individuals marked as "high priority/VIP" for possible unwarranted customer information searches by Apple employees, and sends weekly reports (with statistics such as how many times the individual's page is visited globally on the web, how common the name is, and verifies the name extracted is human).

Data Engineer – Apple Inc.   JAN 2020 - JULY 2020
- (7-month program) As part of the Data Analytics Server Engineering team, developed and deployed code that utilizes Apache Spark, Python, and SQL to collect diagnostics and usage data from all active iOS devices that transmit analytics data.
- Created an interactive historical table of critical device characteristics such as software version in order to inform other Apple teams about populations of devices and allow 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 and hardware troubleshooting and repairs.

- Provided exceptional customer support, demonstrated the ability to be flexible and knowledgeable as Apple products and services evolve.
- Supported additional areas as needed, such as in-house technology diagnostics and troubleshooting, visual merchandising, leading creative sessions (coding and visual art), and inventory operations.

Chief Telescope Operator – University of Arizona   **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 telescope operators. Organized 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   **JUNE 2015, JUNE 2018, JUNE 2019**

- Developed educational content (including projects to strengthen computational programming skills) and oversaw operations annually for students at Astronomy Camp, led by Dr. Don McCarthy.
- Mentored 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 image-processing analysis software.
- Administered medical care, worked extended/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 Student– University of California, Riverside   **SEP 2021 - Present**

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

Research Assistant – University of Arizona   **JUNE 2016 - SEP 2017**

- Wrote proposals for a high resolution, spherical, space-based, inflatable observatory Terahertz Space Telescope.
- 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.
- Presented research at the 2017 American Astronomical Society conference in Grapevine, TX.
- Wrote significant proposal components, procured instrument estimates, and managed large budgets for two NASA missions: the balloon-borne observatory, GUSTO, and the Europa Ice and Ocean Structure Seismometer (SIIOS).
- Collaborated with a large team of scientists and engineers weekly and organized preparations for the NASA site visit in January 2017, marking its transition into the next phase of the mission and $40 million in funding.
- Analyzed sub-millimeter data of 12CO(3-2) and 13CO(3-2) molecular transitions to better understand the dynamic processes of the Interstellar Medium inside giant molecular clouds.
- Create integrated intensity maps with Python to determine energy balance within the cloud.
- Confirmed previous hypotheses that within molecular cloud, a young star generates bipolar outflows, thus driving star formation.

Undergraduate Researcher – University of Arizona Astronomy Club   **JAN 2015 - MAY 2018**

- Observed 101 dense, dark pre-stellar cores on the 12-Meter Arizona Radio Observatory Telescope at Kitt Peak, AZ.
- Assessed these massive clumps and determined 6 were actively collecting enough material to produce stars.
- Using a radiative transfer model, found the rate at which these clumps were collecting material was approximately 500 - 2000 $M_\odot$/Myr (stellar masses per year), meaning the cores' masses will likely double in a free-fall time.
- Collaborated to publish work in the Astrophysical Journal in 2018. (Supervisor: Dr. Yancy Shirley, Steward Observatory)

Undergraduate Researcher – University of Arizona   **AUG 2014 - DEC 2016**

- Regularly observed transiting exoplanets like XO-2b, while operating the Kuiper 61" Telescope at Mt. Bigelow, AZ, and analyzed corresponding light curves of the host star's light dimming as planets passed in front.
- Studied the change in effective radius of the planet in the U and B bands to determine the composition of the planet's atmosphere.
- Found that certain data reduction techniques work better to help reveal the atmospheric characteristics, such as using brighter nearby reference stars.
- Presented research at the 2016 American Astronomical Society conference in Kissimmee, FL on exoplanet data reduction methods (Supervisor: Dr. Robert Zellem, JPL)

Volunteer & Outreach Experience

Astronomy Volunteer – 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/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

- Provided meaningful and engaging content for undergraduate students with a passion or interest in astronomy and science
- Organized meetings, fundraisers, and opportunities to work on astronomy research projects with professional astronomers
- Partnered with local schools in Tucson to provide more than 300 star parties at no cost, using telescopes and creating activities aimed at teaching kids about STEM
- Established the free Astronomy Tutoring of Majors and Minors (ATOMM) tutoring service for astronomy/physics/math classes.

TIMESTEP Student Leader – University of Arizona   **AUG 2015 - present**

- 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 minorities in STEM fields.
- Coordinated hands-on workshops for topics such as battling persistent stereotypes in STEM, and developing professional skills to achieve career goals.
- Led discussions about my own experiences navigating my degree, and opportunities in industry-related careers.
- Regularly attended conferences for organizations like the American Physical Society's Women in Physics and American Astronomical Society, participated in workshops focused on how to be a better advocate. Learned more about the challenges faced by marginalized groups

Professional Memberships & Service

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

AMERICAN ASTRONOMICAL SOCIETY, WOMEN IN PHYSICS, AMERICAN PHYSICAL SOCIETY,

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

SOCIETY OF WOMEN ENGINEERS, SOCIETY OF PHYSICS STUDENTS, WOMEN IN COMPUTING AT UCR, OSTEM, DEEP SKIES LAB

Conference Presentations

Undergraduate

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.

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, Los Angeles, CA.

Graduate

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

Publications

Undergraduate

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

Graduate

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

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

References Available Upon Request