



Physics

Message from the Chair

This year marks a big change for the Department of Physics as we roll out major revisions to our introductory physics courses. Following a growing trend nationwide, the department will transition its calculus- and algebra-based first-year courses to studio style instruction.



In the studio classroom, students will no longer have separate laboratory and lecture experiences.

Rather, there will be a single, combined experience with a wide variety of learning activities. This innovative pedagogical approach to teaching eschews the traditional lecture and lab format, fostering a more engaging learning environment where students actively participate in a variety of exercises, mini-lectures, example problems, hands-on demonstrations, lab activities, and group work. And it works! Student learning, topic mastery, and content retention all improve when adopting the Studio Physics format.

The transition to studio instruction has been supported

through a number of generous gifts to the college. The teaching infrastructure was funded by a gift from the Vitek family and allowed for a complete overhaul of our instructional technology. It is now possible for the two introductory lab spaces in Palenske Hall to be used as a single instructional space. Additionally, new furniture was purchased for the laboratory with proceeds from former faculty member Aaron Miller's grant activity. As such, we have flexible spaces that can accommodate up to 24 students.

This is an exciting time for the department. We believe strongly that this new form of instruction will better prepare students for careers in physics, engineering, astronomy and medicine, improve retention, and increase student engagement.

Charles Moreau, Chair
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Palenske 323



Palenske 321



Faculty News

David Seely

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David continues to do research at Oak Ridge National Laboratory (ORNL) in Tennessee. He had a co-authored paper published in the May, 2017 issue of Physical Review A (**D G. Seely**, V. M. Andrianarijaona, P. C. Stancil, D. Wulf, K. Morgan, D. McCammon, M. Fogle, and C. C. Havener, "Line ratios for soft X-ray emission following charge exchange between O8+ and Kr," Phys. Rev. A. **95**, 052704 (2017)). Additionally, two joint-author contributed papers and a poster were presented at the 25th International Conference on the Application of Accelerators in Research and Industry (CAARI) in August, 2018 (see www.caari.com). Recent graduate Leanne Wegley, '18, traveled to ORNL on several occasions to do research that was supported by FURSCA with additional support from the David and Dorothy Kammer fund. Leanne also attended the CAARI conference and was joint author on some of that work.

David was on leave during the spring semester but is back to full-time teaching this semester. He currently is teaching the introductory algebra-based mechanics course for life-science majors and the second-year electronics course for majors. He is again working on the college's reaffirmation of accreditation effort.

Phil Voss

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I am starting my third year at Albion College and am really in the swing of things: between teaching some fun classes, engaging in committee

work, setting aside time for pedagogical development as part of the CIC Consortium for Instructional Excellence and Career Guidance, and my research, the weeks just fly by!

I am particularly excited to report that this fall we've begun teaching our introductory physics course sequence for scientists and engineers (PHYS 167 and 168) in the Studio Physics format. Rather than a specific pedagogical technique, Studio Physics is more of an approach to teaching that stresses space and methodological flexibility. Swing by my class at any time and you'll be just as likely to see students on the floor with laptops and Bluetooth kinematics carts as in their chairs taking notes, conducting an experiment with partners on wave motion as gathered around my bench watching me get wet during a hydrostatics demonstration, and working through example problems quietly as using their smartphones to answer conceptual questions posed on the board. This transition could not have been possible without the new furniture, computers, and demonstration equipment that have transformed Palenske 321 and 323.

In addition, I am teaching the first semester of introduction to mathematical methods (PHYS 243) with a great group of physics and pre-engineering students. (A similar course at Central Michigan University was one of my personal favorites as an undergraduate.) Finally, I have blended internal and external speakers with a special focus on career skill building in our seminar course (PHYS 191/291). Students are learning to create eye-catching resumes and cover letters in LaTeX, how to use our library's research resources to the fullest extent, and the nuances of scientific presentations in both poster and talk format.

In 2017, I published an article in Physical Review C: "Doppler-shift attenuation lifetime measurement of the ^{36}Ar

$^{2+}$ level". This paper represents the culmination of my postdoctoral work at TRIUMF, Canada's national laboratory for particle and nuclear physics. There, I was part of the design, construction, and initial scientific investigations of the TIGRESS Integrated Plunger. "TIP" is a specialized piece of equipment that allows us to measure ultra-short nuclear lifetimes on the order of 1 picosecond (one-millionth of one-millionth of a second!)

On the local research front, I have spent a large portion of my first two years upgrading the gamma-ray spectrometer and associated laboratory equipment. The detector will be moved in the near future from its current location in the Dow Analytical Science Laboratory to a larger research space in the basement of Kresge Hall. (The spectrometer's shield weights nearly two tons, so moving it has turned into quite a project!) In my Kresge lab, I have built up a pair modernized digital data acquisition systems, upgraded most of the electrical hardware, replaced some cryogenic lines, and purchased new supporting equipment such as radioactive sources. The most recent additions are a small vacuum system and a new silicon detector to permit alpha-gamma coincident spectroscopy and a large scintillator crystal that will form the basis of a student-built muon veto detector. This veto detector will complement the passive shielding of the spectrometer's lead enclosure and a freshman, Jordan Mason, will begin working with me this fall as a Student Research Partner. All this hard work is worth it; the spectrometer detects high-energy photons (particles of light) with good efficiency and excellent energy resolution. Detectors like it are used in a wide variety of applications from basic nuclear physics, to medical oncology, to spotting forgeries in the world of old wine, and national defense and stockpile stewardship. It will be a great tool to work with alongside Albion undergraduate students!

Nicole Zellner
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I was promoted to Full Professor in 2017 and I am currently on sabbatical for the 2018-2019 academic year. As usual, I've been busy with various research and education activities. My work with lunar impact glasses resulted in a high-impact manuscript (<https://www.ncbi.nlm.nih.gov/pubmed/28470374>) that received national attention (<https://www.nature.com/articles/d41586-018-01074-6>), and I continue to update the data to see how they can be applied to understanding conditions on the early Earth. My Phys 105 (Introductory Astronomy) video project continues to be popular: since Fall 2008, 140 videos have been created, involving 356 Albion College students, 75% of whom were registered for the class. I've written up that project in a manuscript that will be published in December 2018 in the *Journal of Astronomy and Earth Science Education*, and a short summary will appear in the December 2018 column Astro Notes (in The Physics Teacher). You can watch the "People's Choice" award-winning videos at <http://campus.albion.edu/nzellner/teaching/>.



Nicolle at the high site (16,500 feet) of the Atacama Large Millimeter/Sub-millimeter Array (ALMA), in Chile.

During sabbatical, I've already traveled to Chile (where I toured a few NSF-funded telescopes), Hawaii, and Germany, and I plan to travel to Arizona, Massachusetts, Australia, Florida, Texas... and places in between. Follow me on Twitter at @astrodiva to keep up with my adventures!

Holly Sheets
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I am new to the department this year as a visiting assistant professor. I am excited to be in Albion, as I grew up and attended college in similar small towns in central Pennsylvania. I am currently teaching Phys 105 (Introductory Astronomy) and two sections of the Phys 115 (General Physics) lab.

I graduated from Gettysburg College with a BS in physics, and I am a member of Phi Beta Kappa. I then completed an MS in physics at Dartmouth College, followed by an MS and PhD from the University of Maryland in Astronomy. Prior to arriving in Albion, I was a Trottier Postdoctoral Fellow at the McGill Space Institute, at McGill University in Montreal, Quebec.

My research focuses on transiting exoplanets. I use data from space-based telescopes to characterize the atmospheres of these planets by determining how light is reflected, emitted, and/or refracted by the planet. I have an extensive background with ground-based observations as well, and I look forward to using the historical Alvan Clark refractor here on campus as well as the rooftop observatory to share the skies with students and the public.

Alumni News

On the first operational mission to the International Space Station, Sunita Williams and Josh Cassada, '97 Albion College Graduate, would fly for Boeing.

READ MORE: https://www.washingtonpost.com/business/2018/08/03/nasa-unveil-astronauts-who-will-relaunch-human-flights-us-soil/?utm_term=.f49c99ffb200&wpisrc=al_news_alert-economy--alert-national&wpmk=1

Advice for Physics/Pre-Engineering Majors/Minors from Alumni:

Joe Pinkerton, '89, I would encourage physics students to pursue the joint program (talk to a current faculty member). Even though I dropped out of Columbia to start my first tech company, the prestige of having attended a top ten university really helped me (when raising venture capital, taking one of my companies public, etc.).



Back row, left to right: James Stanulis, Dr. Seely, Ashton Timmons, Dr. Voss, Kevin Claucherty, Jack Lhamon, Antoniu Fodor. Front row: Dr. Zellner, Oana Vesa, Leanne Wegley James Wong.



2017 Solar Eclipse

On August 21, 2017, faculty, staff, students, and members of the community viewed the Great American Solar Eclipse on campus. The viewing event was hosted by the Albion College Astronomy Club and the Physics Department; over 2000 pairs of solar eclipse glasses were distributed. The day proved to be clear and the partial eclipse (~90% coverage) was enjoyed by all. We're looking forward to the next one on April 8, 2024!

Read more about the 2017 eclipse viewing at www.albion.edu/academics/departments/physics/department-news/13631-hundreds-gather-on-campus-to-watch-solar-eclipse



2016-2017 & 2017-2018 Award Winners

Rood:

Kelsi Inman (16-17)
Antoniu Fodor (17-18)

Tabor:

Claudia Crake (16-17)
Kelsi Inman (17-18)

Ricker:

Oana Vesa (16-17)
Antoniu Fodor (17-18)

Alumni/Faculty Physics:

Erik Davis &
Jenna Voorman (16-17)
Oana Vesa (17-18)

Pettersen:

Ray Cook (16-17)
Jeremy Russikoff (17-18)

Kammer:

Oana Vesa (16-17)
Oana Vesa (17-18)

Walton:

Zachary Hubbell &
Jayden Butler (16-17)
Oana Vesa (17-18)

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