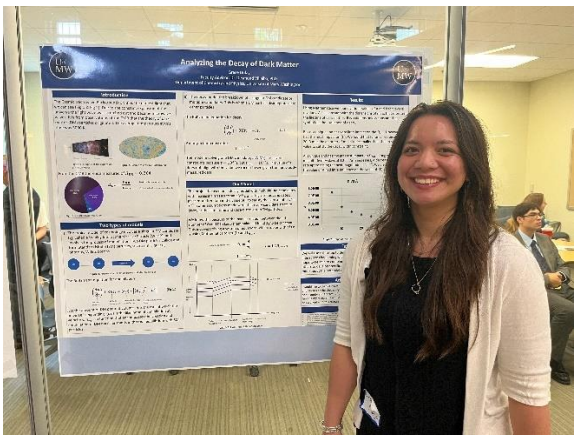
Physics Program Insight 2023-2024

Summer Research Takes Center Stage

UMW Physics had a total of five physics majors participating in the 25th Summer Science Institute in 2024. This does not include the three other physics majors who participated with other mentoring faculty (math, music technology), nor the two other students who participated in NSF-sponsored research experiences (REUs). In total, this means we had ten students participating in a summer research experience. Below are the student names, project focus, and mentoring faculty/institution for pictured SSI 2024 (From left, Cloughley, B. Fleenor, Makhija, Frazier, Dulay, Villalba, Swick, M. Fleenor, Callaway.) A full story about the 25th Summer Science Institute can be found here.

SSI 2024 Projects:

Ryan Cloughley, Humidity Modeling and Radiative Transfer, Coastal Carolina
Grace Dulay, Dark Matter Particle Decay Modeling, UMW (Villalba)
Boone Fleenor, Drone-induced Water Circulation, Coastal Carolina
Donovan Frazier, Ultrafast Molecular Dynamics, UMW (Makhija)
Sean Swick, Galaxy Dynamics and their Environment, UMW (Fleenor)



Importance of Basic Science

UMW Physics maintains a strong commitment to basic science. In a world of career planning and pre-professional training, the value of a physics degree cannot be underestimated. The creativity and open-ended problem solving that physics demands are skills desperately needed in our world. These skills are cultivated by our program at all levels.

Graduate Spotlight: Abigail (Abby) Swanson

Hard to believe that we must say good-bye to Abby Swanson. After coming to Mary Wash without a formal interest in physics, Abby has gone on to play a formative role in our program. She has served as SPS President, participated on the program's Department Action Team, received a Goldwater Scholarship (first UMW woman to do so), successfully defended her Senior Thesis, and received the Darden Award. She is now at Stony Brook University.

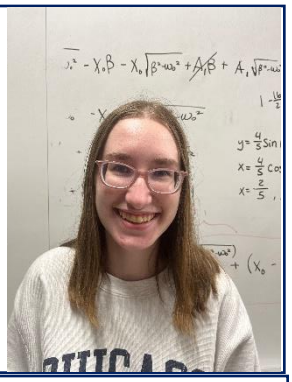
Senior Spotlight: Emilee Leaman

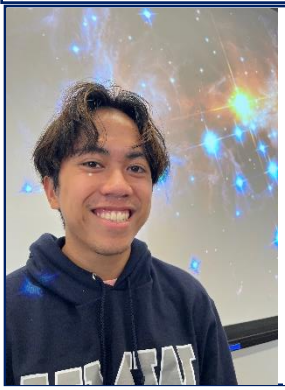
I was born and raised in Fredericksburg, Virginia. I like WWII movies, and you can't really beat the Lord of the Rings. I love spending time with people. I like that UMW is small and historical. I love the Physics Department at UMW, it is personal, collaborative, and holds to a standard of excellence. I love Africa and spent some time in Rwanda this summer to learn about missions. While in Rwanda, I spent time with some dear friends from Zimbabwe, and I would love to collaborate with them and another friend's organization on my research project about subsistence farming.

Junior Spotlight: Carly Healy

I was born and raised in Midlothian, Virginia. I like Avatar the Last Airbender or Lord of the Rings. I love rock climbing. I really like how beautiful our campus is and how much professors care about their students and the campus community. I enjoy the closeness we share as a department, and how we come together for activities outside of classes. One of my life goals is to visit every US national park.

Carly serves as our current SPS President and also participates on the Department Action Team. She has attended the CU*IP and completed an REU last year at Georgetown.



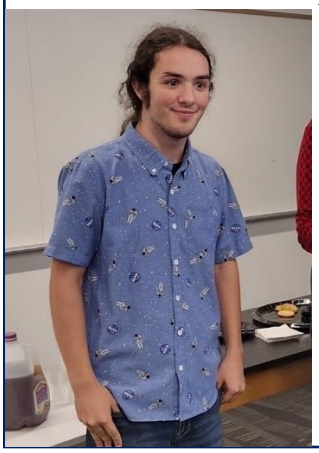


Sophomore Spotlight: Edmund Garcia

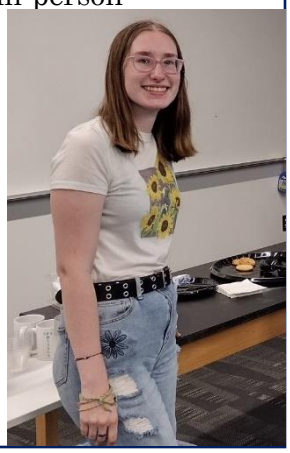
I am from Dulles, Virginia! I attended Rock Ridge High School and the Academies of Loudoun concurrently. My favorite movie is definitely Interstellar. My favorite show is Better Call Saul! I love making art for fun. Portraits are my favorite, especially in unorthodox mediums and coloring. I really enjoy how small our program feels, especially compared to other schools. I feel like we have a lot more opportunities for connecting with our peers in small class sizes. I've made some really good friends really quickly, through class and through the Society of Physics Students. I stayed at the Catholic University of America for a physics REU internship this summer. I got hands-on experience in the biophysics lab!

Physics Program Insight 2023-2024

Student Scholarships & Sigma Pi Sigma Induction

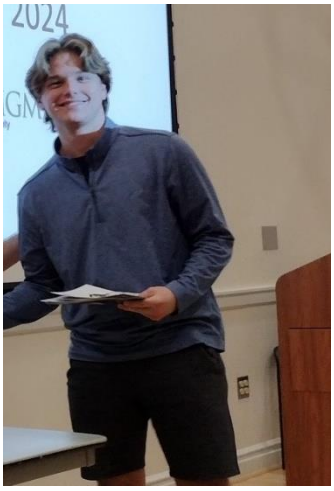


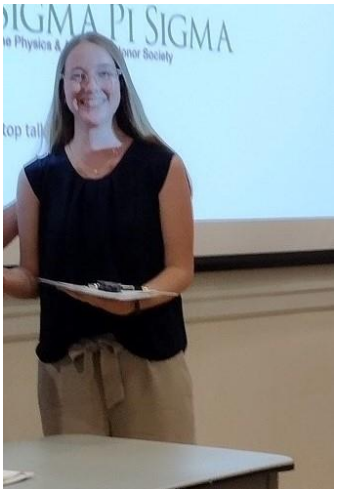
Two scholarship awardees were in attendance for the 2023 in-person announcements, Carter Bussey and Carly Healy.

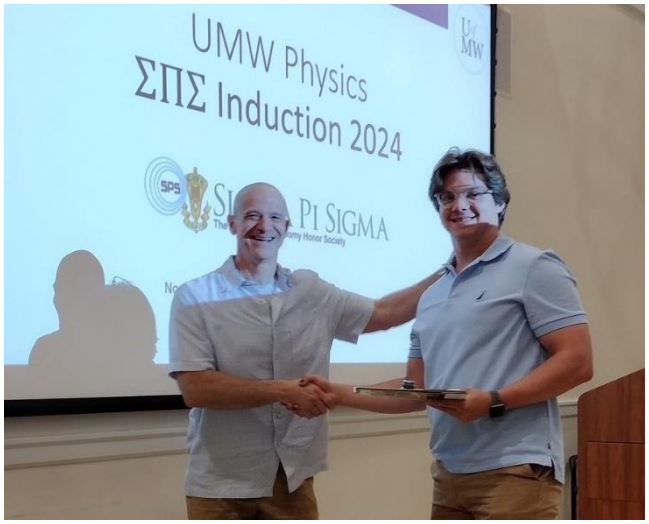


Most of these scholarships are made by Physics or STEM alumni from UMW. **Thanks to the family and friends of John Cope ('83), James Rollin Morgan III ('86), and Bulent T. Atalay, Professor Emeritus.**

We also had five inductees in the 2024 class for Sigma Pi Sigma. The national physics honor society requires a major GPA of at least 3.25 and junior standing in the physics major. We are proud of these excellent students, their work, and their achievements.





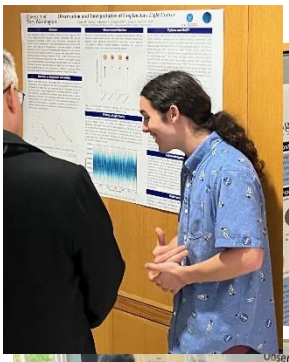


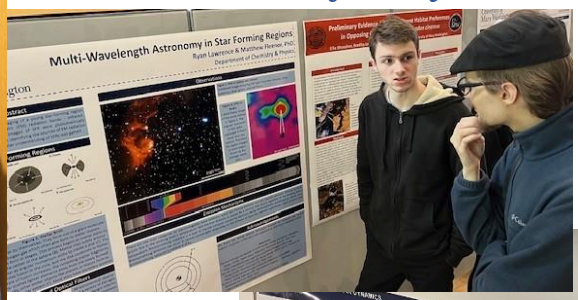
Abby Swanson Earns Departmental Honors

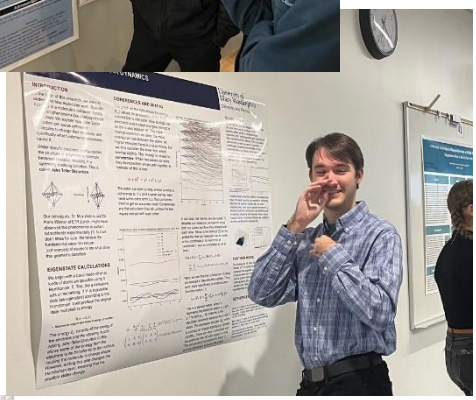
Mentored by Desmond Villalba, PhD, Abby successfully defended an Honors Thesis entitled **"Classification of Topological Defects in Cosmological Models"** in April 2024**.** With Varun Makhija, PhD, and Janusz Konieczny, PhD, (Mathematics) on her committee, Abby explained how symmetry-breaking in cosmological scenarios could lead to current physical landscapes. From the Abstract, Abby explains, "It is helpful to know what type of defect is produced when a symmetry breaks. Defects are differentiated based on their dimension: a domain wall, cosmic string, and magnetic monopole are 2, 1, and 0 dimensional defects respectively. Depending on the type, each defect can have very different implications for the entire system, so we classify them. As our Universe evolved, it is reasonable to ask if there were any defects produced. We look at some proposed models of our Universe's evolution and compute homotopy groups to classify defects produced in phase transitions."

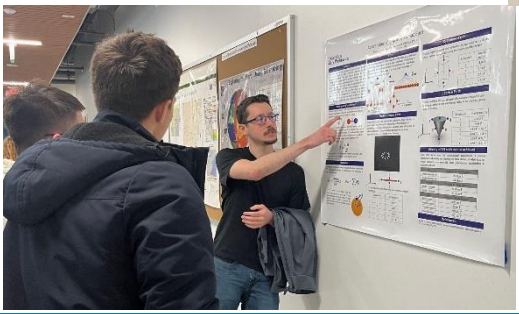
Student Study Projects and Presentations

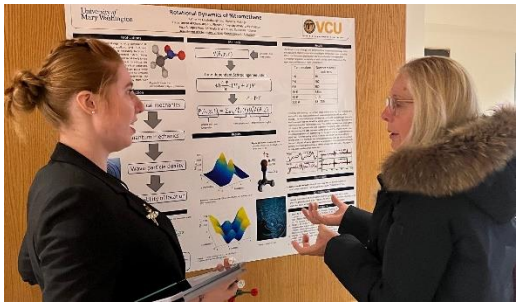
In total, there were 24 student study and research projects leading to presentations in 23-24. Here are few snapshots of some students presenting their work at a variety of venues.



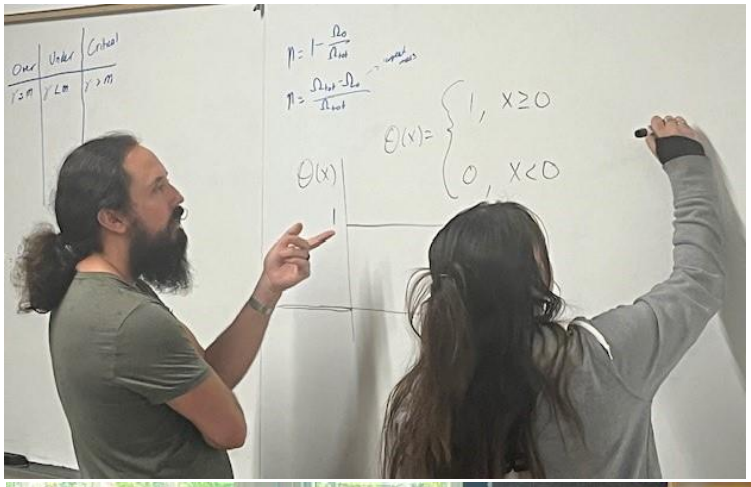




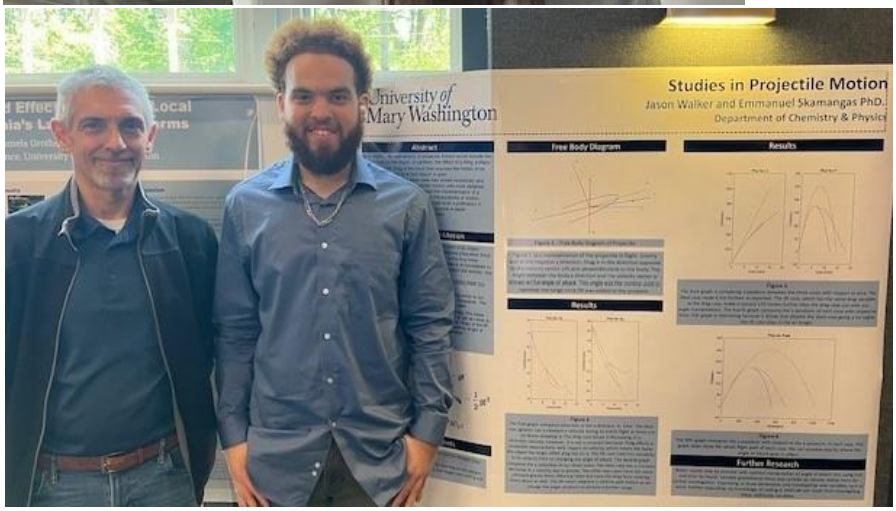


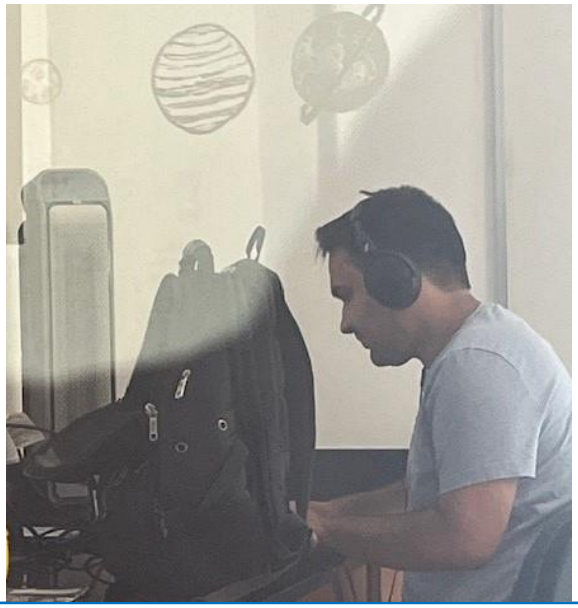


Mentored Student Research is Key for Student Development



UMW Physics faculty consider it a great honor and privilege to mentor majors in new and exploratory study. Many of the previous presentations were a result of collaboration between UMW students and faculty. Whether the mode is the summer science institute (left top), semester-long independent study (left bottom), or a combination of both (below), mentored student study is crucial for professional skill development and career placement after graduation.





Graduation 2024

Tyler Berger, Mason Clark, Clark Saben, Ethan Slachter, Abby Swanson, Heidi Walbesser, Jason Walker

After four years of physics coursework, close-knit relationships form between student majors, their peers, and their faculty mentors. From left, clockwise: Senior lunch at Mellow, Grad Day on the steps, Jason on picture make-up, and the Quantum 2 Independent Study Course.

Solar Eclipse Campus Outreach Event, 8 April 2024

While some of our students traveled to the path of totality, the student groups Optica and SPS had a joint outreach event that drew more than 200 students and faculty to view the eclipse safely. We were ecstatic to share the event.

Physics Education and Outreach

Informal education events (aka., “outreach”) have been shown to increase learning for both those conducting the outreach event as well as the participants. Both Optica and SPS student members conduct informal learning for the campus and regional communities with both educational and cohort-building foci.

SPS Physics Colloquia connect students with scientists

Sponsored by the Margaret Duke (’44) endowment, monthly physics colloquia feature world-renowned scientists, graduate physics students, and UMW alumni. During their visit, most invited speakers spend significant personal time with physics majors, talking about careers and discussing physics participation from a historically under-represented perspective. Colloquia are Friday at 4 PM and open to the public and campus.

2023 – 2024 Speakers:

Susan Mullally (STScI)

Digesh Raut (St. Mary’s)

Margaret Gregory (’22, MIT)

Shraddha Agrawal (UIC)

Rama Bala (APS/CCL)

Joe Francisco (UPenn)

Ryan Barlow (’17, Geopulse)

Travis Sievert (Northrup)

Never Strictly Socializing

UMW Physics believes in connecting students outside the classroom. While these events are often cohort-building and inclusive of both non-/physics majors, and always including snacks, they are not strictly social events. The conversation is often science-oriented and students get to know one another from an interest and careers perspective. Whether its WED PM HW Help, End-of-Year celebration of physics, or having class at Sunken, we can't imagine physicking without these events.

UMW SPS T-Shirts For Sale

Interested in a UMW SPS T-Shirt. Please contact a UMW Faculty member with size and delivery information ($15).

UMW Physics Program Donation

If you are ever interested in supporting the work of physics education and scientist preparation at UMW, please follow the QR code below.

(1) Go to https://giving.umw.edu/ and Select "Give Now" button (top right)
(2) Under "Designations" (just under "Amount"), select "click to add additional funds:"
(3) When the Designations window pops open, scroll all the way down to "University Other"
(4) Hit Continue
(5) In the "Please indicate a designation here:" space, type "Physics Program."
(6) Complete the remainder of the information and Submit

Please feel free to contact the program at mfleenor@umw.edu.