Physics at Wabash

Welcome!

Another summer is drawing to a close so it is time to prepare for the coming academic year and finish the new edition of our departmental newsletter. This has been a good year as we were finally able to put the pandemic behind us and resume all of our normal activities as you will see.

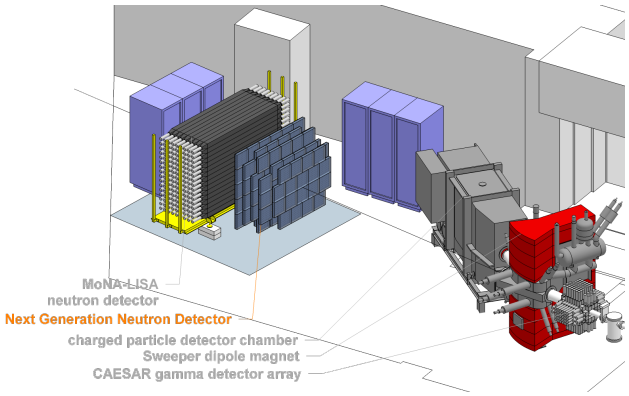
There is no need to wait another year to see what went on in 2023–24. You just have to follow us on Facebook. Finally, please let us know what you are doing so that we can include it in next year's newsletter.

Faculty & Staff Update

Jim Brown enjoyed his sabbatical in the Fall. He was able to finish up reporting on the Campbell Scholars program which provided support to primarily first-generation college students interested in the physical sciences. He also started some research and design work for a proposal to build a next-generation neutron detector to further the MoNA collaboration's work on the structure of neutron-rich nuclei. The new design features a smaller detector size and more photodetectors. The detector design takes advantage of silicon photomultipliers which have higher quantum efficiency and lower cost than traditional photomultiplier tubes. A conceptual design for this new array in front of the existing MoNA detectors, by Thomas Baumann of FRIB, is shown at the right. A formal proposal to the National Science Foundation was then submitted in the Spring. Finally, in August Jim was elected executive director of the MoNA collaboration.

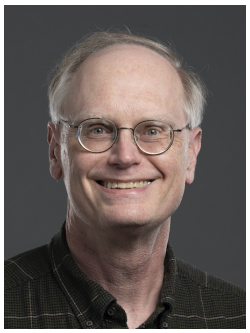
In another sabbatical project, Jim and Math/CS Professor Colin McKinney purchased a mid-level graphics processing unit (GPU) workstation for a GPU-computing and machine-learning project using the new fund created by Ken Crawford ('69). The goal is to develop expertise in highly parallel GPU programming as applied in two ways: data analysis and machine learning for simulation and particle identification.

Jim mostly took a break over the summer, spending several weeks in northern Michigan, enjoying lake sports and visiting with friends and family. He is looking forward to continuing the prototyping work with students in the fall.



Jill Keller continues serving as our Academic Administrative Coordinator for Physics and also Math & Computer Science Departments. She has been our AAC for five years now. This has been an especially busy year as she assisted the Math/CS Department with two tenure-track and one visiting position searches. With Physics, Jill continues to help with our on-campus speakers and our biweekly journal club meetings.

Over the summer Jill and her family went on a vacation to Orange Beach, Alabama, where they relaxed and enjoyed the beach. Her older son is now a junior in college and her younger son is a senior at Southmont High School.



Dennis Krause continued as department chair this past year. In the fall semester, he again taught PHY 111 (Physics I-Calculus) and PHY 315 (Quantum Mechanics). For the latter, he continued to tweak the quantum textbook he is writing, adding new chapters on qubits and quantum gates. In the spring semester, Gaylon Ross handed off his freshmen tutorial students to Dennis for EQ–Enduring Questions. Gaylon did a good job preparing these students as they held good discussions and the writing was much improved from the last time Dennis taught EQ. Also in the spring, Dennis taught PHY 112 (Physics II-Calculus) and taught four physics of music sessions for Prof. Makubuya's MUS 202 course.

Dennis was pretty busy outside the classroom. In November, he traveled south to DePauw to give the Monon Bell Physics Lecture on "Searching for Ultralight Dark Matter Forces." Then in April, he was invited by Zach Rohrbach ('12), the president of the Indiana Chapter of the American Association of Physics Teachers, to give the keynote lecture at their annual meeting at Indiana University Kokomo. He spoke on, "$E = mc^2$ and the Quantum Mechanics of Systems with Indefinite Mass," which highlighted work done by Zach and Inbum Lee ('16) while at Wabash. At the same meeting, he gave a short talk, "Entering the Forbidden Region: When a Part Can be Larger than the Whole," related to the work he did with Nikolai Jones ('24) last summer.

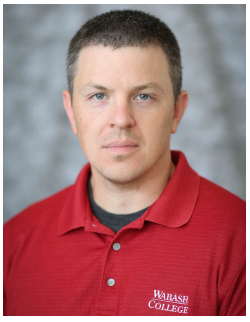
This summer, Dennis had two research interns, Evan Baldwin ('26) and Gus Sanchez ('26). Evan studied the nature of quantum entanglement, quantum correlations, and their application to fermions and bosons. Gus investigated how to create quantum entanglement and its destruction via quantum decoherence; the former has applications for detecting quantum gravity.

On the research front, Dennis continues to work on the derivation of the 2-axion exchange potential which is relevant to the search for ultralight dark matter.

This past year, Dennis published a single paper, with colleagues at Purdue,

- "Phenomenological implications of a magnetic 5th force," D. E. Krause, J. Bertaux, A. M. McNamara, J. T. Gruenwald, C. Y. Scarlett, E. Fischbach, *International Journal of Modern Physics A* **38**, 2350007 (2023).

One of the co-authors, Joseph Bertaux ('19), did key calculations in this paper as a physics graduate student at Purdue where he is continuing his work toward a doctoral degree in high energy nuclear physics.



Matt Roark enjoyed a full return to physics activities including the biweekly Journal Club in which the Department gathers to discuss the latest and greatest physics news, and Pi Day at the Crawfordsville Carnegie Museum. This year's Pi Day celebration saw the debut of a pair of acoustic levitators assembled and modified by Matt. Both kids and adults had a blast finding the trap nodes by levitating small styrene balls. Stop by next year for a unique and interactive lesson on waves and resonance!

Matt has also spent time working on and with his 3D printer. He completed a custom CAN Bus upgrade to improve wiring, and finished a 1000-hour tune-up. Matt continues to develop CAD (Computer Aided Design) software skills and has made over 60 models including tool accessories, storage organizers, aquarium equipment, and Christmas presents.

The above photo taken by Matt during his winter hiking trip shows that you can find lush green in nature, even in winter. Here rain and snow created a waterfall in February at Grey's Arch, Red River Gorge, Kentucky.

Gaylon Ross is entering his sixth year as Visiting Associate Professor in the physics department. The 2022-23 academic year was successful in a number of areas, with Gaylon's freshman tutorial course *Power for the People: Energy Resources in a Changing World* helping recruit several majors to the department. Students in this class were also his academic advisees, and he enjoyed spending extra time getting to know their backgrounds and goals and serving as a touchstone as they began their college experience. The

effort seems to have paid off, as the first-year retention rate for this cohort is well above the college average. Additionally, the PHY-101 Astronomy class has done a good job of attracting students to fulfill a distribution requirement in the physics department. Gaylon has held discussions with several top students from across the campus to ensure that the course fits well within the liberal arts framework while maintaining the appropriate rigor for a lab science class.

With regard to service activities, Gaylon coordinated our Sigma Pi Sigma banquet on April 26, 2023, with our local chapter inducting four new student members into the national honor society. He was faculty advisor for College Mentors for Kids, helping the student leaders regrow the mentoring program to include over 20 Wabash students and their Little Buddies at Hoover Elementary in Crawfordsville. He continued to serve as a member of Lilly Scholarship Committee, which selected three incoming freshmen to receive full scholarships to Wabash. And lastly, his participation in Wabash's Christmas Festival of Music & Readings has become an annual event, with him singing "O Holy Night" at last December's celebration.

The upcoming year holds lots of excitement, as Gaylon will be teaching an Astrophysics course for majors this fall along with his usual Astronomy class and labs. He hopes to use these courses to build anticipation for the total solar eclipse which will cross the campus on April 8, 2024. More information on the department's plans is included later in this newsletter.

Nathan Tompkins finished his sixth year as a member of the Physics Department and is looking forward to working with students on the new Physics 400 (Senior Seminar) this fall. This past year he taught Physics 110 (Physics II-Algebra), Physics 209 (Introduction to Thermal Physics and Relativity), Physics 310 (Classical Mechanics), and taught Physics 381/382 (Advanced Laboratory I/II) for the first time.

This past year Nate worked on creating cobalt hydroxide membranes in a microfluidic device while measuring the electric potential during material formation. This work with students Bryan Cherry ('24) and Aiden Orcutt ('24) will be used in a grant application to the NSF and described in a future publication. In the fall Nate intends to continue working on using microfluidic devices to study material formation and prepare these results for publication.

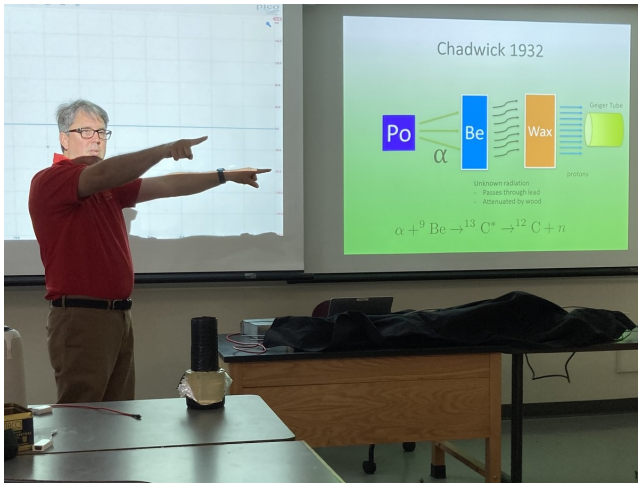
The microfluidic fabrication facilities within the Physics Department have continued to grow, adding a plasma chamber for PDMS bonding along with a new Zeiss 508 stereo microscope and a 24-bit data acquisition system. The Microfluidics Lab already includes two 3D printers, a combination CNC mill/laser cutter, an automated inspection microscope, data collection stereo microscope, rate-controlled fluid injectors, pressure-controlled fluid injectors, a planetary mixer for PDMS casting, PDMS curing oven, and vacuum chamber for degassing.

Nate had one publication that appeared since our last newsletter which he co-authored with Wabash Psychology Professor Karen Gunther:

- "Color Vision Deficiency and Teaching Electromagnetism," N. Tompkins and K. L. Gunther, *The Physics Teacher* **60**, 466–468 (2022).

This upcoming year Nate is looking forward to teaching the introductory algebra sequence again, working with the Advanced Lab courses again, and introducing the new Senior Seminar.

Professors Krause and Brown were recognized by President Feller at the annual Faculty & Staff Recognition Luncheon for their 25 and 20 years, respectively, of service to the College.



Professor Brown in action during his fall colloquium on his research using neutrons to study nuclei.

Student News

Graduating Seniors

Three physics majors (Michael Hoppel, Sam North, and Elijah Scurlock) and two minors (Zennon Wilhelm and Chris French) graduated this year. In addition, Hamza Moudden and Yuhao "Jerry" Jiang completed their degree requirements by participating in the dual-degree engineering programs at Washington University in St. Louis and Columbia University, respectively.

After Wabash, Michael Hoppel is joining The Walsh Group - Walsh Construction & Archer Western, while Sam will be putting his theater production experience to work on Royal Caribbean cruise ships. Finally, Elijah is entering the Ph.D. program at Florida State University to study nuclear physics.

On the Goodrich steps after graduation: In the front row (left to right) are Hamza Moudden, Sam North, Elijah Scurlock, and Michael Hoppel. In the back row are Profs. Krause, Ross, and Brown. Unable to join them were Yuhao Jiang and Prof. Tompkins.

The annual senior dinner at Creekside Lodge: Clockwise from the left are Matt Roark, Prof. Tompkins, Prof. Brown, Sam North, Elijah Scurlock, Prof. Krause, and Michael Hoppel.

Awards Chapel

At this year's Award Chapel, we had two worthy winners of the Fuller Prize for the most outstanding junior physics major, Gabe Cowley and Fardin Hoque. Both received the *Feynman Lectures in Physics* from Prof. Krause. Elijah Scurlock also received "Distinction" on his physics comps, and Fardin Hoque was inducted into Phi Beta Kappa as a junior. Finally, demonstrating that our majors are true students of the liberal arts, senior Sam North won the Kenneth W. Kloth Design and Technical Theater Award. Congratulations to all!

Juniors Gabe Cowley and Fardin Hoque receiving their Fuller Prizes from Prof. Krause.

Fardin Hoque ('24) at the Phi Beta Kappa induction ceremony.

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https://www.facebook.com/WabashCollegePhysics

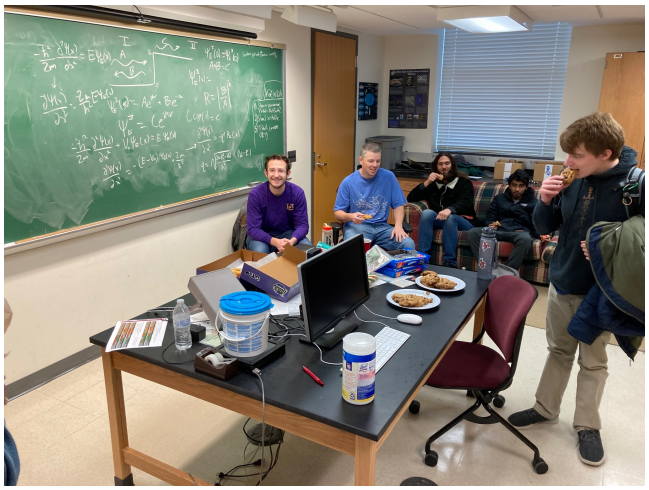
Sigma Pi Sigma

At a banquet with the Department in Trippet Hall emceed by Prof. Ross, four outstanding junior physics majors were inducted into the physics honor society Sigma Pi Sigma. Below top: Prof. Ross, Gabe Cowley, Fardin Hoque. Below bottom: Nikolai Jones, Thomas Joven, and the group.






Cookies…and Comps



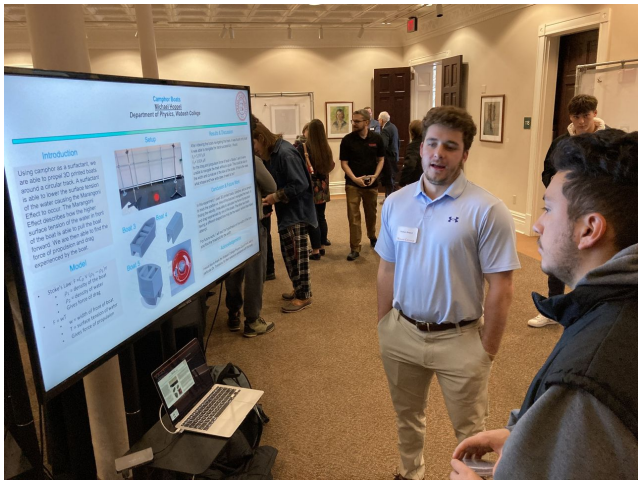

On the left, students, faculty, and staff enjoy cookies at our weekly Thursday Cookies at 4:00 in the Society of Physics lounge. However, Wabash is not all fun and cookies. On the right, seniors Elijah Scurlock, Michael Hoppel, and Sam North work through their physics comprehensive exams.

January Celebration of Student Research, Scholarship, and Creative Work

The year's annual Celebration of Student Research, Scholarship, and Creative Work in January showcased work by several groups of physics students. The program booklet which contains the abstracts describing the work in more detail (along with that done by all the other Wabash students) can be found at:

https://www.wabash.edu/ugresearch/docs/2023_CelebrationEvent_ProgramBook2.pdf

Nikolai Jones ('24) gave the short talk, "Comparing Classical and Quantum Decay Rates of an Unstable Particle in a Barely-Bound State of a Finite Square Well," on the work he did with Prof. Krause last summer.



Michael Hoppel ('23) explains his poster, "Camphor Boats." In this advanced lab project, Michael designed and fabricated small boats powered by camphor, and measured their performance.

Bernardo Morales ('24) discusses his poster, "Aerodynamics: Measuring the Downforce of a Custom Rear Wing in a Wind Tunnel," which covers his advanced lab project.

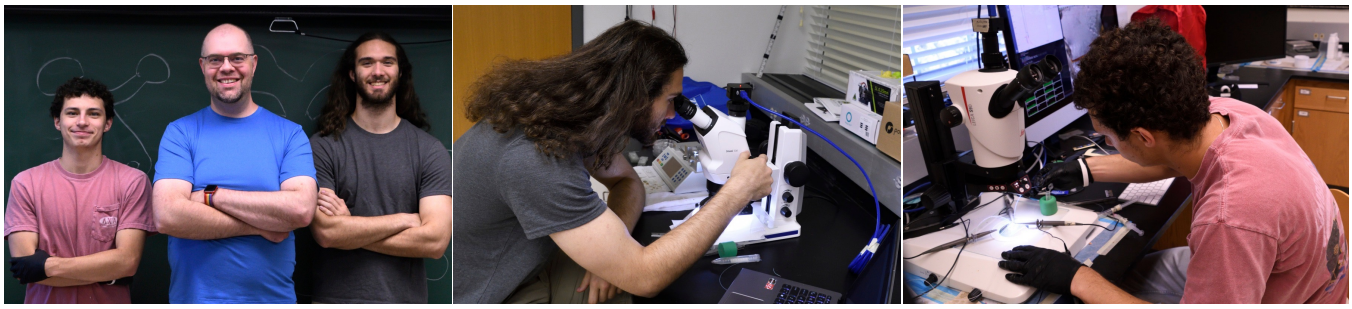
Bryan Cherry ('24) and Nikolai Jones ('24) answer questions on their poster, "The Frequencies that Comprise the Wabash 'W' " which presents their advanced lab project involving Fourier microscopy.

On-Campus Summer Research 2023

This summer, we had two groups of summer interns working with faculty for 8 weeks. As part of the internships, they held weekly Friday group meetings to discuss progress, and faculty had students over to their homes for cookouts. The research projects were grouped around experimental microfluidics and theoretical explorations on the nature of entanglement:

Microfluidics

Professor Tompkins' students Aiden Orcutt('24, center) and Bryan Cherry ('24, right) designed, fabricated, and characterized microfluidic devices.



Quantum Entanglement

Professor Krause's students Evan Baldwin ('26, center) and Gus Sanchez ('26, right) investigated the intricacies of quantum entanglement.

Off-Campus Summer Research

Several of our students found off-campus internships this summer. Here are some that were more physics-related:

- Hailemariam Ayalneh ('26) received a U.S. CMS PURSUE (Program for Undergraduate Research Summer Experience) internship. He had the opportunity to work on data analysis, employing various Python libraries like Pandas, NumPy, and SciPy to process and manipulate large datasets. He was also able to learn different machine-learning techniques. They used the CMS Open Data, specifically $Z \rightarrow$ di-electron decays, to create an unbiased, high-purity, electron sample for measuring the efficiency of specific selections or triggers.
- Spencer Phillips ('25) worked with a project manager at Tri-Tech Construction at the new DeFouw Nissan Dealership construction site in Lafayette. His time was spent learning about all sides of construction, including the labor, engineering, and business aspects.
- James Szalkie ('25) recieved an NSF REU internship at Purdue University where he worked with Prof. David Nolte's optics group. During the first part of his internship, James began setting up a laser to detect sound waves in motion as they traversed a block of lucite, but he encountered technical issues with the laser. He spent the rest of the summer devoted to Professor Nolte's novel approach to imaging biological samples under treatment. Using a coherent light source, a Fourier plate, and a Fresnel biprism, they are able to take scans of samples and record their movements.

Pi Day: Physics at the Museum

Society of Physics Students and Math/CS students turned out on a very cold Saturday afternoon in March to show off physics demonstrations and math activities for Pi Day at the Crawfordsville Carnegie Museum. Everyone had a great time, as you can see.

April 8, 2024 Eclipse

On April 8, 2024, a total solar eclipse will pass through North America from Mexico to Canada, and Wabash College is gearing up for the occasion. Although the campus is just barely inside the path of totality, we will experience approximately one minute of totality. This will be the first time a total eclipse has crossed Crawfordsville since 1806, before the college's founding in 1832. The next total eclipse won't occur at our location until 2153, so we are planning numerous activities to involve the entire campus in "Bashin' the Eclipse", which is truly a once-in-a-lifetime event.

With the support of the President's office, the Physics Department has already purchased 1000 pairs of eclipse glasses. The Department has two SunSpotter solar telescopes which project an image of the Sun (rather than using an eyepiece) for safe and easy viewing by multiple persons simultaneously. In addition, we have a Coronado Personal Solar Telescope for observing the Sun at the H_α-wavelength, which is ideal for viewing the chromosphere during totality. And lastly, we have other astronomical telescopes which can be fitted with solar pre-filters, resulting in lots of options for viewing the progression of the eclipse. In case of cloud cover, we also plan to have several classrooms across campus reserved for viewing the eclipse as it crosses various remote locations along the eclipse path.

To make this a truly "liberal arts" experience, we are in the process of organizing a series of eclipse-related sessions across campus the week or so prior to the event. Gaylon Ross will be providing a public talk on the physics of eclipses, and we are in discussions with other members of the Wabash community.

Alumni News

Updates

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

- **Ernest Henninger ('55)** donated a photo of the 1913 Machester University (UK) Physics Department that he received while on sabbatical leave at Manchester in 1989. It now hangs in Goodrich 305, where we teach the courses in which some of those shown appear. Henninger received his Ph.D. in physics from Purdue in 1966, and then was a physics professor at DePauw University 1968-1998. Interestingly, Henninger's wife Melva spent more time at Wabash than he did, conducting biology research with Tom Cole and Aus Brooks.
- **Bob Jones ('63)** informed us of the recent passing of his friend **Tom Gaisser ('62)**. After graduating from Wabash, Tom went on to become "a giant in the fields of cosmic-ray physics, particle astrophysics, and multimessenger astronomy who supported and inspired his colleagues and the next generation of scientists." A complete obituary was published in the May issue of Physics Today:
  https://physicstoday.scitation.org/doi/10.1063/PT.3.5006
  Bob and Tom were both Marshall Scholars in the United Kingdom. While Tom returned to the United States, Bob remained in the UK at Queen Mary, University of London, for his entire career as a theoretical physicist.
- **Gary Wollenweber ('74)** received the Military Sensing Symposia (MSS) 2022 Goodell-Pollock Memorial Award for Distinguished Service in recognition of noteworthy contributions to the field of infrared radiation countermeasures (IRCM). In the IRCM community, IR suppression is considered one of several types of IRCM. Gary has presented multiple suppression papers at the annual IRCM symposia and co-chaired the annual symposium program committee for over two decades.
  About 2-1/2 years ago GE Aviation reorganized and separated the military business, of which Gary is a part, and called it "Edison Works." The branding is similar to Lockheed-Martin's "Skunk Works," Boeing's "Phantom Works," and Rolls-Royce's "Liberty Works." Recently GE is splitting into three companies with GE Aviation and Edison Works being recombined into GE Aerospace. Gary has been told the Edison Works branding will remain.
- **Hup Chan ('78)** spent 3 years at Wabash as a Physics major and became good friends with Pat Conroy ("78) and Larry Norris ('78) since their freshmen year in 1974. They have managed to stay in touch over the years and succeeded in having their infrequent reunion in between. Wabash being a small school provided them with an opportunity to know each other very well.
  After his junior year at Wabash, Hup transferred to Purdue and finished with a BSME. Right after graduation in 1979, he returned to Malaysia where his parents and siblings lived. He found work with an American semiconductor company (Advanced Micro Devices) for 3 years. His role there was an Assembly Process Engineer where he worked with Production/ Quality Control / Production Control departments to ensure efficient manufacturing and delivery to the customers. "Apple was their early customer and back then nobody had any idea what Apple was and they worried about Apple not being able to pay their bills since at one point they almost went under!"
  After three years of working for AMD, their corporate office in Silicon Valley had a job opening and they relocated Hup to Sunnyvale, California, where he worked as a Manufacturing Coordinator and had responsibilities to work with all the AMD offshore manufacturing plants (both in-house and external subcontractors) in Malaysia, Singapore, Taiwan, Korea, Japan, Thailand, China and the Philippines. His work required him to audit the various manufacturing plants and he was on frequent business trips to resolve manufacturing issues. Those issues typically involved materials/equipment/human resources which had a major impact on the quality and reliability of the semiconductors.
  Hup stayed with AMD for 8 years and later on he moved to various semiconductor companies in Silicon Valley. He eventually rose up to mid-level management positions before he retired in 2014. At one point in his career, he was also doing technical sales for a company which involved utilizing his technical knowledge to talk to American/European and Asian customers and providing them with different semiconductor packaging options.
  "I have retired from active professional work and live in San Jose with my wife. Trying to stay healthy through physical exercise is what keeps me busy these days. Other than that, I am also helping with babysitting my granddaughter in San Francisco."
- **Patrick Conroy ('78)** told us that Profs. Henry and Easterling were influential for him. In addition to his physics major, he obtained a teaching minor and taught high school physics (among

other classes) in Frankfort, Puerto Rico, Massachusetts and Mexico for 7 years. He then went back to college and graduated with a BS in Civil Engineering from Montana State University. While he was in his second internship, he read about an engineer who performed diving (scuba) inspections of bridges, piers, wharves, water tanks, nuclear facilities, etc. Pat called him up and asked if he could become an engineer-diver. For the next 30 years, he traveled the world on Navy Bases, working for Departments of Transportation, including Ireland.

Pat was always drawn to teaching and ended up instructing other engineers how to inspect bridges through the National Highway Institute/Federal Highway Administration and the companies that he worked for. He also became a private pilot and a certified flight instructor to keep the instruction fires burning. He retired from diving, and started a business performing Manufactured Home Inspections where he obtained Professional Engineer licenses in 45 states. The business has been very lucrative so that he and his wife could enjoy RVing around the country while running the business. He has owned and flown 5 different airplanes over the years and continues to teach and enthuse others in aviation.

- **Larry Norris ('78)** joined Hup Chan ('78) at Purdue University after completing is physics degree and business area of concentration, and graduated in 1980 with a MS in mechanical engineering. He thought he'd found his dream job in 1980 when he was hired for a summer internship at the General Motors Proving Grounds in Michigan, where he performed vibration and acoustical tests on prototype cars. Having grown up in Indy, and being a huge Indy 500 fan, he always wanted to work for GM. Unfortunately, by the end of that summer internship, GM was cutting heads (due to the recession and growing competition from Honda and Toyota). So when he graduated from Purdue the following semester, he transferred to GM's Allison Gas Turbine Division in Indianapolis, which manufactures turbine engines for both military and commercial customers. After a 40-year career with Allison, which later became Rolls-Royce Inc., he retired last year. His career included stints as a stress engineer, vibration test engineer, and technical support representative based in Dallas (2 years) and England (3 years). He also spent a year in Sweden at Saab Aircraft flight testing a new 50-seat turboprop aircraft. Ultimately he decided to transition out of engineering into the financial side of the business, and went to IU and obtained an MBA degree in finance. The most interesting and exciting part of his career was when many of the world's airlines started buying 34-50 seat regional jets and turboprop aircraft in the late 90s and early 2000s. Rolls-Royce/Allison had developed the perfectly sized engines for these markets, and he was involved in the contractual negotiations and sale of thousands of these aircraft and engines and their highly profitable maintenance contracts. He enjoyed being one of the few people (jack of all trades) who could communicate between all the various technical, financial, and legal experts involved in these huge multi-million dollar deals. That was a long way from his physics education at Wabash!

  Larry is now recently and living on the North side of Indianapolis. "I play a lot of golf, and keep in touch with both Hup and Pat, and a few of my Delta Tau Delta fraternity brothers from Wabash. I obtained my real estate broker's license about 20 years ago, and I still occasionally help friends and former coworkers buy or sell houses when asked. I'm also trying to make up for all lost time studying too much while attending Wabash and Purdue, and try to attend as many rock concerts as possible. We didn't get many concerts in Crawfordsville 'back in the day' and I missed all of those great 70s bands! I also volunteer as a usher at the Palladium in Carmel, where I get to see concerts for free in return for some minor unpaid work. I'm also hoping to become a 'snowbird' this winter and disappear to either FL or AZ to avoid the cold winter months in Indy."
- **Jon Button ('05)** was promoted to Lab Chief for the Radiation Lab here at CDC. The Radiation Lab is part of the Inorganic and Radiation Analytical Toxicology Branch of the Division of Laboratory Sciences within the National Center for Environmental Health. Broadly, their mission is to evaluate how environmental exposures impact human health. The Radiation Lab provides clinical laboratory support during the federal response to a radiological or nuclear emergency or incident. They have developed a number of methods capable of screening, identifying, and quantifying 22 priority threat radionuclides using 6 different analytical technologies; a mix of radiation counting and mass spectrometry techniques. The methods are unique to radiation measurement laboratories because they are validated and approved for the clinical reporting of patient results. They report measurement results of radioactivity concentration in patient urine, and their Health Physicist partners within CDC use the results and certain patient data in order to calculate an effective radioactive exposure dose and the expected additional lifetime risk of developing tumors or cancers as a result. These data can be used to guide decisions by public officials

regarding prioritization of scarce medical countermeasures, future health screenings, long-term public health studies of radiation effects, and population biomonitoring.
As Lab Chief, Jon will be directing their method research, development, and validation programs and collaborating with state, local, and federal partners to improve preparedness and response to nuclear and radiological emergencies.
For more detail, you can look at one of Jon's journal articles that was just recently made freely available: "Rapid HPGe Well Detector Gamma Bioassay of 137Cs, 60Co, and 192Ir Method": https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8312759/.

- **Rabin Paudel ('10)** rejoined Intel in Oregon last year as a software research scientist after spending 4 years as an optical engineer at ASML in San Diego. He is working in a group which uses computational lithography techniques to improve resolution for future Intel products. It's a slight change in career for him since so far he had been mostly focused on experimental physics or hardware engineering. This job has aspects of software engineering, data science and computational modeling. He's enjoying this new role so far and the life in Oregon!
- **Zach Rohrbach ('12)** completed his term as president of the Indiana section of the American Association of Physics Teachers.
- **Yijun Tang ('12)** dropped by the physics department during the first week of classes. After receiving his Ph.D. in physics from Stanford University, Yijun went on to work for Argo AI where he is a senior software engineer developing Lidar technology for self-driving cars.
- **Jia (Alex) Qi ('15)** completed his Ph.D. in astrophysics at the University of Florida. His dissertation was entitled, "Simulating Galaxies with Explicit Interstellar Medium and Stellar Feedback Models." He's now moving to Seattle where he will be a software engineer at Amazon, working with a team of economists to build tools for sales and pricing analysis. Congratulations, Alex!
- **Andrew Rippy ('22)** sent a note to tell us he is enjoying his first year of graduate school in computer science at Carnegie Mellon and loves Pittsburgh.

We apologize to anyone we missed, and for mspellings or other mstakes 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.

Alumni Colloquium

Dr. Jon Button ('05) joined us virtually from the Centers for Disease Control for our final physics colloquium of the semester. He gave a great presentation describing the work done at the CDC's radioanalytical lab where he is a lab chief. He also discussed how his Ph.D. in nuclear physics from Texas A & M and what he learned at Wabash led to his rapid advancement at the CDC.

1913 Manchester University Physics Photo

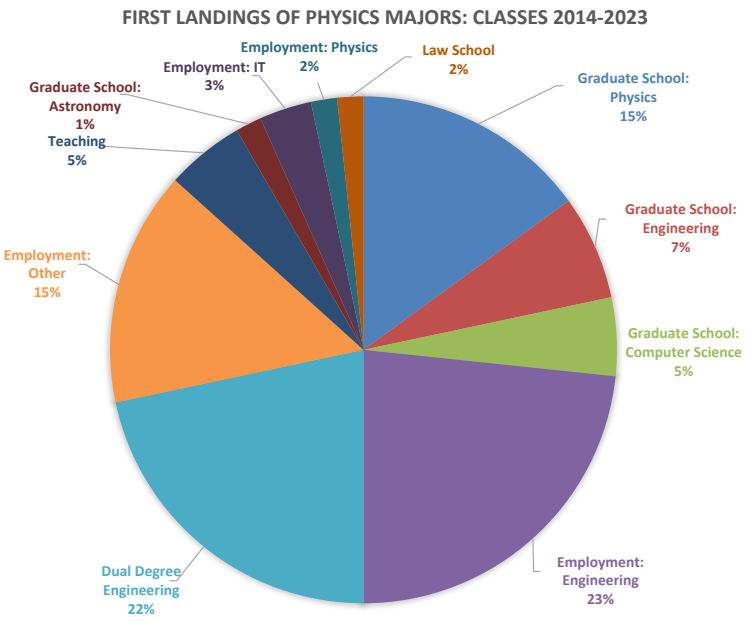
Faculty and staff photo of the 1913 Manchester University (UK) Physics Department donated to the Department by Ernest Henninger ('55). It depicts some famous physicists including Ernest Rutherford (Chemistry Nobel 1908) and James Chadwick (Physics Nobel 1935). The photo now hangs in Goodrich 305.

What can you do with a physics degree from Wabash?

Some Graduate Schools and Companies Accepting/Hiring Recent Majors

Stanford University
University of Colorado
Purdue University
Indiana University
New York University
U. of Oregon
U. of Minnesota
U. of Notre Dame
U. of Michigan
Michigan State U.
U. of Cal., Santa Barbara
U. of Southern California
Carnegie Mellon U.
Auburn U.
U. of Mass.-Amherst
Florida State U.

Apparatus
Axiom
Rahal Racing
ELANCO
Walsh Construction
Epic
Trans-United
Rolls-Royce
Backstop Solutions
Peerless AV
J.P. Morgan Chase
FAAC, Inc.
F. A. Wilhelm
Quest Global
Ontario Systems
RQAW



Thank you for your support!!!

The Physics Fund is a special fund established specifically to support physics student-faculty research at Wabash. In the past, we have used this fund to purchase laboratory equipment and provide summer internships—we never want to turn away an eager student!

We thank Jim Clynch ('67) and Dennis Henry ('67) for establishing funds which supported two research interns this summer and Kenneth Crawford ('69) for the fund that supported the GPU computing project of Prof. Brown. We especially thank the Rippy Family for their fund that will support students in the coming year:

https://giantsteps.wabash.edu/?pagetype=news&news_ID=13128

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