



Momentum

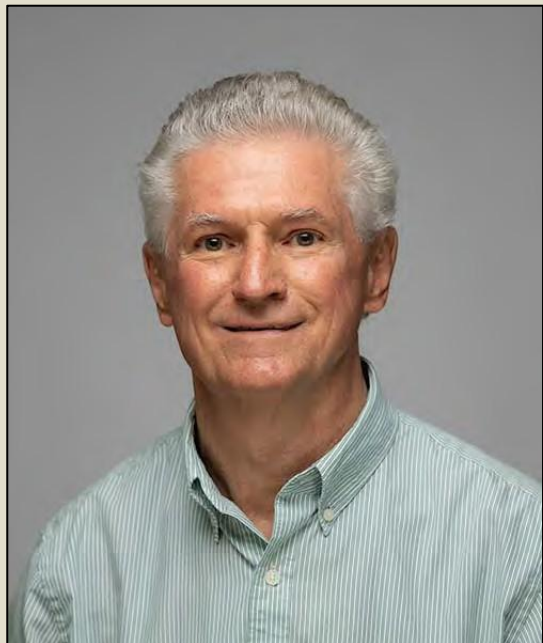
Newsletter

2025 MSU Physics, Astronomy, and Materials Science Newsletter

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Letter From Department Head



Dear Alumni and Friends of MSU Physics, Astronomy & Materials Science Department,

The department had an eventful calendar year 2025. Many of our students continue to perform at a high level academically and to excel in research-related activities. Greg Vatrano, who is a M.S. Materials Science graduate student, participated in the USA Air Force Lab student fellowship, at the USA Air Force Lab in Dayton, OH, in summer of 2025. Lana Janson, who was an undergraduate physics student, had a summer research internship at the BMRI

institute at Stellenbosch University in Cape Town, South Africa. Brogan Homburg participated in a study abroad at the Universidad de Valparaíso in Chile, where he conducted a research project on subdwarf B stars with Prof. Maja Vuckovic.

This past year was a record year for presentations made by our undergraduate and graduate students on their research. I am happy to report that we were able to fund 28 student trips to make presentations at conferences, meetings, and workshops in 2025. Travel to such venues provides an excellent opportunity for professional growth of our students.

PAMS continues to be highly prominent in fulfilling the public affairs mission of the university, particularly in holding public viewing



Letter From Department Head



nights and hosting group tours at Baker Observatory. Several faculty and students in the department participated in outreach activities including the YMCA Seuss Science Day, the Middle and High School Science Olympiads, and high school student tours at Baker observatory and in the department.

The PAMS Advisory Board meeting was held during homecoming on November 14, 2025. This was slightly later than usual due to university schedule realignment with the Conference USA athletic schedule. We had a productive meeting with the advisory board, who continue to provide important advisement and support for our department.

We thank our alumni and friends for endowments and gifts to the department in 2025. Through their continued financial support, the department scholarships provide important financial support to our students in the pursuit of their degree goals. In addition, I am happy to report that through support of our alumni and friends, we are now in the process of purchasing a vehicle for our PhysBiz outreach efforts. If you would like to provide a gift to the department, please feel free to contact me or you can make a donation online at <https://www.missouristatefoundation.org/colleges-and-departments.htm>.

Bob Mayanovic

Missouri State
U N I V E R S I T Y

Public Viewing Nights



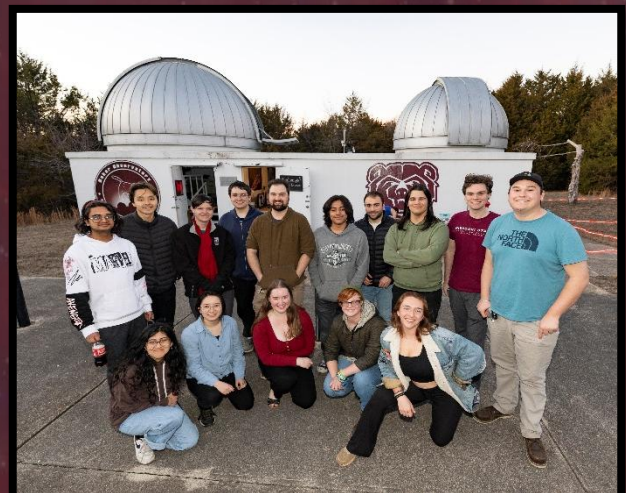
Baker Observatory never disappoints! This year we were granted a rare view of the Aurora Borealis in addition to the many wonderful views observers are already lucky enough to see through the Baker telescopes.



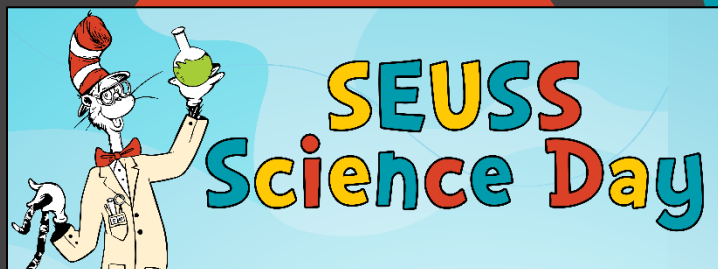
Aurora Borealis photos
credit: Bishwash Devkota



Members of the Ozarks Amateur Astronomy Club, with assistance from Dr. Baran, get ready for another exciting Public Viewing Night!



Seuss Science Day 2025

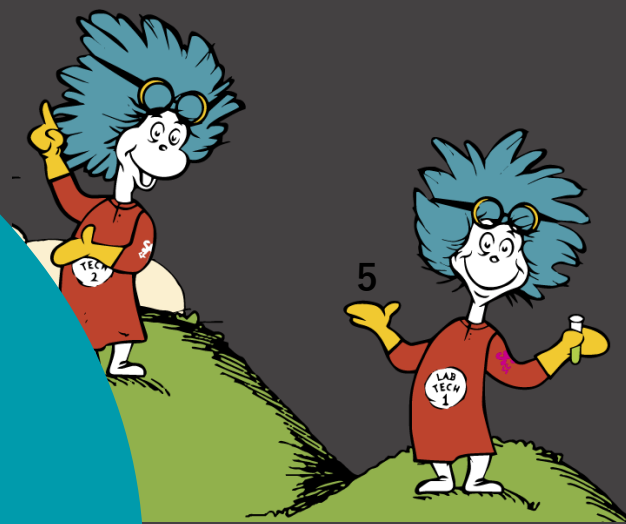


Seuss Science Day is an annual event dedicated to helping kids foster scientific curiosity and a love for all things STEM!



Instructor Devon Romine (left) and students Aili McFall (center) and Sam Cope (right)

Our students and faculty presented several exciting physics demonstrations for the kids to enjoy and learn from!



Science Olympiad



For over 20 years, Missouri State has hosted Science Olympiad – an enormous K-12 competition focused exclusively on STEM topics.

Junior Science Olympiad allows young students the chance to show their stuff in a variety of competition types, from multiple choice tests to practical/experimental events.



This year members of the PAMS faculty as well as student volunteers assisted our elementary participants with an egg drop event. The students loved participating in a hands-on physics experiment!



Exploring the World of Science

Society of Physics Students Trip



The Society of Physics Students (SPS), accompanied by Dr. Tig Besara, went on a trip from March 16th -19th to Huntsville, AL. The students had the opportunity to tour the NASA Marshall Space Flight Center, the Propulsion Research Center, the Department of Physics at University of Alabama-Huntsville and the U.S. Space & Rocket Center.



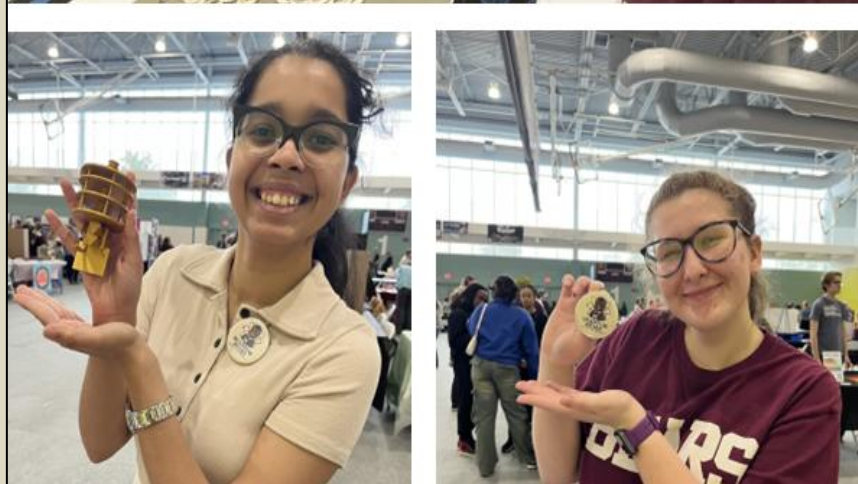
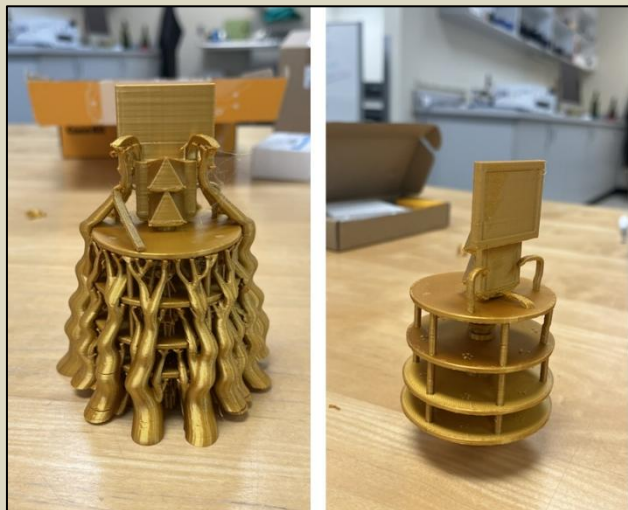
Quantum Bears



The department officially formed a student club in 2025 titled the Quantum Bears. The faculty advisor of Quantum Bears is Dr. Ridwan Sakidja.

The club's focus is quantum computing. Part of their activities involve participating in quantum computing challenges hosted by various companies and institutions.

The students participating in the Quantum Bears club utilize quantum computing algorithms to solve real-world physical and chemical problems put forth by the organizers of the quantum computing challenges.



Conferences for Undergraduate Women and Gender Minorities in Physics (CU*iP)

The APS Conference for Undergraduate Women and Gender Minorities in Physics (CU*iP), is a national conference tailored for undergraduate physics majors. The conference offers opportunities to connect with mentors, explore educational and career paths, and network with fellow physics students to share knowledge and experiences.

This year we had a record 8 attendees representing Missouri State University. Emmalein Pendley, Armitha Dutta, Aili McFall, Isabella Grizzle, Emma Rapp, Rebecca Jolivette, Faith Sheridan, and Caroline Witt attended the conference in Boulder, Colorado January 24th-26th.



Conferences



245th Annual Meeting of the American Astronomical Society (AAS)

Rebecca Jolivette, Brogan Homburg, Jonah Vercher attended the annual meeting of the AAS in National Harbor, Maryland January 12th-16th. The AAS winter meeting is the largest annual gathering of American Astronomers, and the premier astronomical event worldwide. We are proud of our students and their presented works at this prestigious conference.



Brogan Homburg explains his iPoster titled:
"Determining Radii and Masses of Hot Horizontal Branch Stars Using Gaia and SED Fitting From Archival Photometry."



Jonah Vercher explains his iPoster titled:
"Classification of Delta Scuti, Gamma Doradus, and Hybrid Stars through Oscillation Spectra Analysis."

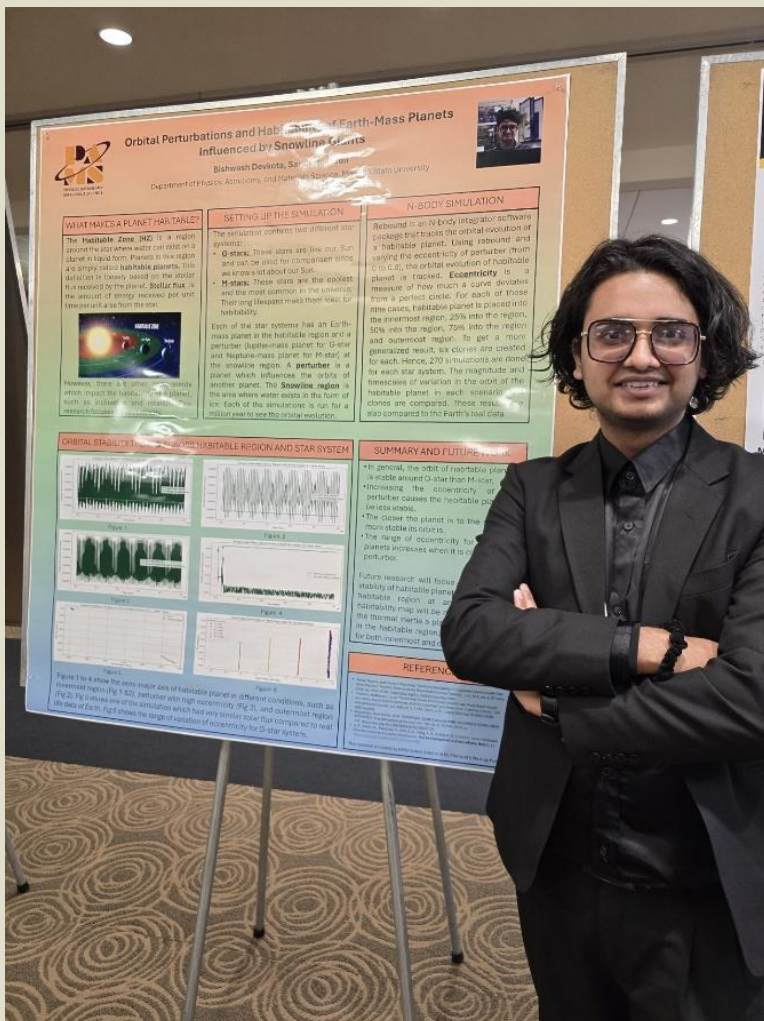


Rebecca Jolivette with her iPoster titled:
"Asteroseismology of Hot Horizontal Branch Stars using K2 and TESS Data."

Mid-American Regional Astrophysics Conference (MARAC)

This year, the University of Missouri in Columbia, MO hosted the annual MARAC conference on December 4th & 5th. We had several students attend: Emmalein Pendley, Rebecca Jolivet, Devon Tarter, Armitha Dutta, Bishwash Devkota, and Jaihan Smith.

Here's what Bishwash had to say about his time at the conference:

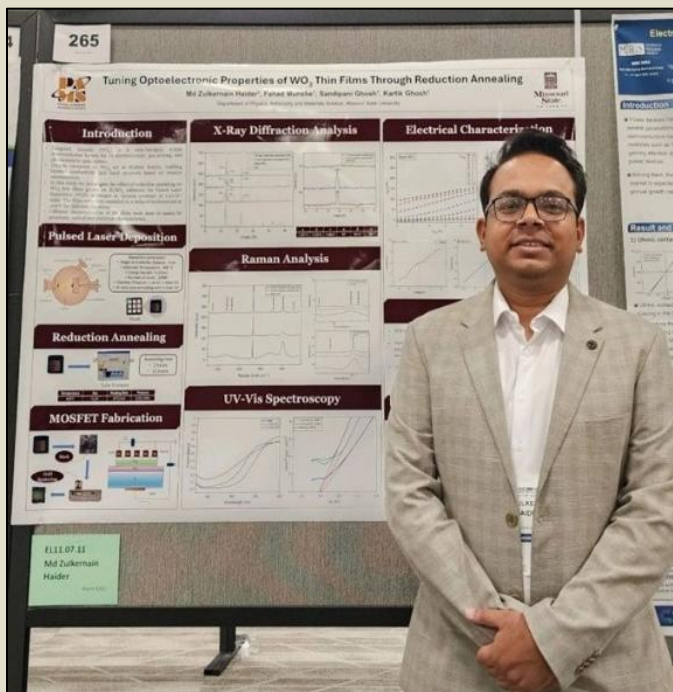


I presented a poster with the title "Orbital Perturbations and Habitability of Earth-Mass Planets Influenced by Snowline Giants". My presentation focused on how a massive planet located near the primordial water-ice snowline can gravitationally perturb potentially habitable planets, particularly in M-star and G-star systems, and the implications for planetary habitability.

I found "Teaching Undergraduate Students Critical Thinking and AI Skills in Astronomy" very beneficial. The talk was about how to use AI while still being able to gain basic information and have proper judgment about different topics. Using AI might feel like a shortcut while learning about new topics, and relying too much on it can affect critical thinking to be affected.

Attending the MARAC meeting was a unique opportunity to learn about different research being done in the region. It was also an excellent way to network with both students and researchers. The conference offered valuable insights into presenting research, use of AI, and application for jobs and graduate school.

Materials Research Society (MRS) Annual Conference



Md. Zulkernain Haider joined more than 4,000 researchers in Seattle, Washington for the 2025 spring meeting of the Materials Research Society.

This annual event is considered an exploration into interdisciplinary research in both fundamental and applied areas.

The conference took place from April 7th-11th. He presented a poster titled "Tuning Optoelectronic Properties of WO₃ Thin Films Through Reduction Annealing."

The American Astronomical Society's Division on Dynamical Astronomy held its 56th annual meeting in Atlanta, Georgia on May 19th-23rd.

This meeting was virtually attended by Bishwash Devkota and Armitha Dutta.



Internships & REUs



USA Air Force Lab

Accompanying Dr. Kartik Ghosh, student Gregory Vatrano represented Missouri State with a student fellowship to the USA Air Force Lab in Dayton, Ohio.



See what Greg had to say about his experience at the lab!

"I spent 12 weeks in an infrared spectroscopy lab under the supervision of Dr. Chris Stevens. Unlike previous summers in which 4-10 students would be selected, I was lucky enough to be the sole recipient of this student fellowship.

Dr. Stevens allowed me to gain a first-hand look at all levels of the operation. From attending meetings and lunch events, to allowing me to align the free space optics for nearly every experiment, he made sure to include me as if I was more than just a passing intern. I was able to co-author two published papers (one still in review) during my time there!

This fellowship gave me the chance to expand my knowledge in so many ways, including learning to perform measurements as low as 4 Kelvin (cryo), time-dependency, single photon generation (g2), and photoluminescence (PL). More than just academic education, this program singlehandedly reignited my passion for science and proved that the skills I am learning at Missouri State are invaluable in the workplace."



Internships & REUs



Lana Janson was awarded a summer internship at BMRI (Biomedical Research Institute) at Stellenbosch in Cape Town, South Africa. Stellenbosch's BMRI is a world-class facility that spearheads innovative medical initiatives to improve health outcomes across South Africa and Africa.



Brogan Homburg participated in a summer study away trip at the Universidad de Valparaíso in Chile. Here is what Brogan had to say about his time in South America: "I am very excited to continue my work at MSU. I have had a wonderful experience thus far attending many conferences, culminating in a study abroad trip to Chile that the university help me attend. I look forward to pursuing my master's degree with professors I respect and admire."



Student Awards



Outstanding Teaching Assistant Yashasvi Moon



Yashasvi is a double major in Physics and Mathematics. In addition to her majors, she is also obtaining a Computational Science Certificate. She has an impressive overall 3.97 GPA. Yashasvi has excelled in research at a very young age. She has established research collaborations with faculty at Missouri University of Science and Technology and at the University of Illinois. Her collaboration with Decker French from the University of Illinois has led to her publishing an article as lead author in the Research Notes of the American Astronomical Society journal in late 2024. In addition to her studies and research, she has been an active participant in outreach in the department. She has begun her PhD studies in Astrophysics at the University of Illinois at Urbana-Champaign.

Outstanding Undergraduate Student Sandipani Ghosh



Sandipani has been a very effective Teaching Assistant during his time here at MSU. He taught PHY 123 introductory labs. He made sure to be well prepared for teaching his labs. He was well organized and provided clear instructions to the students. The students in his lab sections said that he was always available for help outside of the classroom and that he helped them to understand the material better in the context of the experiments that they performed in the lab. One of the students commented that "Sandipani was an amazing lab instructor. He was very helpful and knowledgeable."

Student Awards



Outstanding Research Assistant Matthew Bruenning

Thesis Advisor: Dr. Ridwan Sakidja

Matt has maintained an impressive 3.89 GPA throughout his graduate studies. His research has two major thrusts: The development of force fields for Molten Salt Reactors (MSRs) for next generation nuclear technology applications of quantum computing to materials science challenges. Matt was selected for the 2024 NASA-Missouri Space Grant Consortium's Summer Internship and Fellowship Program. He has also been a participant in MSU's highly successful Quantum Challenge worldwide competition. He has presented his research work at national and regional meetings. Matt is currently a PhD student at the University of Missouri in Columbia to begin his studies in Physics.



Faculty and Staff Achievements



CNAS Faculty & Staff Excellence Awards

Student-Nominated Awards: Faculty Excellence Andrzej Baran

The nominating student said, "Since joining MSU in 2023, Dr. Baran has brought new energy and direction to astronomy teaching and research, and he has been an excellent research mentor. Dr. Baran spearheaded efforts to realign the 20-inch optical telescope for observational research at Baker Observatory and is currently working on fixing the BORAT automatic telescope for research as well. Overall, Dr. Baran's contribution to the university in only a few years has been substantial. His impact has grown student interest in astronomy and has brought Baker Observatory back to a more active role in research."



Other Notable Staff Achievements

Our Administrative Assistant, Adam Beck received his Master's degree in Communication and two graduate certificates, one in Applied Communication and one in Conflict and Dispute Resolution. This is Adam's second Master's degree from Missouri State University. Well done Adam!

Graduates



SPRING 2025

Helena Bel Arbuties	UG
Braxten Clark	UG
Samuel Cope	UG
Joe Cota	UG
Michael D'Alfonso	UG
Partha Das	GR
Markos Georgy	GR
Sandipani Ghosh	GR
Simarpreet Girn	UG
Vadim Grishchuk	UG
Mateo Guerra Toro	GR
Theo Luan	UG
Aili McFall	UG
Yashasvi Moon	UG
Emily Rapp	UG
Jonah Vercher	GR

SUMMER 2025

Matthew Bruenning	GR
Jared Shortt	GR
Caroline Witt	UG

FALL 2025

Jessica Fink	GR
Md. Zulkernain Haider	GR
Rossana Papa	UG
Anika Tabassum	GR



Scholarship Winners



Andereck Family Scholarship

Bishwash Devkota

Katie Harris

Banks Family Scholarship

Asher Van Maanen

Howard Petefish Award

Brogan Homburg

Kenneth A. Soxman Memorial Scholarship

Sophie Aslin

Physics and Astronomy Department and Friends Scholarship

Sophie Aslin

Asher Van Maanen

Mick Drecker

Pre-Engineering/Engineering Physics

Scholarship

Mick Drecker

Thomas Cave Endowed Astronomy

Scholarship

Bishwash Devkota

Laurel Foltz

Thurman Family Scholarship

Isabella Grizzle



Intellectual Contributions



Otani, T., **Baran, A.**, Spence, R., Von Hippel, S., Lynum-Lozano, Y., Clark, J. M. (2025). A Search for Subdwarf B Binaries Using Pulsation Timing from TESS. *Astronomical Journal*, 170(1), 199-207.

Reed, M. D., Baran, A., Telting, J., Ostensen, R., Jeffery, S., Gaibor, Y. (2025). K2 observations of five pulsating subdwarf-B stars with white dwarf companions. *Monthly Notices of the Royal Astronomical Society*, 540(1), 3725-3752.

Noor, F. B., Law, K.-M., Yasmin, N., Hauser, A. J., **Besara, T.** (2025). Ferrimagnetism and Half-metallicity in Cr-substituted Mn_{4-x}Cr_xAl₁₁. *Journal of Physics: Condensed Matter*, 37(23), 235704.

Longworth, S. M., Mou, M. M., Yasmin, N., Noor, M. F. B., **Sakidja, R., Besara, T.** (2025). Single Crystal Growth and Structural Study of the New MCu₂Zn₂₀ (M = Nb, Hf) Compounds. *Crystals*, 15(5), 391.

Haider, M. Z., Munshe, F., Ghosh, S., Lee, J., **Ghosh, K. C.** (2025). Tuning optoelectronic properties of WO₃ thin films through reduction annealing. *MRS Advances*, 10, 2229-2235.

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Anwar, A.D., **Mayanovic, R.A.** (2025). The structural, morphological, and magnetic properties of Mn_xNi_{1-x}O/NiO thin film bilayers. *Applied Physics A*, 131, 427.

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Matin, N., **Moreno, D.**, Abad, K., Omosebi, A., Liu, K., Thompson, J. (2025). Life Cycle Assessment of the Charge Carrier Mediated Electrocatalytic Reduction of Carbon Dioxide to Formic Acid. *Journal of Environmental Chemical Engineering*, 13(1), 115184.

Simpson, S., **Moreno, D.** (2025). Numerical Pipe Flow Model to Demonstrate Laminar Flow in Concentric Double-Pipe Heat Exchangers (ed., vol. V001T11A007, pp. 9). *American Society of Mechanical Engineers* (Conference Proceeding).

Sandhaus, P., Dawson, R. I., MacDonald, M., Shakespeare, C. J., **Morrison, S. J.** (2025). Effects of Outer Giant Planets on In Situ Formation of Inner Super-Earths. *The Astrophysical Journal*, 990(61), 17

Hamburg, B., **Reed, M. D.** (2025). Determining Radii and Masses of Hot Horizontal Branch Stars Using Gaia and SED Fitting From Archival Photometry. *Bulletin of the American Astronomical Society* (vol. 57) (Conference Proceeding).

Jolivet, R., **Reed, M. D.** (2025). Asteroseismology of Hot Horizontal Branch Stars using K2 and TESS Data. *Bulletin of the American Astronomical Society* (vol. 57) (Conference Proceeding).

Chen, T., Fu, H., Dong, S., Zhou, Y., Gu, Y., Zhou, C., **Sakidja, R.** (2025). Predicting the high temperature deformation behavior of Haynes282 by a dislocation-density based crystal plasticity model. *Materials Science and Engineering*, 923, 147690.



**Missouri
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UNIVERSITY

Alumni:

Please take a few minutes to send us an email at: physics@missouristate.edu

Include your current contact information, graduation year and Missouri State degree.

Let us know where you are working now, job title or other career or personal accomplishments so we can include you in our next issue.

Stay current with the MSU Alumni Association at <http://alumni.missouristate.edu>.

Update contact information online and learn about upcoming alumni events, such as MaroonNation.

Media and Contact:

 <https://www.facebook.com/MSUPAMS2/>

 <https://www.instagram.com/msupams2/>

 <https://twitter.com/PAMSatMSU>

You can reach us by email:

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Gift Giving:

State universities could not operate without generous contributions from alumni and friends. Your support enables us to provide scholarships, teaching equipment, and more. We hope you will consider contributing to the PAMS department or to one of the scholarships; your gift is tax deductible.

To learn more about how you can help, visit <http://physics.missouristate.edu/Alumni.htm>. Please make checks payable to Missouri State University Foundation in support of the PAMS department and mail to:

The PAMS department
Kemper Hall 101
901 S. National Ave.

Springfield, MO 65897

Also, donations can be made online at: www.missouristatefoundation.org/waysofgiving.asp.

Select Natural & Applied Sciences/Physics, Astronomy, & Materials Science

Thank you!

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Missouri State University is a community of people with respect for diversity. The University emphasizes the dignity and equality common to all persons and adheres to a strict non-discrimination policy regarding the treatment of individual faculty, staff, and students. In accord with federal law and applicable Missouri statutes, the University does not discriminate on the basis of race, color, national origin (including ancestry, or any other subcategory of national origin recognized by applicable law), religion, sex (including marital status, family status, pregnancy, sexual orientation, gender identity, gender expression, or any other subcategory of sex recognized by applicable law), age, disability, veteran status, genetic information, or any other basis protected by applicable law in employment or in any program or activity offered or sponsored by the University. Sex discrimination encompasses sexual harassment, which includes sexual violence, and is strictly prohibited by Title IX of the Education Amendments of 1972.

Momentum:

The Newsletter of the Department of Physics, Astronomy, and Materials Science at Missouri State University. To submit information for the next Momentum newsletter, e-mail Patrick March at: PatrickMarch@Missouristate.edu



In Memoriam – Olumide Akinduro

This year, PAMS experienced a tragedy when a bright young student's life was cut short far too soon. Here we honor Olumide Akinduro.

Originally from Nigeria, Olumide came to Missouri State University with a dream for a better life and the unyielding drive to achieve it. A serious and dedicated student, he also enjoyed many activities in his free time such as football, guitar, and photography. Fellow students and friends remember him as caring and generous, with a lively personality, and a willingness to listen to and support those around him. Olumide was only 35 years old at the time of his passing. Olumide Akinduro received his MS in Materials Science posthumously.

Our department head, Dr. Bob Mayanovic, wrote a few words to mark this somber occasion:

We were grieved at the passing of Olumide Akinduro in September 2025. Olu was a graduate student in our MS Materials Science program and was in his last semester of study prior to graduation. Dr. Daniel Moreno and I were his MS thesis co-advisors. He was a highly talented young man of exceptional character with much promise for a budding career in science. Olu was very generous with his time and assistance given to the students in his classes.

-Bob Mayanovic



Olumide's family has set up a tribute website where you can view stories and memories from his life.

<https://www.forevermissed.com/olumide-akinduro/about>