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 software engineering. Currently researching data science and machine 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
UNIVERSITY OF ARIZONA — BACHELOR OF SCIENCE IN ASTRONOMY — TUCSON, AZ — RECEIVED MAY 2018
Relevant coursework: Classical and Quantum Physics, Theoretical and Observational Astrophysics, Computational programming with astrophysics applications (Galactic data modeling and analysis), Orbital dynamics, Mathematics, Data science, Machine Learning

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
- Jupyter notebooks
- Numpy, Matplotlib, TensorFlow, Scikit-learn, Pandas
- Astronomy Software: IRAF, SAO DS9
- Cloud computing and storage
- Object-oriented programming
- REST APIs
- Machine Learning
- Amazon Web Services
- Apache Spark
- Microsoft Office 365 Suite, Apple iWork, Confluence, Slack
- Outreach
- Github, version control
- Certifications: Systems Tool Kit (STK), HAM Radio
- Apple Certified iOS Technician (ACiT): technical troubleshooting
- Customer Service, Mentoring, Managing large teams
- Preparing technical reports
- Research proposal development
- Technical Presentations
- Export Control Training
- Data Visualization
- Scientific Data Analysis
- Clear Communication, Virtual Collaboration
- Technical Communication, Public speaking

Work Experience

Graduate Intern – NASA Goddard Space Flight Center **AUG 2021 - Present**

- Currently working on the Earth Information Systems team to migrate NASA data and models a cloud-optimized, analysis-ready format in order to develop user-friendly visualization and analysis dashboards, including improved near-real-time fire emissions forecasting. Actively engage with scientific and policymaking communities to identify user-specific needs for local fire tracking and response strategy.

Data Science Engineer – Apple Inc. **JAN 2021 - JUNE 2021**

- (6 month program) As part of Apple's Strategic Data Systems (SDS) team, developed and maintained data pipeline mitigate internal fraud, waste and abuse within AppleCare Support. Created weekly Python job that utilizes APIs to regularly identify, extract, parse and update records of individuals on the web marked as "high priority/VIP" for possible unwarranted customer information searches by Apple employees. Also adds statistics such as of how many times the individual's personal page is visited globally on the web, how common the name is, and verifies name extracted is human. Writes new table out to EDW, and sends out weekly updates of new names added to team member for manual approval if desired.

Data Engineer – Apple Inc. **JAN 2020 - JULY 2020**

- (7 month program) As part of Apple's Data Analytics server engineering team, wrote and deployed job that utilizes Apache Spark, Python, and SQL to collect diagnostics and usage data from all iOS devices. This provides a historical report of critical characteristics like software version and first date of logs transmitted, to inform other Apple teams about the population of devices and allow for less-expensive lookups.

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

- Resolve customer technical issues at the Apple Store Genius Bar, including software and hardware troubleshooting and repairs.
- Provide exceptional customer support, demonstrate ability to be flexible and knowledgeable as Apple products and services evolve.
- Support additional departments when needed, such as visual merchandising, teaching 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 team of telescope operators. Organized private and educational STEM outreach events in 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

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 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 on a large team of scientists and engineers from various institutions on a weekly basis. 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.
- Using the velocity and line-width of the molecule, calculated gas temperature and column density, allowing me to create integrated intensity maps with Python and determine the energy balance within the cloud.
- Confirmed previous hypotheses that within R CrA, there is a young star generating bi-polar 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 ranged approximately 500 - 2000 $M_{\odot}$/Myr, 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 atmospheres.
- 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 experiments.

University of Arizona Astronomy Club **AUG 2014 - MAY 2018**

OUTREACH COORDINATOR JAN 2016 - JAN 2017

PRESIDENT JAN 2017 - JAN 2018

- Mission: to inspire and assist anybody with a passion or interest in astronomy and science. Provide undergraduate students opportunities to work on astronomy research projects with professional astronomers who care deeply about astronomy education.
- Organized meetings and fundraisers, and partnered with schools to provide more than 300 star parties, using telescopes and creating activities aimed at teaching kids about planetary science, astrophysics, and math for the local Tucson community, including elementary and middle school STEM nights, at no-cost in order to increase STEM awareness.
- Established the Astronomy Tutoring of Majors and Minors (ATOMM) program, a free tutoring service for astronomy/physics/math 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 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, as well as learned more about the challenges faced by marginalized groups

Professional Memberships & Service

AMERICAN ASTRONOMICAL SOCIETY, WOMEN IN PHYSICS, WOMEN IN OPTICS,
TUCSON INITIATIVE FOR MINORITY ENGAGEMENT IN SCIENCE AND TECHNOLOGY PROGRAM (TIMESTEP), AMERICAN PHYSICAL SOCIETY,
SOCIETY OF WOMEN ENGINEERS, SOCIETY OF PHYSICS STUDENTS, WOMEN IN COMPUTING, OSTEM

Conference Presentations

Undergraduate

Ryleigh Fitzpatrick, M., et al. (2017 January 4-8). *A Study of the Effects of Underlying Assumptions in the Reduction of Multi-Object Photometry of Transiting Exoplanets* [Conference presentation]. American Astronomical Society Meeting Abstracts #227, vol. 227, p. 138.07, Kissimmee, FL.

Dunn, Marina Madeline. (2017 January 3-7). *TeraHertz Space Telescope (TST)* [Conference presentation]. American Astronomical Society Meeting Abstracts #229, vol. 229, p. 238.30, Grapevine, TX.

Dunn, Marina Madeline. (2017, January 13-15) *TeraHertz Space Telescope (TST)* [Conference presentation]. 2017 APS Conference for Undergraduate Women in Physics, Los Angeles, CA.

Graduate

Peters-Lidard, C.; Kumar, S.; Shiklomanov, A.; Felikson, D. (2021, November 15-18) *NASA's Earth Information System* [Upcoming Conference presentation]. NASA@Supercomputing Conference 2021.

Publications

Undergraduate

Calahan, Jenny, et al. "Searching for Inflow Towards Massive Starless Clump Candidates Identified in the Bolocam Galactic Plane Survey." *The Astrophysical Journal*, vol. 862, no. 1, July 2018, p. 63. *arXiv.org*, doi:10.3847/1538-4357/aabfea.

Graduate

Dunn, M; Nguyen, D. M.; Chazaro-Cortes, J; Shiklomanov, A. (2021). Optimal Strategies for Storing Earth Science Datasets in the Commercial Cloud [Unpublished manuscript]. NASA Goddard Space Flight Center.

References Available Upon Request