

KELCEY DAVIS

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MARC and Cal-Bridge Pre-Doctoral Scholar

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EDUCATION

Overall GPA: 3.32

Upper-Division Physics GPA: 3.67

San Diego State University (SDSU)

Bachelors of Science in Astronomy

Double Minors in Mathematics and Creative Writing

August 2018 - May 2021

Campus GPA: 3.61, Major GPA: 3.58

Minor GPAs: 3.50, 4.00

San Diego City College

Associates of Science in Astronomy

August 2014 - May 2019

Campus GPA: 3.10

ACADEMIC ACHIEVEMENTS

Reginald F. Buller Endowment 2020-2021 academic year, private scholarship

Awona W. Harrington Astronomy Scholarship 2020-2021 academic year, private scholarship

L'SPACE NPWEE Summer Student (Lucy Student Pipeline Accelerator and Competency Enabler, NASA Proposal Writing and Evaluation Experience) NASA Program to familiarize undergraduate students with proposal writing process, May 2020 - August 2020

SDSU Dean's List Fall 2019, Spring 2020

SDSU National Society of Leadership and Success, Sigma Alpha Pi February 2019, Honors Society recognizing academic accomplishment and leadership capabilities

MARC Scholar September 2019-May 2021, MARC (Maximizing Access to Research Careers) , Pre-Doctoral Program funded by the NIH

Cal-Bridge Scholar September 2019-May 2021, Pre-Doctoral Program funded by the NSF

2019 CAMPARE/CHAMP Scholar June 2019-August 2019, CHAMP (CAMPARE HERA (Hydrogen Epoch of Reionization Array) Astronomy Minority Partnership), part of CAMPARE summer research experience for undergraduates program

SDSU MESA Student August 2019 - Present, MESA (Mathematics, Engineering, and Science Achievement), student organization involved in outreach and promoting success in STEM

Tau Sigma Honors Society March 2019, inducted in recognition of academic achievement, placing in top 20% of transfer students during first semester at San Diego State University

William F. Lucas/San Diego Astronomy Association Endowment 2019-2020 and 2020-2021 academic years, private scholarship

Certificate in Exoplanet Observing November 2018, AAVSO (American Association of Variable Star Observers), Completed necessary coursework to demonstrate ability in Exoplanet analysis using AstroImageJ

JOURNAL PUBLICATIONS

2. **Astrometric Measurements and Historical Data Summary of WDS 05599-3703B**

Journal of Double Star Observations, October 1st, 2019

Neusha Kharrati, **Kelcey Davis**

1. **An Astrometric Measurement of WDS 16476-4708 AB and AC**

Journal of Double Star Observations, April 1, 2019

Kelcey Davis, Sophia Vanslyke, Pat Boyce, Grady Boyce, Ashlyn Little

OBSERVING EXPERIENCE

Kitt Peak 0.9m optical telescope, October 26 - 27, 2018

CLUB INVOLVEMENT

Transfer Student Outreach Alliance Vice President of Public Relations April 2020 - present, member April 2020 - present

Schwartz Astronomical Society Vice President April 2020 - present, member August 2019 - present

San Diego Mesa College Women in Science Club Secretary February 2018 - May 2018, member August 2017 - May 2018

ORAL RESEARCH PRESENTATIONS

9. **SMEARS (Statistical Modeler for Extended Astrophysical Radio Sources) as a Potential Improvement to Epoch of Reionization Foreground Models**

Kelcey Davis, Ruby Byrne, Miguel Morales, Bryna Hazelton,
October 16, 2020, SDSU URS(Undergraduate Research Symposium)

8. **SMEARS (Statistical Modeler for Extended Astrophysical Radio Sources) as a Potential Improvement to Epoch of Reionization Foreground Models**

Kelcey Davis, Ruby Byrne, Miguel Morales, Bryna Hazelton,
August 22, 2020, CAMPARE 11th annual student research symposium

7. **Channel Performance at the POLARBEAR Telescope**

Kelcey Davis August 11, 2020

Presentation given to lab group at end of summer project

6. **Improving Foreground Modeling in Searches for the 21cm Reionization Signal**

Kelcey Davis, Ruby Byrne, Miguel Morales, Bryna Hazelton, Kate Rubin, February 28, 2020
SRS (Student Research Symposium) San Diego State University

5. **Improving Foreground Modeling in Epoch of Reionization Searches**

Kelcey Davis, Ruby Byrne, Miguel Morales, Bryna Hazelton, Kate Rubin, January 18, 2020
CUWiP (Conference for Undergraduate Women in Physics)

4. **Programmable Lenses Using Spatial Light Modulators**

Kelcey Davis, Jeffrey Davis, Don Cottrel

MARC (Maximizing Access to Research Careers) Undergraduate Research Symposium, San Diego, CA,
October 18, 2019

3. **Improving Foreground Modeling for 21cm Cosmology**

Kelcey Davis, Ruby Byrne, Miguel Morales, Bryna Hazelton

10th Anniversary CAMPARE Research Symposium, Panoma, CA, August 24, 2019

2. **An Astrometric Measurement of WDS 16476-4708AB and WDS 16476-4708AC**

Kelcey Davis, Sophia Vanslyke, Ashlyn Little

Boyce Astro Results Presentation, Session May 19, 2018

1. **Possibilities of WDS 13523-3047**

Kelcey Davis, Sophia Vanslyke, Ashlyn Little

Boyce Astro Project Proposal, Session March 17, 2018

POSTERS PRESENTATIONS

4. **SMEARS (Statistical Modeler for Extended Astrophysical Radio Sources) as a Potential Improvement to Epoch of Reionization Foreground Models**

Kelcey Davis, Ruby Byrne, Miguel Morales, Bryna Hazelton,

October 12, 2020, SACNAS (Society for Advancement of Chicanos/Hispanics and Native Americans in Science) 2020 online conference

3. **Improving Foreground Modeling in Searches for the Epoch of Reionization**

Kelcey Davis, Ruby Byrne, Miguel Morales, Bryna Hazelton, Kate Rubin, June 3, 2020

AAS (American Astronomical Society) Conference, iPoster available [here](#)

2. Improving Foreground Modeling in Searches for the 21cm Reionization Signal

Kelcey Davis, Ruby Byrne, Miguel Morales, Bryna Hazelton, Kate Rubin, January 5, 2020

AAS (American Astronomical Society) Conference

1. Constructing Zoom Systems with Spatial Light Modulators

Kelcey Davis, Jeffrey Davis, Don Cottrel, November 14, 2019

ABRCMS (Annual Biomedical Research Conference for Minority Students)

OUTREACH PRESENTATIONS AND PROJECTS

8. How to Get Involved in Undergraduate Research

Talk given over Zoom to members of the Schwartz Astronomical Society on beginning undergraduate research within the field of Astronomy

November 16, 2020

7. AAVSO Diversity Committee Member

Member of committee dedicated to increasing diversity among the AAVSO membership base by increasing the size of the membership base and surveying demographics of current members

November 2020 - Present

6. SDSU Astronomy Department Diversity and Inclusion Committee

Undergraduate representative on committee working to address issues in representation of minorities within the department and create an inclusive environment

October 2020 - Present

5. Digital Sous Podcast: Lunar New Year Episode

Digital Sous created a food-based podcast episode about the lunar new year. I organized a group of astronomers the podcast could interview about moons and participated in the interviews myself Published: February 12, 2021

4. Planetesi-Pals: An Astronomy Buddy Program

Organized program as part of the Schwartz Astronomical Society, paired incoming and prospective transfer students with an upper division mentor, September 8, 2020

3. Ask A Fleetster: Science and Contemporary Art

Fleet Science Center with **Kelcey Davis** and Melissa Walter, May 9, 2020

Answered question "What is Science?" sent in to fleet science center for museum's YouTube channel, video available [here](#)

2. Summer Research Programs

Kelcey Davis April 20, 2020

Talk given over Zoom session to lower division undergraduates participating in the Pre-MARC program applying for summer research positions

1. Getting Involved in Research

Kelcey Davis February 10, 2020

Talk given to lower division undergraduates participating in the Pre-MARC program on getting involved with campus research

COMPUTER SKILLS

Python 3 (Since August 2018)

Astropy, Matplotlib, Numpy, Pandas, Scipy, Jupyter Notebooks

Operating Systems

Linux OS (Ubuntu), Mac OS, Windows OS (8, 10)

General Software

Microsoft Office (Excel, PowerPoint, Word), L^AT_EX, Unix, Git

Astronomy Software

AstroImageJ, SAOImage DS9, Mira Pro

RELEVANT WORK EXPERIENCE

AAVSO Outreach Ambassador October 2020 - Present

- Joined outreach ambassador program to promote astronomy to a general audience
- Intend to bring this work to a graduate program to facilitate outreach efforts
- Served on the organization's Diversity Committee beginning 11/2020

Remote Mathematics Tutor May 2020 - June 2020, October 2020 - Present

- Worked with San Diego Tutor Tree to support a high school students learning remotely during the COVID-19 quarantine
- Aided in retention for AP pre-calculus and calculus class materials by providing individualized assistance with coursework
- Organized meeting 1-4 times a week as necessary over Zoom to work through problems and answer questions as student worked through problems with me

Submission Reader at Short Édition Magazine April 2020 - Present

- Volunteer reader for submissions to Short Édition literary magazine
- Wrote short reviews of submissions to aid editors in selecting publishable pieces
- Reviewed poetry and short fiction
- Short Édition literary magazine is a distributor of short fiction, poetry, and short children's literature. They publish through their website as well as in kiosk found at malls and libraries where readers can chose the time they would like to spend reading a story and the kiosk will pick one for the reader

Service Learning Tutor at San Diego State University Pathways Office February 2019 – May 2019 San Diego, CA

- Tutored at Lincoln high school, servicing underprivileged students
- Aided in freshmen Math, Pre-Calculus, and Calculus classrooms
- Individualized approach with students based on level of understanding and need for challenge
- Provided assistance in concept retention during lectures and classroom activities

Local Astronomy Volunteer Work at Boyce Astro October 2018 – Present San Diego, CA

- Continuous volunteer work to promote the involvement of students, especially young women, in Astronomy
- Act as a mentor for students who conduct research on a double star system chosen from the Washington Double Star catalog
- Meet regularly throughout project to concentrate on research ideas, determine team roles, answer scientific questions, and guide students through the process of exploring their idea with scientific research
- Support students who work towards publishing their work in the Journal of Double Star Observations
- More information about Boyce Astro can be found at boyce-astro.org

RESEARCH PROJECTS

7. Exploring Hubble Data of M82 August 2020 - Present

- Used data taken with MGII Filter that has previously remained unexplored due to cosmic ray abundance
- Worked with DrizzlePac and Python to mitigate cosmic ray presence across images³
- Hope to use this work to learn about the galactic winds of M82 through the lens of the MGII transition

6. **CMB (Cosmic Microwave Background) Polarization Instrumentation** May 2020 - August 2020

- Developed a Python script to put observation data from the POLARBEAR telescope in an easily accessible format
- Helped to understand efficiency of channels and how efficiency varies by observation
- Worked remotely under Dr. Darcy Barron of the University of New Mexico through twice-weekly zoom meetings and individual contact

5. **L'SPACE Proposal Writing Workshop** May 2020 - July 2020

- Worked with remote team to develop an idea for a NASA mission proposal and submit it to compete for a \$ 10,000 grant
- Attended weekly seminars to develop understanding of proposal process
- Primarily responsible for editing proposal to reflect proper, professional scientific language and assisting other team members in formatting
- trained to evaluate NASA proposals and sat on panel to evaluate proposals from other teams

4. **Exploring Spatial Light Modulators** August 2019 - December 2019

- Supervised by Dr. Jeffrey Davis at San Diego State University's Electro-Optics lab
- Programmed Spatial Light Modulators (SLMs), a programmable Liquid Crystal Display, with software developed in lab, Coherent Optics
- Explored various applications, focusing on programmable diffractive lenses and optical trapping
- Developed scripts that programmed various potential optical systems onto SLMs to explore variations in system structure

3. **Undergraduate Senior Thesis: Improving Foreground Models for 21cm Cosmology** June 2019- Present

- Published work in accessible for on Github under name SMEARS (Statistical Modeler of Extended Astrophysical Radio Sources)
- Supervised by Dr. Kate Rubin at San Diego State University and Dr. Miguel Morales, Dr. Bryna Hazelton, and PhD candidate Ruby Byrne at the University of Washington
- Submitted to the Department of Astronomy at SDSU in the form of a written thesis
- Continuation of summer research at the University of Washington as senior thesis at San Diego State University
- Improved models of radio bright sources in Python 3 to calibrate data taken at the MWA (Murchison Widefield Array)
- Explored sources with complex structure recorded in GLEAM (GaLactic and Extragalactic All-sky MWA survey) as point sources.
- Research conducted as part of a Research Experience for Undergraduates program through CHAMP (CAMPARE HERA Astronomy Minority Partnership)/ CAMPARE programs and the HERA (Hydrogen Epoch of Reionization Array)

2. **Analysis of Novae in M31** August 2018 – June 2019 San Diego, CA

- Supervised by Dr. Allen Shafter as part of a Special Studies course
- Built Python script attempting to identify individual sources in M31 across hundreds of thousands of observation, focusing on newly-appearing faint sources
- Utilized data from the Palomar transient factory as well as observations taken at the 0.9m optical telescope at Kitt Peak national observatory
- Ultimately unsuccessful, but gained valuable experience in Python-based analysis of large data sets

1. **Double Star Analysis, Boyce Astro** February 2018 – September 2018 San Diego, CA

- Supervised by Grady Boyce and Pat Boyce
- First author and team lead for paper analyzing the movement of a possible double star system
- Utilized images taken through Las Cumbres Observatory network with Mira Pro software

FICTIONAL PUBLICATIONS

5. **Street Cat** 10 word micro-fiction

Potato Soup Journal, September 6th, 2020, **Kelcey Davis**

4. **Summer** 10 word micro-fiction

Potato Soup Journal, August 29th, 2020 **Kelcey Davis**

3. **Inside** 10 word micro-fiction

Potato Soup Journal, June 17th, 2020, **Kelcey Davis**

2. **Used Car** 10 word micro-fiction

Potato Soup Journal, May 13th, 2020, **Kelcey Davis**

1. **Death in Bloom** Science-fiction short story

FICTION on the WEB, March 13th, 2020, **Kelcey Davis**