

# Eliza Diggins

COMPUTATIONAL ASTROPHYSICIST – MATHEMATICIAN  
MULTI-DISCIPLINARY SCIENTIST

## POSITIONS

### – Research Scientist – U of U, Department of Physics and Astronomy

[April 2022 – Present, April 2023-April 2024 as a Parmley Scholar]

- o Performed hydrodynamics / N-body simulations of galaxy clusters and their mergers. Co-developed the [cluster\\_generator](#) initial conditions generator.
- o Performed analysis and pipeline development for cosmological simulations including IllustrisTNG.
- o Worked with eROSITA ERASS1 results to identify novel sources, including developing the [pyXMIP](#) library for Bayesian cross-matching.
- o [Advisor](#): Dr. Daniel R. Wik

### – Lab Technician – U of U, School of Dentistry

[March 2022 – April 2023, Undergrad. Researcher]

[April 2023 – April 2024, Wilke's Scholar]

[May 2024 – Present, Data Science Lead]

- o Developed novel algorithms and mathematical methods for tracking and identification of trade mediated pathogens.
- o Utilized machine learning and big-data methodologies to probe connections between rare disease and autoimmune conditions.
- o Led the development and growth of a multidisciplinary data science team focused on the long-term integration of computational research.
- o [Advisor](#): Dr. Melodie L. Weller

### – Undergraduate Researcher – U of U, Department of Mathematics

[January 2021-December 2021]

- o Modeled the transport of COVID-19 virions in the human respiratory system using computational models.
- o Developed simplified models of human lungs for fluid dynamics computations.
- o [Advisor](#): Dr. Fred Adler

## SERVICE, COMMUNITY, AND ADVOCACY

[May 2024 – Present] **Program Development / Processes Intern – Encircle SLC**

- Led program development efforts to improve services for the transgender community, including reimagining the structure of peer-support groups and improved linkage to external resources.
- Developed programming for the neurodivergent community and worked with staff to improve accommodations for disabled guests.
- Worked with staff and guests to provide resource referrals, crisis de-escalation, and support plans.
- Assisted in event planning and community engagement work to broaden access to Encircle's services.

[Mar 2023 – Present] **Transgender Support Group Facilitator – Encircle SLC**

- Facilitate a weekly peer-support group for transgender adults.
- Coordinate a team of co-facilitators to provide multiple purpose-built support groups within our overarching program.
- Incorporate crisis management and suicide prevention strategies for support group guests.
- Work with staff and community resources to assist guests in need.

## CONTACT

[Eliza.diggins@utah.edu](mailto:Eliza.diggins@utah.edu)

+1 (385)-231-6988

<https://eliza-diggins.github.io>

Salt Lake City, Utah

## ABOUT ME

I'm a theoretical astrophysicist and mathematician at the University of Utah. My research is shared between the Department of Physics and Astronomy, where I study galaxy cluster dynamics and gravitational theory; and the School of Dentistry, where I work on mathematical models of trade-mediated pathogens in complex global trade networks.

## EDUCATION

[University of Utah](#) – 2024

HBS Physics

GPA: 4.00 (*Suma Cum Laude*)

Thesis: *Constraining Modified Gravity Using Galaxy Clusters*

[University of Utah](#) – 2024

BS Applied Mathematics

GPA: 4.00 (*Suma Cum Laude*)

[Hillcrest High School](#) – 2020

International Baccalaureate

Diploma

GPA: 4.00

## ETHOS

I believe in the inherent importance of scientific progress for its own sake and for the sake of the human endeavor. I am staunchly against isolationism in science and believe that science in both its practice and its implementation should be a diverse and inherently human affair. Diversity in science is important to me and, in my opinion, one of the most important things we can use to improve the productivity, communicativity, and impact of science on all scales.

---

## SERVICE, COMMUNITY, AND ADVOCACY (Continued)

### [Jun 2023 – Present] **Staff Advisor for LGBTQ Friendship Club – University of 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.

### [Dec 2023 – Present] **Student Lecture Series (Chair + Founder) - U of U, 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.

### [July 2019 – May 2023] **English as a Second Language Tutor – Guadalupe Schools**

- 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.

## AWARDS AND RECOGNITIONS

### - **2024 Alison Regan Library Thesis Award**

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**

Awarded by the University of Utah Department of Physics and Astronomy to an outstanding graduating senior.

### - **2024 Gibson Senior Award**

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**

Awarded by the Barry Goldwater Scholarship and Excellence in Education Foundation for outstanding career and research potential in physics.

### - **2023 Thomas J. Parmley Scholarship**

Awarded once annually by the University of Utah Department of Physics and Astronomy for outstanding undergraduate research.

### - **2023 Continuing Undergraduate Award**

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**

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.

---

## Presentations, Publications, and Lectures

### Presentations

(T): talk, (P): Poster

- (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
- (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.

## Publications

- Constraining MOND Extensions in Galaxy Clusters. **Eliza C. Diggins** and Dr. Dan R. Wik. (Manuscript undergoing internal review.)
- Constraining Modified Gravity Using Galaxy Cluster Dynamics. **Eliza C. Diggins**, Dr. Daniel R. Wik.
  - o Honors thesis. Awarded Alison Regan Library Thesis Award as the best thesis in the sciences.
- Unraveling the Impact of COVID-19 on Sjogren's Disease: A Retrospective Cohort Analysis. **Eliza C. Diggins**, Melodie L. Weller, Swetha Shankar. (Manuscript undergoing internal review)
- Signals of Hormone Mediated Protective Factors in Sjogren's Disease. **Eliza C. Diggins**, Melodie L. Weller. (Manuscript undergoing internal review)
- Increased Risk of Environmental and Endemic Infectious Diseases in Sjogren's Disease. Swetha K. Shankar, Taylor C. Boone, **Eliza C. Diggins**, Melodie L. Weller (Manuscript undergoing internal review)

## Outreach and Public Talks

- Chaos and the Three-Body Problem, Presented November 2021 and Published September 2022.
  - o <https://www.youtube.com/watch?v=mm3l4m8YsnM>
- The Philosophy of Science and Modified Newtonian Dynamics, Presented December 2022.
- From Learning to Doing: The Philosophy of Science, Presented March 2024. University of Utah Department of Physics and Astronomy Student Lecture Series.
- Modified Newtonian Dynamics, presented May 2024 as part of the Astronomy of Tap (SLC) science outreach series.
- Cosmological Test Kitchen: How to Make the Milky Way in a Box, presented September 2024 as part of the Astronomy on Tap (SLC) science outreach series.