Youssef El Gharably

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Education

Franklin and Marshall College **August 2022 – May 2025**
Major in Astrophysics with a Minor in Applied Mathematics, 3.80 GPA *Lancaster, PA*
Honors' and Dean's List — Charles A. Dana Scholar

Washington University in St. Louis **December 2023 – January 2024**
Visiting student in Mckelvey School of Engineering for J-Term, 4.00 GPA *St. Louis, MO*
Student of J-Term 2024 taking MEMS253

Gharbiya STEM High School **September 2019 – July 2022**
Mathematics Division, 3.82 GPA *Tanta, Egypt*
Ranked 82/2500 students in the country.

Relevant Coursework

- PHY112 - Intro to Electromagnetism (Fa22)
- Mathworks - MatLab Fundamentals (W22)
- AST121 - Intro to Astrophysics (Sp23)
- PHY223 - Modern Physics (Fa23)
- MAT229 - Linear Algebra and Differential Equations (Fa23)
- MEMS253 - Statics and Mechanics of Materials (Winter 23, WashU.)
- PHY226 - Classical Mechanics (Sp24)
- AST322 - Stellar Astrophysics (Sp24)
- MAT215 - Statisitcal Modeling (Su24)
- PHY331 - Mathematical Methods of Physics (Fa24)
- PHY322 - Experimental Physics: Electronics (Fa24)
- PHY333 - Electromagnetism (Fa24)
- MAT216 - Probability and Statistics (Fa24)
- PHY344 - Quantum Mechanics (Planned, S25)
- MAT372 - Origami Math (Planned, S25)
- AST332 - Galaxies and Cosmology (Planned, S25)
- AST422 - Advanced Methods in Astrophysics (Planned)

Research Experience

Physics and Astronomy Department, Franklin and Marshall College **August 2023 – December 2023**
Research Assistant (AST290, Fall 23), Fronefield Crawford Ph.D. *Lancaster, PA*

- Project Title: Investigation and Development of the Small Radio Telescope in Franklin and Marshall Campus.
- Developed a comprehensive plan for the investigation of the Small Radio Telescope owned by the Physics Department.
- Implemented scripts on the control computer to acquire radio data, optimizing the telescope's performance and calibration.
- Enhanced the quality of Astronomical observation labs conducted by astrophysics professors in classes.
- Investigated the mechanics and electronic systems of Radio Telescopes with the Department's electronics engineer to deepen knowledge of Astronomical Instruments and telescopes.

Physics and Astronomy Department, Franklin and Marshall College **June 2024 – July 2024**
Summer Hackman Scholar Research Assistant, Ryan Trainor Ph.D. *Lancaster, PA*

- Project Title: Characterizing Black Holes and the Circumgalactic Medium with Keck Cosmic Web Imager
- Developed Monte Carlo Markov Chain algorithim using python for creating statistical models of the Mariposa nebula.
- Derived substantial results from models to characterize AGN's through spectroscopy readings.

Physics and Astronomy Department, Franklin and Marshall College **Jan 2024 – August 2024**
Research Assistant (AST390, Spring 2024) and Summer Hackman Scholar, Deborah Schmidt Ph.D. *Lancaster, PA*

- Project Title: Investigations of Chemical Complexity in Proto-Planetary Nebulae, currently through the process of writing a paper to publish.
- Co-authored proposals for observations in the Arizona Radio Observatory.
- Wrote a script to automatically produce publication worthy figures based on any CLASS data during Summer 2024. Published script on GitHub for other astronomers to benefit from it.
- Utilized GILDAS tools to determine optimal observation times.

- Analyzed radio data from Arizona Radio Observatory to identify HCO, HCN, HNC, and HCO3N compounds in protoplanetary nebulae.
- Played a key role in the first-ever detection of HCO3N molecules in a protoplanetary nebula through data analysis.

Earth and Environment Department, Franklin and Marshall College **Jan 2024 – May 2024**

Research Assistant in Landmine Detection Research (PHY390, Spring 24), Fronefield Crawford Ph.D. *Lancaster, PA*

- Tested optical systems to detect tripwires using Python and Raspberry Pi.
- Assisted in construction of the mechanical arm that integrates the optical system.

Physics and Astronomy Department, Franklin and Marshall College **Jan 2023 – May 2023**

Research Assistant in NANOGRAV Pulsar Survey (AST290, Spring 23), Fronefield Crawford Ph.D. *Lancaster, PA*

- Assisted the Physics Department in Franklin and Marshall College with their research on surveying potential Pulsar star signals brought by observations of the Parkes Telescope in Australia.

Teaching Experience

Governor's STEM Institute Camp at Green Bank Observatory **July 2023**

Mentor at GSI *Green Bank, WV*

- Selected alongside 10 other undergraduate mentors to advise and lead an astronomy project to determine the efficiency of the 40-foot-telescope for rising 9th graders from West Virginia
- WVGSI is a program funded by West Virginia's Governor and hosted at Green Bank Observatory to educate K-12 students about radio astronomy with hands-on experience.
- Residential Adviser for bunkhouse during the program for the 9th graders.

Quantitative and Science Center, Franklin and Marshall College **August 2023 – Present**

Mathematics Tutor for Q&SC for Calculus 1, 2, 3 and Linear Algebra, Differential Equations *Lancaster, PA*

- Worked in coordination with the Math department to tutor students in math classes on campus via individual appointments and Drop In tutoring.
- Assigned to multiple math sections to be the main tutor, professors reported that students who came to my tutoring sessions had a significant increase in their grades for calculus.
- Significantly improved my tutees' math grades.

Physics and Astronomy Department, Franklin and Marshall College **Jan 2024 – May 2024**

Lab Teaching Assistant for AST121 (Introduction to Astrophysics) *Lancaster, PA*

- Assisted in the introduction to astrophysics lab, helped a class of 25 students navigate radio astronomy and basic astrophysics concepts.

Work Experience

Sparklab in Franklin and Marshall **August 2022 - May 2023, January 2024**

Tech Tutor *Lancaster, PA*

- Assisted students on campus with their technical issues, operating poster printers, 3d printers, resin printers, and managing classroom technical equipment.
- Constructed multiple projects using soldiering, Arduino, and Rasberry Pi.
- Repaired and maintained Ultimaker and Prusa 3D Printers.
- Maintained and maintained electronics and hardware.

Shadeck-Fackenthal Library in Franklin and Marshall **August 2022 - May 2023**

Circulation Assistant *Lancaster, PA*

- Assisted students and patrons in retrieving books and browsing in the College Library
- Shelved returned books once or twice weekly throughout the library.

Projects

Automated publishing-worthy figure builder for radio observations. | *Python* **Summer 2024**

Monte Carlo Markov Chain Statistical Modeling Program for Active Galaxy Nucleai | *Python* **Summer 2024**

Finite Element Analysis Material Bending simulator | *Python* **Spring 2024**

LED Panel For SparkLab at Franklin and Marshall College | *Micro-controller programming* **January 2023**

Solar Tracker Thermal Generator for High School Capstone | *Arduino* **September 2021 - January 2022**

- Designed a system using optics to track and focus the sun's thermal energy into a steam engine

Oral Presentations

Modeling Spectral Emissions for characterizing real data **July 2024**
Summer Hackman Research Scholar, Professor Ryan Trainor *Lancaster, PA*

- Presented my work on Monte Carlo Markov Chain modeling of spectral emissions using Cloudy data aganist CECILIA data.
- No formal paper is wrriten yet, research summary could be found *here.*

The Theories behind the Maximum Size of White Dwarfs **April 2024**
Stellar Astrophysics (AST322), Professor Deborah Schmidt *Lancaster, PA*

- Presented the work of S. Chandrasekhar published by the Indian Academy of Sciences for a class project

CHIME Telescopes and the International Pulsar Timing Array **May 2024**
Stellar Astrophysics (AST322), Professor Deborah Schmidt *Lancaster, PA*

- Presented my final paper of Stellar Astrophysics as an investigation of an ongoing area of research in Stellar Astrophysics
- The paper could be accessed *here*, written in the ApJ format.

Finite Element Analysis using Python to simulate material bending **May, 2024**
Classical Mechanics (PHY226), Professor Ryan Trainor *Lancaster, PA*

- Presenting my final project for the computational physics lab of Classical Mechanics class.
- The project report could be accessed *here*.

Technical Skills

Programming Languages: Python, Arduino, Wolfram Mathematica, MatLab, LaTeX, R, Rmarkdown.
Hardware Experience: Robotics, 3D Printers, Windows PC Hardware, Soldiering.
Design Software and Other Skills: 3D Printing, Blender, Photoshop, Lightroom, Premiere
Languages: Arabic(Native/Bilingual Proficiency) - English (Native/Bilingual Proficiency) - French (Limited Working Proficiency)
Hobbies: Photography, Programming, Reading.
Currently Learning: CAD, Finite Element Analysis, Mechanical Systems.

Leadership / Extracurricular

Muslim Student Association **August 2023 – May 2024**
President *Franklin and Marshall College*

- Rewrote the Muslim Student Associations' constitution and added addendums to ensure inclusion and condem hate speech aganist all religions.
- Represent the Muslim student body in the Student Union Congress, ensure accommodation for the Muslim student body on campus, and participate in philanthropy for underrepresented Muslim countries and regions.
- Significantly contributed in initiatives and meeting with the college administration and other organizations on campus to counteract hate speech, Islamophobia, and anti-semitism.
- Planned and led the preparations for Ramadan in both spring 2023, and spring 2024; had meetings with the campus dining services and organized surveys with office of faith and meaning, and Diversity, Equity, Inclusion office to accommodate Muslim students' needs for Ramadan.

Facilitator and Student Panelist for Identity, Power, and Inequality class. **Fall 2023**
Panelist and Student Leader *Franklin and Marshall College*

- Invited as a guest panelist for a student panel in INT127 (Identity, Power, and Inequality) due to known efforts on campus to establish peace in the student body and advocacy for minorities.

Competitive College Club, EducationUSA **February 2020 - May 2023**
Current Alumni, Former Vice President *Amideast Alexandria, Egypt*

- The Education USA Competitive College Club (CCC) is an intensive group advising program that assists top high school students who want to be competitive applicants to U.S. colleges and universities.
- Participated in the intensive mentorship program, standardized tests club, creative writing club, 2-week intensive boot camp with intensive tasks and book club in which I received guidance from graduating seniors and alumni.
- Chosen as Vice President by Amideast Advisers as of February 2021.