

# DAPHNE ZAKARIAN

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## EDUCATION

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### TRUMAN STATE UNIVERSITY

Bachelor of Science in Physics (Astrophysics Track) – 2024

Kirksville, MO

GPA: 3.96/4.0

## PUBLICATIONS

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### CHARACTERIZING THE INFRARED VARIABILITY OF PROTOSTARS USING WISE AND NEOWISE

<https://www.nrao.edu/students/2023/Reports/ZakarianDaphne.pdf>

NRAO 2023 Summer Student Symposium Report

### CHARACTERIZING WASHINGTON DOUBLE STAR CATALOG ENTRIES WITH GAIA DR3

(Zakarian et al. 2024, in prep)

Astronomical Journal

## PRESENTATIONS

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### CHARACTERIZING THE INFRARED VARIABILITY OF PROTOSTARS USING WISE AND NEOWISE

- 243rd Meeting of the American Astronomical Society (upcoming), 2023 Fall Meeting of the American Physical Society Prairie Section, NRAO 2023 Summer Student Symposium

### CHARACTERIZING WASHINGTON DOUBLE STAR CATALOG ENTRIES WITH GAIA DR3

- 241st Meeting of the American Astronomical Society, Truman State Student Research Conference, NAU Astro REU Summer Presentation

### OBSERVING AND ANALYZING EXOPLANET TRANSITS FOR THE TESS FOLLOW-UP OBSERVING PROGRAM

- 2023 Missouri Space Grant Consortium Spring Meeting

### INVESTIGATING NATURAL DYES FOR DYE-SENSITIZED SOLAR CELLS

- Truman State Student Research Conference

## RESEARCH EXPERIENCE

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### CHARACTERIZING THE INFRARED VARIABILITY OF PROTOSTARS USING WISE AND NEOWISE

Summer 2023 - Present

Mentor: Dr. John Tobin

National Radio Astronomy Observatory REU Program – Charlottesville, VA

- Developed a photometry pipeline to monitor and quantify the infrared variability of the scattered light nebulae associated with 63 protostars in NEOWISE bands W<sub>1</sub> and W<sub>2</sub>
- Results: Significant variability detected in 59 of the 63 nebulae in at least one band
- Skills: Conducting aperture photometry for stars and extended objects in python, Accessing astronomical databases in python, Visualizing variability using light curves, animations, and average-subtracted images

### CHARACTERIZING SYSTEMS IN THE WASHINGTON DOUBLE STAR CATALOG WITH GAIA DR3

Summer 2022 - Present

Mentor: Dr. Stephen Williams

US Naval Observatory – Northern Arizona University REU Program – Flagstaff, AZ

- Developed a pipeline to characterize systems listed in the Washington Double Star Catalog as visual or physical systems using astrometric measurements from Gaia Data Release 3
- Results: 30,628 Associated Pairs and 60,287 Non-associated Pairs detected
- Future: These results will be used to update the Washington Double Star Catalog and associated catalogs with my characterizations and improved astrometric data from Gaia
- Skills: Python programming for astronomical data science (emphasis in Astropy), Parallelization using multiprocessing techniques, Working with large databases and catalogs, Accessing astronomical databases in python

### OBSERVING AND ANALYZING EXOPLANET TRANSITS FOR THE TESS FOLLOW-UP OBSERVING PROGRAM

Fall 2021 - Present

Mentor: Dr. Vayujeet Gokhale

Truman State University – Missouri Space Grant Consortium – Kirksville, MO

- Observed candidate exoplanet transits using 31 and 42-inch telescopes at the National Undergraduate Research Observatory (NURO) in Flagstaff, AZ, and submitted the transit data for the TESS Follow-Up Observing Program (TFOP)
- Results: 21 Exoplanet transits observed and analyzed, 6 submitted to TFOP
- Skills: Using AstroImageJ to process astronomical images, conduct multi-aperture differential photometry, and extract data such as eclipse timing, depth, and duration, Conducting remote and in-person observing runs using NURO telescopes, Selecting and scheduling reasonable targets based on the telescope specifications

## INVESTIGATING NATURAL DYES FOR DYE-SENSITIZED SOLAR CELLS

Spring 2022

Mentor: Dr. Rasanjali Jayathissa

Truman State University – Kirksville, MO

- Constructed laboratory-level solar cells to test various natural dyes in search of suitable alternatives to the expensive and toxic ruthenium-based dyes commonly found in dye-sensitized solar cells (DSSCs)
- Results: Conducted preliminary tests for DSSCs made using dyes extracted from beetroot, orange peels, and african violets
- Skills: Assembling laboratory-level DSSCs, Characterizing dyes using UV-visible spectroscopy, Characterizing solar cells with current and voltage measurements, Extracting dyes from plants and fruits

## COMMUNITY OUTREACH

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### DARK SKIES

Summer 2021 - Present

- Primary student author for a successful \$5000 proposal to purchase 7 retrofitted light fixtures on campus
- Served as a preceptor for 3 university courses and 1 middle school summer course about light pollution
- Worked with Truman's Dark Sky Group to organize various outreach and educational events for International Dark Sky Week
- Contributed to Truman Dark Sky Group's survey of outdoor lighting, which documented over 300 fixtures on the campus
- Engaged with Truman students, faculty and staff, members of the local government, and members of the broader Kirksville community to share what light pollution is, why it is a problem, and what our community can do to address it

### PHYSICS AND ASTRONOMY

Fall 2022 - Present

- Operated Unistellar eVscopes and shared information about various nebulae, clusters, and galaxies at stargazing events on Truman's campus and at various locations around Kirksville and Missouri (Around 10-15 events per semester)
- Volunteered weekly as a tutor for Truman State's Physics Department through the Society of Physics Students
- Planned and taught an interactive class demonstration about impact crater formation for elementary and middle school students
- Wrote and proctored exams for middle and high school students participating in Science Olympiad

## LEADERSHIP AND EXTRACURRICULARS

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### SOCIETY OF PHYSICS STUDENTS

Spring 2021 - Present

- *President* (Fall 23 - Present)      – *Treasurer* (Fall 22 - Spring 23)      – *Secretary* (Spring 21 - Spring 22)

### MEMBER OF SIGMA PI SIGMA PHYSICS AND ASTRONOMY HONOR SOCIETY

Spring 2022 - Present

### DOUBLE BASS PLAYER:

Fall 2020 - Present

- Truman State University's Orchestra, Wind Symphony and Jazz Ensemble, and the Quincy Symphony Orchestra

## CONFERENCES AND WORKSHOPS

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### AMERICAN ASTRONOMICAL SOCIETY ( 241ST & 243RD MEETING )

Winter 2023, Winter 2024 (upcoming)

- Foundations of Astronomical Data Science 2-day Workshop (2023)
- NASA's TESS Mission Interactive Data Workshop (upcoming 2024)
- Saving Astronomy and the Environment: Tools and Approaches for Addressing Existential Threats (upcoming 2024)

### NATIONAL RADIO ASTRONOMY OBSERVATORY SUMMER STUDENT WORKSHOPS

Summer 2023

- 4-day Radio Astronomy Boot Camp      – Science Communication Training

### 2023 FALL MEETING OF THE AMERICAN PHYSICAL SOCIETY PRAIRIE SECTION

Fall 2023

### 2023 MISSOURI SPACE GRANT CONSORTIUM SPRING MEETING

Spring 2023

### TRUMAN STATE STUDENT RESEARCH CONFERENCE

Spring 2022, Spring 2023

## RELEVANT WORK EXPERIENCE

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### LIGHT POLLUTION SYMPOSIUM COURSE PRECEPTOR (TA)

Fall 2021, Fall 2022, Fal 2023

- Supervised a class of 20 students, prepared weekly class plans, graded homework, and facilitated outreach activities

### JOSEPH BALDWIN ACADEMY LIGHT POLLUTION COURSE PRECEPTOR/CAMP COUNSELOR

Summer 2021

- Worked at a middle school summer academy with responsibilities much like those of a camp counselor and classroom TA

## SCHOLARSHIPS AND ACHIEVEMENTS

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### TRUMAN STATE PERSHING SCHOLARSHIP RECIPIENT

Full Academic Scholarship to Truman State University

### MCREYNOLDS FOUNDATION SCHOLARSHIP RECIPIENT

Physics

### KARL E. WEBB FOUNDATION SCHOLARSHIP RECIPIENT

Music

### TRUMAN STATE UNIVERSITY PRESIDENT'S LIST

Fall 2020 - Spring 2022, Spring 2023

### TRUMAN STATE UNIVERSITY VICE PRESIDENT OF ACADEMIC AFFAIR'S LIST

Fall 2022