Elias Taira

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Education

B.S. Astrophysics Michigan State University — May 2024
GPA: Major 3.92, Cumulative 3.96

B.S. Data Science Michigan State University — May 2024
GPA: Major 4.0, Cumulative 3.96

Research Experience

Circumgalactic Medium (CGM) Simulation — May 2022 – June 2023, August 2023 – Present

- REU Participant / Undergraduate Research Assistant under Prof. Brian O'Shea
- Aided in the development of software designed to simulate environment of the region surrounding galaxies (a.k.a. the CGM)
- Learned numerical simulation techniques utilized in galaxy formation simulation code

Machine Learning to Predict Gamma Ray Burst Redshifts (SULI) — June 2023 – December 2023

- SULI Intern under Prof. Maria Giovanna Dainotti, Prof. Greg Madejski and Prof. Vahe Petrosian
- Built a machine learning algorithm in R to predict the redshifts of gamma ray bursts (GRBs) detected by the Neil Gerehls Swift Telescope using properties extracted from GRB X-ray lightcurves
- Began and submitted research paper to The Astrophysical Journal during course of 10-week internship

Deep Underground Neutrino Experiment (DUNE) — May 2021 – December 2021

- Undergraduate Research Assistant under Prof. Kendall Mahn
- Cherenkov Light Simulation: Led the development of a light simulation software in Python to emulate the environment inside an experimental neutrino detector
- Detector Calibration: Assisted in the creation of test devices for portions of a neutrino detector calibration module

Simplifying Proton Particle Accelerator Designs — September 2020 - May 2021

- Worked under Prof. Yue Hao
- Participated in research involving the construction of simple proton particle accelerators for cancer treatment
- Analyzed the limits of the potential dimensions of the simplified accelerator by altering various aspects of the accelerator (i.e. the length of a certain component, the strength of magnetic fields, etc.)

AP Capstone — August 2017 - May 2020

- Participated in a research course focused on learning how to conduct research as well as write papers based on said research
- Learned how to properly analyze peer-reviewed articles as well as how to construct literature reviews centered around a given topic
- Independently conducted research on the pollution of a nearby body of water
- Authored a research paper based on the findings of the analysis

Publications

Taira, E., Kopenhafer, C., O'Shea, B. W., Rollins, A., Fuhrman, E., Peeples, M., Tumlinson, J., Smith, B. D., Impacts of Ultraviolet Backgrounds on Circumgalactic Medium Ion Densities (in progress: tairaeli.github.io/images/UV_background_impact_on_QSO_absorption_line_spectra.pdf at master · tairaeli/tairaeli.github.io)

Dainotti, M. G., Taira, E., Wang, E., Lehman, E., Narendra, A., Pollo, A., Madejski, G. M., Petrosian, V., Bogdan, M., Dey, A., & Bhardwaj, S. (2024). Inferring the redshift of more than 150 grbs with a machine-learning ensemble model. The Astrophysical Journal Supplement Series, 271(1), 22. https://iopscience.iop.org/article/10.3847/1538-4365/ad1aaf

Presentations

University Undergraduate and Research Arts Forum (UURAF) April 2023
- Presented research completed during school year (continuing CGM Simulation work) in poster-presentation format

Mid-Michigan Symposium for Undergraduate Research Experiences July 2022
- Shared work accomplished during summer REU (on CGM Simulation) in poster-presentation format

University Undergraduate and Research Arts Forum (UURAF) April 2022
- Presented work on DUNE activities in the form of a poster presentation in a campus-wide event

DUNE Collaboration Meeting October 2021
- Discussed work on light simulation software for all 300+ members of the DUNE collaboration in a virtual presentation

Physics & Astronomy Research Experiences w/ Drew Scholars (PAREDS) August 2021
- Gave virtual talk on DUNE work for MSU students and faculty

University Undergraduate and Research Arts Forum (UURAF) April 2021
- Gave virtual presentation about particle accelerator design research for a campus-wide event

Programming Experience

Python (4 years)
R/R Studio (3 years)
C++ (1 year)
Git/Github (4 years)
Linux (3 years)

Leadership Experience

Society of Physics Students (SPS) E-board member – President August 2023 – May 2024
- Establish club directives
- Organized semi-weekly meetings with MSU faculty giving talks about their research
- Worked with Astronomy club to organize fall welcome event for new/current club members
- Aided treasurer in creation / approval of yearly budget
- Assisted in organizing trip to view 2024 eclipse

Student Advisory Council August 2023- May 2024
- Worked alongside other undergraduate and graduate students to advise the board of directors at MSU of issues and initiatives that are taking place on campus

Society of Physics Students (SPS) E-board member – Treasurer August 2022 – June 2023

- Managed club finances
- Collaborated with president to create / approve a yearly budget proposal
- Worked with other e-board members to organize events

Teaching Experience

Undergraduate Learning Assistant, Astrophysics January 2022 – May 2024

- Worked with Prof. Joey Rodriguez to assist in the management of a 50-student, major-requirement course in observational astronomy
- Attended weekly labs and helped answer any questions the students may have on certain procedures they may have been having trouble with
- Held a weekly office hour to aid students with any issues they may be having with any course material
- Graded lab reports from each lab

Undergraduate Learning Assistant, Intro Astronomy August 2022 - December 2022

- Sole assistant to Prof. Ali Ghorbanpour in a class section of 108 students
- Held 2 weekly office hours to assist students with course material
- Graded semi-weekly assignments from students

Undergraduate Learning Assistant, Intro Astronomy August 2021 - December 2021

- The sole assistant to Prof. Abigail Stevens of whom was managing a 112-student class
- Worked with students to work out any issues they had with the course material, or class structure
- Graded weekly essay assignments from each student

Scholarships / Awards

Herbert T. Graham Scholarship March 2024

- Given to high achieving students majoring in chemistry mathematics or physics ($2550)

Lawrence W. Hantel Endowed Fellowship Fund December 2021

- Awarded to outstanding students that are involved with research in physics or astronomy ($1400)

Honors Distinction Scholarship January 2020

- Provided to exceptional students among the Honors College ($20,000)