Physics at Wabash

Welcome!

Welcome to the 25th edition of our annual newsletter! It's hard to believe we've been at it for a quarter of a century. This has been an eventful year. Our new academic administrative coordinator, Rachel Hassler, did a fantastic job keeping the department running smoothly during her first year. Professor Krause was on sabbatical, but it was hard to tell since he was in his office almost every day. Within a few weeks, we'll be welcoming new students into our classes, and we're excited about planning activities that will fill next year's newsletter.

Faculty & Staff Update

Jim Brown was pleased with last year's experience using the OpenStax University Physics series in our introductory courses. As more students come to Wabash with greater need, lowering the barriers to their success here continues to be one of our goals. Prof. Tompkins is also working on an open-access offering as he revises the department's offerings for students with a pre-medical focus.

Jim is truly thankful to Dennis Krause for stepping in from sabbatical to cover Jim's courses in the first half of the Spring semester after a health surprise sidelined Jim for three months. A screening after some symptoms in the late Fall led to heart surgery in January. Jim was fascinated with the medical technology and enjoyed seeing modern physics put to work for medical imaging. Jim is doing well and returned to teaching after spring break. He was happy to be both back in the classroom and to be doing cardio-rehab in the spring. He has taken some time this summer to reflect and focus on well-being. The Wabash community has been amply kind and supportive as he navigated this new experience.

It's been a very long time since Jim did any medical-related research, but the only paper that Prof. John Caraher and he were coauthors on involved using PET scanning to image the deposition of a ^{18}F radioactive beam into a skull phantom as a model for potential online imaging in heavy-ion beam therapy. To those who know Jim, it will come as no surprise that he was the kind of patient who asked the ultrasound tech, "You're looking at some pretty small features. What frequency are you running at?" Apparently, it's not a common question. You never know when and how physics will pop back into a corner of your life!

Jim (in Wabash red below) was happy to get back to FRIB for the MoNA collaboration's 2026 annual retreat. It is always a pleasure to see the progress of the lab and its impact on nuclear science!

Rachel Hassler is beginning her second year serving as the academic administrative coordinator for the Physics, Math, and Computer Science Departments. Her favorite campus experiences from the past year include attending Little Giants home soccer games with her husband and son and singing alto in a small faculty-staff chorus at the Annual Christmas Festival. Rachel enjoyed a quiet summer reading, hanging out with her family, and taking daily walks while identifying new plants, insects, and fungi along the way.

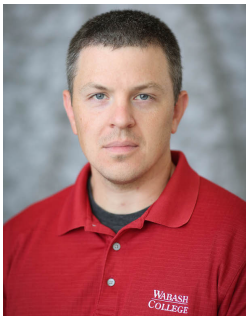
Dennis Krause spent the 2025–2026 academic year on sabbatical. During the fall semester, he focused most of his attention on research. When he wrote his sabbatical proposal, he planned to look into the interesting phenomenology of forces arising from ultralight dark matter (ULDM) fields that couple quadratically to fermions. He did some preliminary work with Evan Baldwin ('26) during the summer of 2024. However, by the time he returned to the project, he found several groups had already written papers on the things he was considering. It was time to think of something new. Fortunately, key ideas pointing toward a different direction emerged from work with his Wabash research students.

First, the lack of progress in detecting dark matter in terrestrial experiments suggested that more exotic possibilities need to be considered. Second, during the summer of 2023, Krause explored the nature of quantum entanglement with Evan Baldwin ('26) and Gus Sanchez ('26), during which they discussed the work attempting to demonstrate the "quantumness" of gravity through the entanglement of two particles via the gravitational force. Finally, his former student, Quan Le Thien ('18), who is now a graduate student at Indiana University-Bloomington, asked him to review a post-doc research proposal he was writing on using quantum probes to investigate quantum condensed matter systems. It was at this point that Krause realized he just needed to replace the words "condensed matter systems" in Quan's project with "dark matter." Krause is now studying how spatially distributed quantum sensors can detect the presence of exotic quantum dark matter via entanglement.

The academic year wasn't all spent doing research. Dennis spent the first half of the spring semester back in the classroom to fill in for Prof. Brown, who was on leave. This gave Dennis a chance to meet the freshman physics students and teach with the OpenStax *University Physics* textbook that we are now using for the PHY 111/112 calculus-based introductory physics sequence. In addition, Dennis taught the first half of PHY 230 (Thermal Physics), which he hadn't taught for 10 years. Also during the spring semester, Dennis gave a physics colloquium on the magic of quantum mechanics using examples of research done by his students.

Finally, you can find a draft of work by Dennis and colleagues at Purdue on a new approach to dark energy, "Search for Quintessence-Like Pseudoscalar Dark Energy Effects on ^{56}Fe Nuclear Transition Energies in Supernova 1991T," on the arXiv: https://arxiv.org/abs/2509.12422.

Dennis is now excited to be back in the classroom. In the fall, he'll be teaching PHY 111 General Physics-Calculus and PHY 315 Quantum Mechanics.



Matt Roark has been busy with all things 3D printing. He assembled the department's new printer and carefully tuned the factory settings. He also developed lectures and training material for students. A public version of the slides can be found on GitHub at: https://github.com/FlyingGyroscope/IntroTo3DPrinting.

In his free time, Matt focused on spending time with family, especially his dad. Matt once again raced in a 5k fundraiser for the Ladoga library and volunteered at Pi-Day at the Carnegie Museum. And of course, some camping and ultimate frisbee were sprinkled throughout the year.

Gaylon Ross is beginning his 9th year at Wabash and his 20th year (really?!) of college teaching overall, after a 14-year interlude in the manufacturing world.

Last fall, Gaylon taught Classical Mechanics for the second time. As in the prior year, students were responsible for the presentation of all new material, with Gaylon filling in the gaps and helping them correct misconceptions and work through problems in class. The students came well-prepared for discussion, and this guided his thoughts on how to handle other upper division courses.

In spring, Gaylon taught Electromagnetic Theory, and although it had been several years since he had done so, the task was made easier since the class was made up of students who had just taken Classical Mechanics with him the prior semester. They came in knowing exactly what would be expected of them from a class discussion standpoint, and we covered the standard material with little trepidation, outside of the nervousness of taking fairly-involved E&M exams.

Gaylon also taught the two-semester algebra-based physics sequence for pre-health and other science majors last year. Having served as instructor for the course over 10 times in the past, it had become one of his most comfortable classes over the years, but it needed a bit of fine-tuning for the current cohort. This go-around, he integrated some interactive teaching methods used by his colleagues to improve overall student learning, especially for those who tend to struggle at the beginning of their first physics course. While students were

more engaged in the class, the overall results were mixed. Gaylon will be handing the reins of algebra-based physics back over to Prof. Tompkins in fall 2026 and will instead teach a large section of astronomy, a course he has taught over 20 times in the past. This course for non-science majors is his favorite to teach, and is probably the most impactful from a college-wide standpoint. That being said, Gaylon would love to have an alumnus of the college donate funds for a planetarium for the campus, as this allows for much better understanding of the night sky by not only our students, but by local schoolkids and community groups.

In the area of service to the department and college, Gaylon coordinated and emceed our local Sigma Pi Sigma banquet on April 22, 2026, with the Wabash chapter inducting one new student member into the national honor society. He served as a stand-in member of the Lilly Scholarship Committee on campus, which selected three incoming freshmen to receive full scholarships to Wabash. Gaylon was also part of the Visiting Artists Implementation Team this academic year, serving as point person for KAIA, an all-female string quartet who performed at the college March 5, 2026.

Gaylon has appreciated the opportunity of working with the faculty, staff, and students at Wabash and looks forward to a productive upcoming year.

Nate Tompkins finished his ninth year as a member of the Physics Department and first as Department Chair. In the fall he taught Introduction to Thermal Physics & Relativity, Advanced Laboratory I/II, and Senior Seminar. In the spring he taught Introduction to Quantum Theory & Applications, Advanced Laboratory I/II, and the lab section for the cross-disciplinary Sensors, Electronics, and Computing course. During the summer, he worked with students in the lab, starting a new research project using a microfluidic device to study double emulsions.

Recently, Nate finished a long-term research project investigating precipitation membrane growth in a microfluidic device, which was published as "Investigations into Precipitation Membrane Growth" in The Journal of Chemical Physics. The work includes Raymond Arebalo '25, Gabriel Brandenburg '28, Bryan Cherry '24, Matthew Moran '27, and Aiden Orcutt '24 as authors. In this work, the authors studied the formation of cobalt hydroxide, nickel hydroxide, and iron hydroxide membranes and the electric potential generated during their growth.

Nate has also published several teaching-related articles, including a Contextualization Essay on Fourier Optics for the Jonathan F. Reichert Foundation and an Open Pedagogy Assignment on Fluorescence Lifetime for the Open Education Network. Both of these publications are available online for free.

The microfluidic fabrication facilities within the Physics Department have continued to grow, adding a high-speed imaging system to image droplet formation as it happens. The Microfluidics Lab includes a Snapmaker A350 combination CNC mill/laser cutter with infrared laser module, a Leica Emspira 3 automated inspection microscope, both Leica S9 and Zeiss 508 data collection stereo microscopes, an optical profilometer, a Minus K vibration isolation platform, a Diener ZEPTO plasma chamber for PDMS bonding, a LulzBot Mini 3D printer, a Pico 24-bit data acquisition system, three Chemyx Fusion 200 rate controlled fluid injectors, a custom pressure controlled fluid injector system, a Thinky ARE-310 planetary mixer for PDMS casting, a vacuum chamber for degassing, and a PDMS curing oven.

This upcoming year, Nate is looking forward to teaching the newly redesigned Physics for Health Sciences sequence and the Advanced Lab courses. Doubtlessly he'll be working in the laboratory with students as well.

Photos taken by Matt Roark while hiking the Knobstone Trail, Indiana's longest footpath. Top: Tulip Poplar (state tree of Indiana) in full bloom. Bottom: Wild blackberry flowers.

Student News

Graduating Seniors

This year, we graduated three majors (Evan Baldwin, Min Heo, Gus Sanchez) and two minors (Arlie Benson and Broderick Frey). Min will be entering the Master's of Mathematics program at Columbia University, specializing in the mathematics of finance. This summer, Gus is going west to the University of Oregon to begin the Applied Physics-Knight Campus Master's Program. Arlie is entering the Master's program at the Air Force Institute of Technology. Finally, junior major Andrew Neidig is heading up to Purdue University to complete the second half of the dual degree engineering program, majoring in mechanical engineering.

On the Goodrich steps after graduation: Front row (left to right): Evan Baldwin, Arlie Benson, Min Heo, and Broderick Frey; back row, Profs. Ross, Tompkins, Brown, and Krause.

Senior physics majors joined the Department to celebrate their completion of written comps at Little Mexico. Left to right: Evan Baldwin, Mr. Roark, Gus Sanchez, Tim Smith, Prof. Krause, Prof. Tompkins, and Prof. Ross. Min Heo was unable to join us since he still had to finish his English comps.

Awards Chapel

During the final week of the spring semester, Wabash acknowledges the great work by its students at the annual Awards Chapel. This year, Prasun Panthi received the Harold Q Fuller Prize, which is given annually to the most outstanding junior physics major. As usual, it took the form of the 3-volume *Feynman Lectures on Physics*.

Also, at the Awards Chapel, it was announced that Prasun Panthi was inducted into Phi Beta Kappa along with senior physics major Min Heo. In addition, senior Gus Sanchez was one of six recipients of the George Lewes Mackintosh Fellowship for graduate study at the University of Oregon. Finally, sophomore major Ryan West received the Pete Vaughan Outstanding Athlete Award.

Above, junior Prasun Panthi receives the Fuller Prize from Prof. Tompkins.

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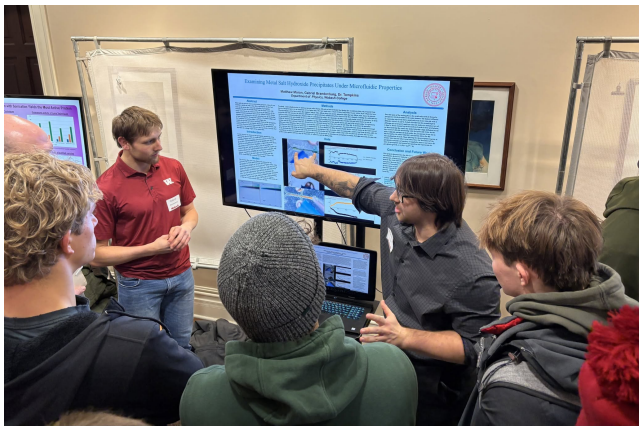
Sigma Pi Sigma

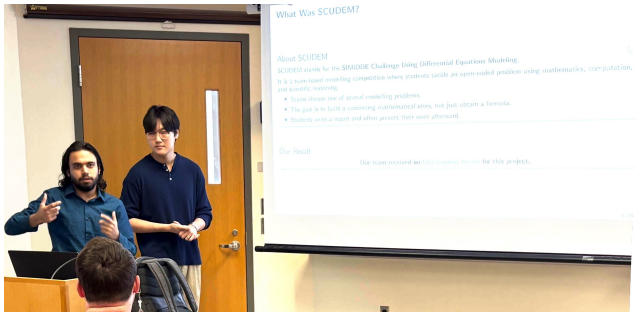
This year, Prasun Panthi ('27) was inducted into Sigma Pi Sigma, the physics honor society, for his exceptional academic achievement and participation in the department. Here, Prasun receives his certificate from Prof. Ross, who emceed the banquet that was held at Prof. Tompkins's house.

Celebration of Student Research



Gabriel Brandenburg ('28, left) and Matthew Moran ('27, right) presented a poster, "Examining Metal Salt and Hydroxide Precipitates Under Microfluidic Properties," describing their research with Professor Tompkins at January's 26th Annual Celebration of Student Research, Scholarship, and Creative Work.

Award-Winning Work



In March, Prasun Panthi ('27) and Min Heo ('26) presented their work with Md. Arham ('27) modeling entry ablation of cosmic dust. This work received an Outstanding Award from the SIMIODE Challenge Using Differential Equations Modeling SCUDEM X 2025. A video of their award-winning presentation can be found at the contest's YouTube channel: https://www.youtube.com/watch?v=Xp5Voo6yrXc... They also presented this work at the Rose-Hulman Undergraduate Mathematics Conference.

Senior Dinner

During finals week, the Physics Department took the physics students finishing up their Wabash careers out to dinner at El Charro. Going clockwise around the table, starting from the left, we have Evan Baldwin, Prof. Brown, Gus Sanchez, Andrew Neidig, Prof. Krause, Prof. Ross, Mr. Roark, Prof. Tompkins, Min Heo, and half of Arlie Benson (sorry, Arlie!).

Did you know…

"In 1880, the College's longest-serving faculty member [Physics Prof. John Lyle Campbell] brought electricity to campus and lit up the Arboretum 'as if by glare of the sun.' "

https://www.wabash.edu/news/story/4795

Goodrich Hall Fall Cookout

The Physics and Math/Computer Science Departments held their annual Goodrich cookout in October. Like last year, the computer science majors won the 3-way tug-of-war competition, but they needed a few more students.

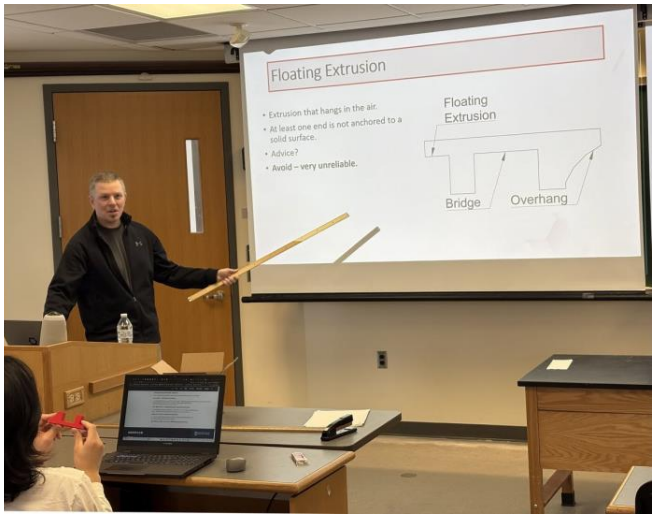
Student Research Presentations

Student presented their research at a colloquium last fall. Top: Gabriel Brandenburg ('28) and Matthew Moran ('27) discussed their results measuring voltages across the membranes they created in microfluidic devices in Prof. Tompkins's lab. Bottom left: Gus Sanchez ('26) described his research at the University of Washington, determining the advantage of 3D arrays over 2D arrays of neutral atoms for quantum error correction. Bottom left: Arlie Benson ('26) talked about working at the Air Force Institute of Technology, including with Wabash alumnus Enam Chowdhury ('95), but he wasn't permitted to tell us what he actually did!

Pi (π) Day at the Carnegie Museum

In March, the Physics and Math/CS Department students and faculty brought physics demos and mathematics activities to the Carnegie Museum in downtown Crawfordsville for the annual Pi Day celebration (albeit a week late due to spring break). Everyone had a great time on a beautiful spring day.

3-D Printing and Physics



In February, Mr. Roark gave a colloquium in which he described the intricacies of 3D printing, including how physics phenomena like resonance and thermal expansion affect the results. He also displayed several of the objects he's printed. Some of his free 3D designs are available at https://www.printables.com/@FlyingGyroscope.

Alumni News

Updates

Since our last newsletter, we've heard from...

- **Len Loker ('59)** has been blogging on Facebook about black holes, especially since the latest results of the James Webb Space Telescope have appeared.
- **Dave Bohlin ('61)** continues to enjoy retirement in the SW Denver area, where his main activity is puttering in our large wood shop. He especially enjoys making useful (and sometimes not-so-useful) items from salvage wood that no one else wants to deal with. He still gains satisfaction from knowing that the solar telescope that he helped develop as a grad student at UColorado is still the basic instrument used in space to monitor the sun for the coronal mass ejections that cause the northern (and southern) aurorae and geomagnetic storms.
- **Pat Kenney ('18)** became president of F.A. Wilhelm Construction Co., Indiana's largest construction contractor. An interview with Pat by Inside Indiana Business can be found at https://www.youtube.com/watch?v=WPx68Qyg-zk.

- **Nick Tipton ('25)** is enjoying his electrical engineering technology classes at Purdue and accepted an applications engineering internship at Texas Instruments. He also sent us some photos of some projects he's been working on in his spare time, including making a vacuum fluorescent display clock from an old cash register, an electromagnet made from a microwave transformer, and a Yagi-Uda antenna fabricated out of a broken tape measure that he used to ping the International Space Station with his ham radio. He also brought some to Pi Day.
- **James Szalkie ('25)** described his experience developing an outreach activity as SPS president in the article, "What a Slip 'n Slide Taught Me About Outreach," that appeared in the spring 2025 issue of The SPS Observer: https://students.aip.org/observer.

James is now at Florida State University, where he finished his first year of physics graduate school. He's happy to report he's joined an excellent group at the John D. Fox Superconducting Linear Accelerator Laboratory at FSU researching nuclear astrophysics. His research is now focused on type II supernova reactions, looking at energy cross-sections of different isotopes on helium gas targets with Dr. Ingo Wiedenhöver. He's working on simulations now, but they will be connecting the detector back up to the beamline soon. He's largely picking up the work from a previous thesis. The group has one other student set to defend at the end of September, and then the ANASEN detector gets handed over to him. Until then, he has been largely doing energy loss simulations and attended the Exotic Beam Summer School at Oak Ridge.

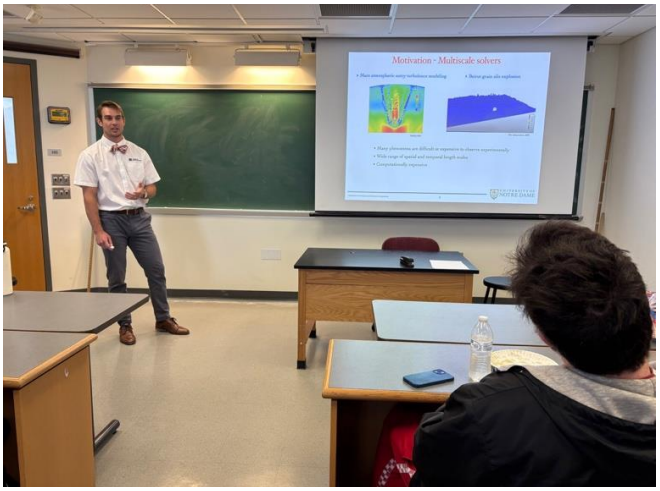
We apologize to anyone we missed and for misspeellinggs or other mmistakess made while editing the material sent to us.

In the future, we would be happy to include your news and comments in our newsletter. Not only is it wonderful to hear from you, it is also very useful for us to learn what our alumni are doing and how they got to where they are. Our students wonder what one can do with a physics degree, and it is great to have alumni stories to share with them.

Physics Demos for 1st Graders

Hose Elementary 1st graders were back on campus for a science field trip in May. After visiting the biology and chemistry departments, they wrapped up their visit with a physics demo show in Goodrich by our faculty, saving the best for last!

Alumni Colloquia



Above left: Bradon Badger ('17) and Glenn Patterson ('15) returned to campus in December to speak to our students about engineering at Rolls-Royce in Indianapolis, where they are working. After graduating, both obtained M.S. degrees in mechanical engineering from Purdue (IUPUI) before joining R-R. Bradon is a performance engineer primarily working on jet engine performance, while Glenn is a structural systems design engineer and one of the few people in the country working on impact and containment problems involving aircraft engines. They emphasized how Wabash prepared them with a solid foundation in physics, mathematics, communication skills, and critical thinking.

Above right: For the final colloquium of the year, we were thrilled to welcome back to campus Cody Cochran ('18), who recently received his Ph.D. in Aerospace and Mechanical Engineering from the University of Notre Dame. (Congratulations!!) He spoke on his groundbreaking work using wavelet techniques to solve partial differential equations in his talk, "A Spacetime Wavelet Method for the Solution of Partial Differential Equations."

If you are interested in giving a talk, please let us know. Our students are eager to learn from our alumni about what they have done with their Wabash physics degrees. We have limited funds for travel, and sometimes scheduling can be challenging, but rest assured, we do want to hear from you.

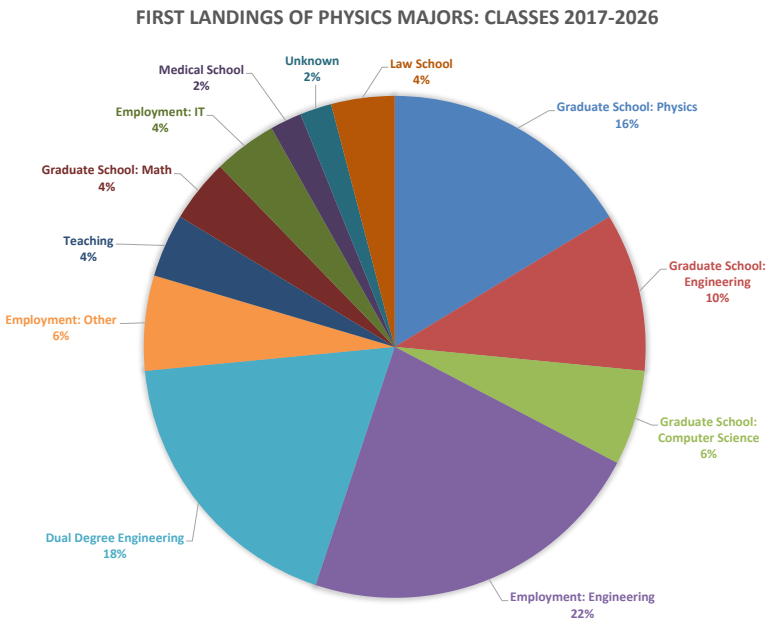
All-Goodrich Big Bash Reception

We had a great turnout at this year's Big Bash Physics/Math/Computer Science reception. We had to move from the Goodrich lounge to the larger lecture room, which was much cooler anyway. Thanks to everyone who attended–we had great conversations. We hope to continue this next year, so please keep an eye out for the schedule of next year's Big Bash events.

What can you do with a physics degree from Wabash?

Some Graduate Schools and Companies Accepting/Hiring Recent Majors

Columbia University	Amazon
University of Colorado	Apparatus
Purdue University	Rahal Racing
Indiana University	ELANCO
New York University	Walsh Construction
U. of Oregon	Epic
U. of Minnesota	Trans-United
U. of Notre Dame	Rolls-Royce
U. of Michigan	Backstop Solutions
Michigan State U.	Peerless AV
U. of Cal., Santa Barbara	J.P. Morgan Chase
U. of Southern California	FAAC, Inc.
Carnegie Mellon U.	F. A. Wilhelm
Auburn U.	Quest Global
U. of Mass.-Amherst	Ontario Systems
Florida State U.	RQAW



Thank you for your support!!!

We thank all the alumni and friends who have supported the department over the years. Special thanks go to Jim Clynch ('67), Dennis Henry ('67), Ken Crawford ('69), and the Rippy Family for creating funds to support our students. We thank Michael Lambert for again sponsoring a department challenge during the Day of Giving, with additional support from James Szalkie ('25). This year, the Physics Challenge received 75 donations! We also thank Roger Alig ('63), William Havlin ('84), Dennis Henry ('67), David Nisius ('87), Jia Qia ('15), Ronald Stoner ('59), and several anonymous donors for their contributions to our Physics Fund this past year. All of this helps to support internships, student travel, departmental prizes, library book purchases, and senior dinners. *We apologize to anyone we fail to acknowledge appropriately, since sometimes our information regarding gifts to the Department is limited.* Finally, we thank The Sidney Frohman Foundation for their grant that, with additional support from the College, helped to purchase new PASCO sensors for our lab courses.

Contact Info

Jim Brown
Phone: (765) 361-6282
Office: Goodrich 308
Email: brownj@wabash.edu

Matt Roark
Phone: (765) 361-6431
Office: Goodrich 001
Email: roarkma@wabash.edu

Rachel Hassler
Phone: (765) 361-6292
Office: Goodrich 106
Email: hasslerr@wabash.edu

Gaylon Ross
Phone: (765) 361-6071
Office: Goodrich 105
Email: rossga@wabash.edu

Dennis Krause
Phone: (765) 361-6181
Office: Goodrich 313
Email: kraused@wabash.edu

Nathan Tompkins (Dept. Chair)
Phone: (765) 361-6305
Office: Goodrich 312
Email: tompkinn@wabash.edu