Eliza Diggins

ASTROPHYSICIST / MATHEMATICIAN

PROFESSIONAL SUMMARY

I'm a theoretical astrophysicist and dynamicist pursuing my Ph.D. at the University of California, Berkeley. My research spans many orders of magnitude in scale and energy, from the dynamics of galaxy clusters to transient phenomena like LFBOTs, Supernovae, and TDEs. I use observational data, numerical simulations, and analytic theory to study how these systems probe fundamental physics and extreme astrophysical environments.

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EDUCATION

Doctor of Philosophy in Astrophysics
University of California, Berkeley – Berkeley, California **2025-2031**
- GPA: 4.0

Honors Bachelor of Science (HBS) in Physics
University of Utah – Salt Lake City, Utah **2020-2024**
- GPA: 4.0 – (*Suma Cum Laude*)
- Thesis: *Constraining Modified Gravity Using Galaxy Clusters*. Advisor: Dr. Daniel R. Wik

Bachelor of Science (BS) in Applied Mathematics
University of Utah – Salt Lake City, Utah **2020-2024**
- GPA: 4.0 – (*Suma Cum Laude*)

International Baccalaureate Diploma
Hillcrest High School – Midvale, Utah **2016-2020**
- GPA: 4.0

RESEARCH POSITIONS

Graduate Student | August 2025 - Present
(August 2025 - May 2026 as a **Chancellor's Fellow**)
UC Berkeley Department of Astronomy

Working under Dr. Raffaella Margutti as part of the Multi-RAPTOR group studying high energy transients across the electromagnetic spectrum.

- Utilized late-time radio emission from explosive transients to characterize the circumstellar medium in the vicinity of the transient and to probe their underlying physics.
- Constructed computational pipelines for shock analysis in realistic environments using *ab initio* hydrodynamical simulations.

RESEARCH POSITIONS (Continued)

Research Scientist | April 2022 - August 2025
(April 2023 - April 2024 as a **Parmley Scholar**)
University of Utah Department of Physics and Astronomy

Worked as part of the X-ray astronomy group with Dr. Daniel R. Wik studying dynamical processes in galaxy clusters and their connection to fundamental physics and cosmology.

- **Gravitational Theory**: Performed idealized hydrodynamical simulations of galaxy cluster formation and mergers to test extensions of General Relativity. Used these methods to identify observable signatures in X-ray data from the Chandra X-ray Observatory.
- **Astrophysical Modeling**: Created the Pisces library, an open-source, general-purpose initial conditions and modeling framework for astrophysical simulations. Pisces integrates the entire process of model generation into a unified API, dramatically reducing the domain expertise and manual setup time required to run complex simulations.
- **Cosmological Simulations**: Studied dynamics and microphysics of galaxy clusters using best-in-class cosmological simulations like TNG-300 and TNG-Cluster to constrain novel observations with the XRISM Observatory.
- **X-Ray Instrumentation**: Developed deep learning methods to perform simulation based inference of best-fit calibration parameters for X-Ray observatories to reduce cross-calibration error.

Lab Technician| March 2022 - February 2025
(August 2022 - May 2023 as a **UROP Scholar**)
(May 2023 - May 2024 as a **Wilkes Climate Scholar**)
(May 2024 - February 2025 as the **Lead Data Scientist**)
University of Utah School of Dentistry – Weller Lab

Worked in the Weller Lab under Dr. Melodie L. Weller on mathematical modeling of epidemiological phenomena and big-data studies of rare disease epidemiology.

- Developed novel algorithms and mathematical methods for tracking and identification of trade mediated pathogens.
- Utilized machine learning and big-data methodologies to probe connections between rare disease and autoimmune conditions.
- Identified novel spikes in Hepatitis Delta prevalence using big-data surveys.
- Led the development and growth of a multidisciplinary data science team focused on the long-term integration of computational research.

Undergraduate Researcher| January 2021 - January 2022
University of Utah Department of Mathematics

Worked under Dr. Fred Adler to model SARS-COV-2 virion deposition in the human respiratory system.

- Modeled the transport of COVID-19 virions in the human respiratory system using computational models.
- Developed simplified models of human lungs for fluid dynamics computations.

SIGNIFICANT AWARDS / RECOGNITIONS

2026 Chancellor's Fellowship for Graduate Study ($18,000)
- Awarded to top admitted graduate students at UC Berkeley.

2025 Churchill Scholarship Alternate
- The Churchill scholarship is awarded annually to 16 outstanding scholars in the sciences. 4 Alternates are named. Winners are funded for 1 year of postgraduate study at Cambridge.

2024 Alison Regan Library Thesis Award ($1,000)
- Awarded annually by the Marriot Library at the University of Utah to the best honors theses in science and in the humanities. Awarded for *Constraining Modified Gravity Using Galaxy Clusters*.

2024 Outstanding Senior Award ($1,000)
- Awarded by the University of Utah Department of Physics and Astronomy to an outstanding graduating senior.

2024 Gibson Senior Award ($1,000)
- Awarded by the University of Utah Department of Mathematics to the student with the highest graduating GPA.

2024 Rhodes Scholarship Finalist
- Awarded by the Rhodes Trust – District 13 for the honor of being named as a finalist for the Rhodes Scholarship.

2023 APS 4 Corners Speaker Award
- Awarded by the 4 Corners section of the American Physical Society for an outstanding oral presentation at the 2023 APS 4C conference.

2023 Goldwater Scholarship ($7,500)
- Awarded by the Barry Goldwater Scholarship and Excellence in Education Foundation for outstanding career and research potential in physics.

2023 Thomas J. Parmley Scholarship ($10,000)
- Awarded once annually by the University of Utah Department of Physics and Astronomy for outstanding undergraduate research.

2023 Continuing Undergraduate Award ($1,000)
- Awarded by the University of Utah Department of Physics and Astronomy for outstanding performance in the classroom and in research.

2023 Undergraduate Researcher of the Year
- Awarded by the Office of Undergraduate Research at the University of Utah for work on the mathematical modeling of trade mediated pathogens.

2023 Wilkes Scholar (~$15,000)
- Awarded by the Wilkes Climate Center at the University of Utah to fund work on the climate impacts on trade mediated pathogens.

July 2021 Ltd. Governor's Award for Outstanding Community Service
- Awarded for 2+ years of service at Guadalupe Schools teaching English as a second language

SERVICE, COMMUNITY, AND ADVOCACY

Outreach Coordinator| August 2025 - Present
UC Berkeley Department of Astronomy – Berkeley, California

- Worked as part of a committee to expand the department's public engagement portfolio, overseeing major outreach efforts such as the Bay Area Science Festival and Cal Day, which collectively reach thousands of visitors annually.
- Build and coordinate interdisciplinary teams of faculty, postdocs, and students to deliver interactive exhibits and science communication programs that make astronomy accessible to diverse audiences.
- Expand the department's outreach footprint by organizing community lectures, classroom visits, and astronomy club collaborations across the Bay Area.

Queer Grads Coordinator| August 2025 - Present
UC Berkeley Department of Astronomy – Berkeley, California

- Organized and facilitated social events in the department focused on uplifting queer members of the community and providing access to mentoring.

Program Coordinator| January 2025 - July 2025
(May 2024 - January 2025 as Processes Intern)
(March 2023 - Present as Transgender Friendship Circle Facilitator)
Encircle SLC – Salt Lake City, Utah

- Responsible for program logistics, volunteer training, quality auditing, community outreach and other aspects of daily operations.
- Responsible for home safety, staff coordination, and guest management; including working with youth and young adults to provide safety and community.
- Developed programming and accommodations for neurodivergent guests.
- Provided community resources including crisis intervention, suicide evaluation, safety planning, and resource distribution for queer youth and young adults.
- Ran the transgender friendship circle, a peer support group from transgender adults. Additionally performed best-practices research and developed programming to optimize the group for its target demographic.

Staff Advisor for LGBTQ Social Club| August 2024 - May 2025
University of Utah – Salt Lake City, Utah

- Acted as an advisor to University of Utah students seeking to fill gaps in community support infrastructure following the closure of the LGBTQ resource center.
- Provided LGBTQ students with peer-support resources and community space through shared activities.

Student Lecture Series Chair| January 2024 - May 2024
University of Utah Department of Physics and Astronomy

- Coordinated student lectures in the department to improve student communication skills and pedagogical engagement.
- Strengthen departmental community and our shared love for physics by encouraging innovative, engaging, and entertaining lectures on subjects which are not traditionally seen in an undergraduate degree program.

SERVICE, COMMUNITY, AND ADVOCACY (Continued)

English as a Second Language Tutor | July 2019 - May 2023
Guadalupe Schools – Salt Lake City, Utah

- Taught ESL in a small group tutoring environment under the supervision of an ESL specialist.
- Incorporated multifaceted pedagogical strategies into instruction.
- Focused on use-centric teaching to help clients reach language goals as quickly as possible.

TEACHING

ASTON 7A/B: Introduction to Astrophysics – Fall 2025/ Spring 2026
UC Berkeley – Berkeley, California

Supervisors: Dr. Daniel R. Weisz, Dr. Daniel Stark

Served as a graduate student instructor (GSI) for the ASTRON 7A/B course, which provides an introduction to astrophysics suitable for future astronomy majors.

- Collaborated with the course instructor and co-GSIs to coordinate assessments, grading, announcements, and course communications.
- Designed and led weekly discussion sections to deepen conceptual understanding, emphasizing pedagogical best practices and active learning.
- Delivered guest lectures covering core astrophysical topics when the instructor of record was unavailable.
- Supported students through regular office hours, feedback sessions, and individualized assistance, fostering academic growth and engagement.

WORKSHOPS & PROFESSIONAL DEVELOPMENT

Michigan Cosmology Summer School | June 2025
University of Michigan, Ann Arbor

Participated in advanced lectures and workshops on theoretical and applied cosmology including cosmic inflation, structure formation, dark energy, and LSS.

SELECT PUBLICATIONS

ASTROPHYSICS

Diggins, E. C., & Wik, D. R. (2025). Galaxy Cluster Constraints on Extensions of Modified Gravity. *The Astrophysical Journal, 989*(1), 17.

EPIDEMIOLOGY / MEDICAL SCIENCE

Diggins, E. C., & Weller, M. L. (2025). *Age-Dependent Sex Disparities in Sjogren's Disease Prevalence Align with Natural Hormone Fluctuations*. medRxiv, 2025-02.

Diggins, E. C., & Weller, M. L. (2025). *Unraveling the Impact of COVID-19 on Sjogren's Disease: A Retrospective Cohort Analysis*. (Manuscript undergoing internal review)

Diggins, E. C., & Weller, M. L. (2025). *Hormonal transitions across the lifespan shape susceptibility to Sjogren's disease. Rheumatology* (Accepted)

SCIENTIFIC SOFTWARE

Diggins, E. C., & Wik, D. R. (2025). PyMetric: A Geometry Informed Array Mathematics Package. *The Journal of Open Source Software* (Accepted)

PRESENTATIONS (T = Talk, P = Poster)

(P) *First Look at XRISM Observations of the Plane-of-Sky Merging Cluster Abell 2163.*
XRISM International Conference - Kyoto, Japan, October 2025
Daniel R. Wik, Cicely Potter, Christian Norseth, Aysegul Tumer, Randall Rojas Bolivar, Eliza C. Diggins.

(T) *Using Galaxy Clusters to Constrain Modified Gravity Theories.*
Honor's Showcase – University of Utah, April 2024
Eliza C. Diggins, Daniel R. Wik.

(P) Using Galaxy Clusters to Constrain Modified Gravity Theories.
American Physical Society April Meeting - Sacramento, California April 2024
Eliza C. Diggins, Daniel R. Wik.

(P) Unraveling the Impact of COVID-19 on Sjogren's Disease: A Retrospective Cohort Analysis.
International Association for Dental Research Annual Conference - New Orleans, Louisiana March 2024
Eliza C. Diggins, Melodie L. Weller, Swetha Shankar.

(T) Using Galaxy Clusters to Constrain Modified Gravity Theories.
American Physical Society (4 Corners Conference) - Logan Utah, Oct. 2023
Eliza C. Diggins, Daniel R. Wik. [Recipient of a speaking award for presentation]

(P) The Harmony Project: Modeling the Epidemiology of Trade Mediated Pathogens in International Trade Networks.
American Society for Virology Conference - Athens, Georgia, Jun. 2023.
Eliza C. Diggins, Melodie L. Weller.

(P) Constructing International Trade Networks to Predict the Origin of Trade Mediated Pathogens: The Harmony Project. 3i Initiative Conference - University of Utah, Feb. 2023.
Eliza C. Diggins, Melodie L. Weller.

(P) International Trade Networks to Predict the Origin of Trade Mediated Pathogens: The Harmony Project.
SACNAS Utah conference - University of Utah, Apr. 2023.
Eliza C. Diggins, Melodie L. Weller.

(P) International Trade Networks to Predict the Origin of Trade Mediated Pathogens: The Harmony Project.
Utah Conference on Undergraduate Research - University of Utah, Feb. 2023.
Eliza C. Diggins, Melodie L. Weller.

(P) Tracing Trade Mediated Pathogens Through International Trade: The Harmony Project.
Math For All Conference, Salt Lake City - Utah. Feb. 2023
Eliza C. Diggins, Melodie L. Weller

PRESENTATIONS (T = Talk, P = Poster)

(P) International Trade Networks to Predict the Origin of Trade Mediated Pathogens: The Harmony Project.
Research on Capitol Hill, Utah, Jan. 2023.
Eliza C. Diggins, Melodie L. Weller.

SUCCESSFUL PROPOSALS

First Look at XRISM Observations of the Plane-of-Sky Merging Cluster Abell 2163.
XRISM Observatory AO-1
Daniel R. Wik, Cicely Potter, Christian Norseth, Aysegul Tumer, Randall Rojas Bolivar, Eliza C. Diggins.