Summer 2018

CrossSections, Summer 2018

University of Northern Iowa. Department of Physics.

CROSSSECTIONS

SUMMER 2018

A MESSAGE FROM THE DEPARTMENT HEAD, DR. PAUL SHAND

It is a pleasure to be able to report on happenings in the Physics Department as well as across UNI for the 2018 edition of Cross Sections. I'll start with the wider view at the university level.

During the 2017-18 academic year, there were many events that were of significant importance to the entire UNI community. I'll mention a few of them here. First, the university has started its preparations for the decennial reaccreditation process. The accrediting body is the Higher Learning Commission (HLC). A Steering Committee has been formed, along with several subcommittees that will be responsible for various aspects of the accreditation process. A major focus will be assessment of student learning, which was identified as an area needing improvement in the last reaccreditation process. The emphasis on assessment has led the Physics Department (and other academic departments) to completely revamp program assessment procedures, which I believe will lead to better student outcomes.

The provost has undertaken a multiyear process to reform the General Education program (currently called the Liberal Arts Core or LAC). A committee has been formed to direct and coordinate the process of revising the program. Ultimately, the new program will consist of 36 credit hours of coursework, substantially shorter than the current 45 credit hours. Undoubtedly, students will cheer but some departments that have heavy teaching commitments in the LAC are expressing concern.

A faculty evaluation committee has also been constituted and charged by the provost to develop a comprehensive evaluation process for faculty across the university. The main elements are: (i) the definition of faculty workload (the weighting of teaching, research, and service and what contributes to each category) and (ii) university-wide evaluation procedures for annual review, tenure, promotion and post-tenure review. Yours truly is a member of this committee and I can tell you that it has not been a walk in the park on a warm summer day. The committee has held several forums to elicit feedback from faculty and we learned, among other things, that some people have strong feelings about some of the proposed changes. However, progress is being made and the committee expects to complete its work by the end of the fall 2018 semester.

On the departmental front, I will begin with the departure of faculty member Rui He, who was an associate professor of physics. Rui resigned her position at UNI last August and took a position as associate professor of electrical engineering at Texas Tech University. Rui was an exceptionally productive physics faculty member. As you might recall, she was the first faculty member in UNI's history to have been awarded a prestigious CAREER grant by the National Science Foundation. We wish Rui well in her new position.

One of our majors, Joseph Tibbs, made us proud by earning an Honorable Mention in the highly competitive national Goldwater Scholarship competition. This is an especially noteworthy achievement given that Joseph is just a sophomore. This summer, Joseph will be participating in a Research Experiences for Undergraduates (REU) program at Yale University, where he will likely be conducting research in the area of computational biophysics. Over the past 6 years, two previous physics majors, Corey Cooling and Lucas Beving, have participated in summer research programs at Ivy-League universities (Columbia and Princeton, respectively).

In the area of curriculum, we are moving forward with a new data science emphasis in our B.A. degree program. Data science is a burgeoning field that includes big data, data

analytics and other similar data-centric occupations. In addition to physics and calculus, the new emphasis incorporates introductory and advanced statistics as well as business analytics. If all goes well in the curriculum review, the B.A. Physics: Data Science Emphasis program should be ready to enroll students in Fall 2019.

You will also be interested to learn that under the leadership of new co-presidents Taylor Harris and Joseph Tibbs, the Physics Club has completely rewritten its bylaws and have undertaken a top-to-bottom reinvigoration program. The Club has already bought a "new" sofa for the Physics Majors' room. The sofa was generously sponsored by alumnus Kevin Junck, whom you will read more about in this issue.

I'll end this message on a note of gratitude. You, our loyal alumni and friends, have been very generous to the Physics Department over the past year. Your gifts continue to support undergraduate research fellowships and scholarships for our students. Thank you for your kind support and I hope you will continue to invest in our students. As always, please stop by the Physics Department for a visit if you are in the area. In fact, you have the perfect reason for a visit – our annual Homecoming Picnic on October 20, 2018. I hope to see you there!

Dr. Paul Shand
Professor and Head of the UNI Department of Physics

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FACULTY PROFILE: LAWRENCE ESCALADA

Lawrence Escalada
Professor of Physics and Science Education

One of the things that drew Lawrence Escalada to UNI was the balance between physics, education and programming that aligned perfectly with his background. Escalada received bachelor's degrees in both and Physics and Education, a Master of Science in Physics, and finally a doctorate in Curriculum and Instruction—Physics and Science Education, all from Kansas State University. Because secondary education majors are within their respective departments at UNI, being a physics professor allows him to teach both physics classes and secondary science methods courses. "What I found to be very attractive about UNI is that it allows me to teach the subject that I love, but also that I can focus in on what it takes to be a good science teacher," Escalada explained.

His love for physics and science education has been evident from the beginning of his college studies, and he gets to interact with both subjects as the current Chair of Science Education at UNI. Escalada has been at UNI since 1997, but before coming here he taught high school physics in Kansas. He uses that experience, as well as current experiences from teaching introductory physics at UNI, to shape his teaching of the secondary science methods courses. He can observe problems and difficulties that his physics students have in real time and relay them to his soon-to-be science educators so they are prepared for real-world teaching and come ready with solutions.

When asked if he could pick a favorite between physics and education, Escalada says he wouldn't want to, because they both work together. Introductory physics is sometimes a challenge to show students the relevance to their daily life and spark an interest in something they haven't been exposed to before. But doing so keeps him fresh and allows him to share the experiences from his teaching with education students also headed out to introduce students to physics for the first time. "I really like that I can teach the content courses, so then when I teach my methods course, I know what I'm talking about. It would be very difficult to do one without the other," says Escalada.

His integrated passion for physics and science education also manifests itself in his heavy involvement in research and professional development. Much of Escalada's research is on developing curriculum like the PRISMS PLUS program. PRISMS stands for Physics Resources and Instructional Strategies for Motivating Students and is a comprehensive curriculum designed to generate interest and enthusiasm in both students and teachers. This combats a problem many schools are facing; the output of physics teachers is not meeting demand, so someone with a biology or chemistry background might be teaching all of the science classes. Escalada has also worked as supervisor of the Science Education Resource Center, known as the SERC, providing K-12 curriculum and kits to UNI faculty, students, and current teachers in the Central Rivers AEA and overseen workshops and summer instruction for teachers needing continuing education for a physics endorsement.

An additional part of Escalada's activities outside of the classroom are outreach opportunities, enriching both his current students and local high school students. Coordinating the State of Iowa Physics Competition at the McLeod Center encourages a passion for physics among high schoolers, while giving real-word experience to Escalada's students as they volunteer at the event and help with competitive projects such as building a mouse trap car and a toothpick bridge. The teaching majors absorb methods and strategies to help them after they graduate and go on to teach physics classes of their own.

Esclada's work has not gone unnoticed. He's received both the UNI Regents Award for Faculty Excellence and the UNI Ross A. Nielson Professional Service Award for his efforts. In addition to his published curricula, his writings have been published in numerous journals, and he's spoken at conferences across the nation.

Current endeavors for Escalada include working on a National Science Foundation project to set up an online collaborative community where faculty can help each other with problems as they implement a new curriculum. He serves as a mentor providing guidance for other faculty instructors, incorporating some of his research into his teaching.

With so much going on, Escalada says the secret to being a teacher, instructor, mentor, researcher and more is that they are all connected. He incorporates his research into professional development and outreach, and incorporates it all into teaching his classes. He enjoys the opportunities he has at UNI to share his passion, working with high school students, college students, science teachers and UNI faculty. "To be successful, you've got to make a connection with everything you're doing. I've been able to make all of these connections and spend time on professional development, outreach and curriculum development, and I incorporate that all in the courses that I teach," said Escalada.

DEPARTMENT HAPPENINGS

Homecoming

The 2018 Homecoming Picnic was, for the first, time held indoors because of inclement weather. Attendees gathered in Room 114, the main lecture room in Begeman Hall, which seats 88. Despite the weather, there was a good turnout. It was also a much easier trip for students already in the Physics Building doing homework!

Though it was wet outside, conversation certainly was not dampened!

In the foreground, 2015 Physics graduate Corbyn Mellinger (left) and current physics major Byron Fritch chat more freely, having eaten every morsel on their plates.

Department head Paul Shand presents alumnus Jack Dostal ('96) with a "Superalumnus" award. Over the years, Jack has been a fixture at Homecoming events and a regular visitor to the Physics Department. Jack teaches at Wake Forest University.

Begeman Lecture

The 2018 Begeman Lecture was held on March 28 at the Lang Hall Auditorium. The lecture was given by Dr. Charles Falco of the University of Arizona. The title of the lecture was "The Science of Optics; The History of Art." It was a fascinating look at how Falco and collaborators used optical physics to uncover some of the techniques used by some of the masters to create their paintings. The annual Begeman Lecture is sponsored by Richard Jourdan and Frances Jourdan.

Dr. Charles Falco explains his work at the 2018 Begeman Lecture.

Some of the artwork investigated by Falco.

Physics Banquet

The annual Physics Awards Banquet was held in the Slife Ballroom in the Commons Building on April 13. It is always gratifying to reward students for excellence in academics and service to the department, and have a great meal in the process.

Physics Teaching major Taylor Harris receives one of her two awards from Dr. Larry Escalada.

Summer Research Fellowship awardees (standing) are deservedly applauded by the attendees. Bravo!

DEPARTMENT HAPPENINGS

Holiday Colloquium

The Holiday Colloquium is a special event held at the end of each fall semester. With gifts appropriate to the season, the faculty expresses its gratitude to the staff members of the department for their excellent work throughout the year. The Holiday Colloquium also features performances of demonstrations, "magic" tricks and minor miracles by faculty, staff and students. It is an excellent way to end the year!

Physics faculty member Andy Stollenwerk creates a cloud…

…and when the cloud dissipates, Andy has gotten much younger! (The younger version of Andy bears a striking resemblance to his son, Quincy.)

Presentations by Visitors

Emeritus Physics faculty Fred Behroozi presents his colloquium entitled "The Physics of Dew Drops: Surprising and Wonderful."

"Everyday Astronaut" Tim Dodd talks about his work educating the public about science. Tim has his own astronaut suit, which you can see on the screen. In addition to on-site presentations, Tim has a Youtube channel ("Everyday Astronaut") that discusses science, especially space and space-related technology.

Physics Competition

The Physics Department continues to organize and coordinate both the regional and state-level Physics Competitions for high-school students. The students compete in 5 events: The soda-straw arm, the mousetrap car, the catapult, the toothpick bridge, and the challenge problem. The challenge problem involves measuring a given quantity (e.g., the mass of an object) using the seemingly random pieces of equipment provided.

Student operates the bridge tester, which applies an increasing force to the deck of the bridge until it fails.

Students get ready to launch a ping pong ball so that it travels certain horizontal distances.

Farewell to Rui He

Physics faculty member Rui He left us last August to take a position as associate professor of electrical engineering at Texas Tech University. At Texas Tech, Rui will have the opportunity to work with Ph.D. students, which will certainly boost her research career. Also, the warmer weather probably will not hurt.

Rui He shows off her farewell gift from the Physics Department.

STUDENT PROFILE

BYRON FRITCH

One of Byron Fritch's (Dike, IA) deciding factors in choosing to attend UNI was the size of the university. For him, it has the perfect balance between having the features and activities of bigger schools, like the Gallagher Bluedorn Performing Arts Center and Division I athletics, but at the same time maintaining a good ratio of students to professors, so there was the opportunity to develop personal relationships. "I knew that I would not like attending a large institution because I would have felt like a number in a crowd of students. UNI offered the large campus activities but also the ability to connect one-on-one with the professors," said Fritch.

Fritch decided to major in physics due to his interest in mathematics and his desire to learn how things work. In combining those two things, physics provides an opportunity to use math techniques to predict how objects and systems will behave. Fritch says he enjoys discovering explanations for everyday occurrences that the general population might overlook.

As part of that exploration into the way things function, Fritch cites the opportunity for undergraduate research as one of his favorite parts of the Physics department. Undergraduates are given the opportunity to conduct and run the experiments, providing great experience and the chance to develop laboratory skills needed for future endeavors. One of the projects Fritch worked on was research on nanocellulose aerogels. Nanacellulose aerogels are created by using an ultrasonic probe to send high frequency sound waves through cellulose, breaking them into particles roughly 1,000 times smaller than the diameter of a human hair. These particles are then freeze-dried to create an aerogel derived from plant material, meaning it is safe for humans to touch. Aerogels are good thermal insulators and serve as catalysts in chemical reactions.

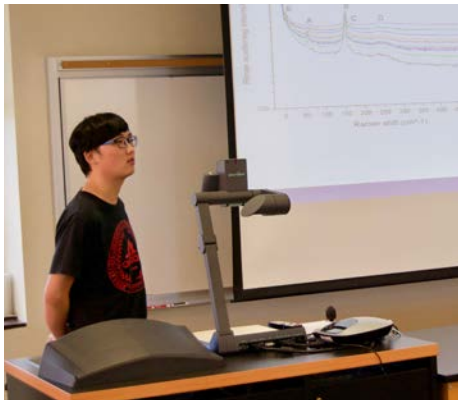
When not in the classroom or the laboratory, Fritch kept busy with involvement in various clubs and organizations like the Student Admissions Ambassadors, UNI Physics Club and the Honors Student Advisory Board. He credits these organizations with helping make his college experience a positive one. "Through these groups, I met students from different majors across campus who have been able to help me out in a number of ways during my college career. Being a successful student also requires that you put some time into an activity other than your studies so you can learn about yourself outside of the classroom," Fritch said.

In his free time, Fritch likes to run on the trails in the Cedar Valley, discovering peace and quiet in spots inaccessible to cars. When the weather isn't cooperating, he likes to hang out with his friends and play card and board games.

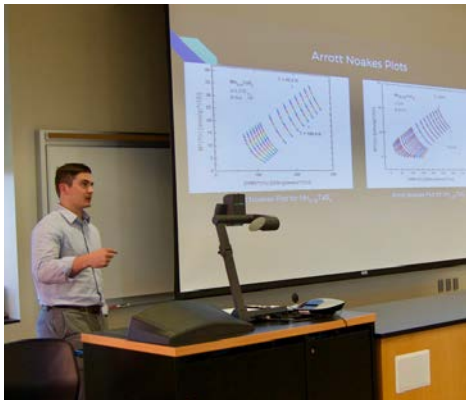
Fritch graduated in May and plans to attend graduate school at Colorado State University, where he will pursue a PhD in Experimental Physics. Upon completing those studies, Fritch isn't entirely sure on his next steps, although they may involve a few years of research at a government lab, helping with outreach events and possibly spreading his passion for physics to others by becoming a professor at a small university.

STUDENT RESEARCH

Research continues to be vigorously pursued by our majors. In some cases, students who are not physics majors have been involved in research with physics faculty members. The students present their results at departmental colloquia, on-campus research conferences, and with sufficient funding, national conferences.



Physics major Xiaoxiao Liu discusses Raman spectroscopy measurements on the layered crystalline material $HgCr_2Se_4$.



Physics major Jake Parks explains his research on the magnetic properties of TaS_2 intercalated with Mn.

Physics Scholarships and Awards

Louis Begeman Memorial Scholarships
Trevor Dunt
Joseph Tibbs

Grossman-Perrine Scholarship
Taylor Harris

Begeman Fund for Excellence in Physics Scholarship
Evan O'Leary

C. Clifton Chancey Scholarship in Physics
Dexter Cox

Jourdan Mentor Scholarship
Mason Clendenen

Outstanding Performance in Introductory Physics
Zach Heinzman
Noah Haack

First Year Projects in Physics Awards
Noah Haack
Taylor Harris
Zach Heinzman
Xiaoxiao Liu

Outstanding Research Presentation
Joseph Tibbs

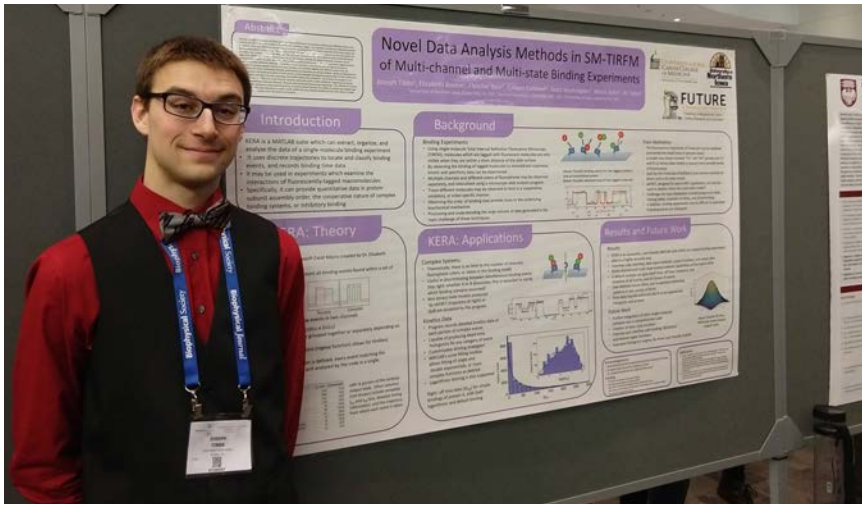
Physics Department Service Award
Byron Fritch
Jake Parks

Physics Summer Undergraduate Research Fellowships

Brent Anderson
Sam Prophet
Wayne Bowie
Nathan Schmidt
Dexter Cox
Paul White
Evan O'Leary

STUDENT RESEARCH

Undergraduate Research Report



Joseph Tibbs at the 2018 Biophysical Society meeting in San Francisco.

Joseph Tibbs is a rising junior at the University of Northern Iowa pursuing a double B.S. in Physics and Biochemistry. His interests span a variety of scientific disciplines and he has found support in the Physics Department to pursue research relevant to many of those interests. It all started when Dr. Ali Tabei spoke to Joseph's Physics I for Science and Engineering class about his research and indicated that he was looking for students interested in computational studies of biological systems. This seemed to Joseph like a great combination, and he approached Dr. Tabei about it. Thus began Joseph's intellectual foray into computational biophysics research, in the spring semester of his first year as a UNI physics major. Later in that semester, the Physics Department awarded Joseph an undergraduate summer research fellowship to work with Dr. Tabei, who, coincidentally, had been selected to participate in a program at the University of Iowa called FUTURE in Biomedicine.

FUTURE in Biomedicine is a unique program that brings together faculty from across the state of Iowa to the University of Iowa medical school to pursue collaborative research. Each faculty member is also allowed to invite one undergraduate student to participate in the research. Thus, Dr. Tabei and Joseph trekked to Iowa City in summer 2017 to work with Dr. Maria Spies and her graduate students on projects in biochemistry and biophysics.

Dr. Spies's primary focus is the use of advanced fluorescence microscopy methods to study the interactions of biological molecules (proteins, DNA, and various cofactors). The experiments centered around the use of Total Internal Reflection Fluorescence Microscopy (TIRFM) and FRET (Fluorescence Resonance Energy Transfer), a pair of techniques that allow the binding or folding of molecules to be observed and quantified in real-time, on a single-molecule level. Essentially, they could watch a single protein molecule bind to a single DNA molecule, time its stay, and observe its unbinding. Joseph spent about half of each day working with the proteins and DNA, putting to use his interest in biochemistry.

Joseph was excited to work on the kinetics of important biological reactions such as those involved in DNA repair and recombination, but found his niche in updating and reconstituting the lab's computer software. Joseph had been doing MATLAB coding for Dr. Tabei during the first semester of his research; thus, he had gained some experience in writing software in that language. Fortunately, Dr. Spies's group used MATLAB to analyze much of their data, which occupied Joseph for the other half of each day. Parts of the data analysis suite being used by the lab needed to be updated to improve the versatility of the code and its user-friendliness. Under the guidance of Dr. Tabei, Joseph made many of these changes. Older methods were improved and new ideas for data analysis were created and tested using the lab's existing data. The end result was the creation of new suites of MATLAB programs, which could be used by Dr. Spies's lab and even some of their partner labs.

Although Dr. Tabei and Joseph departed Dr. Spies's lab at the end of the summer, the collaboration did not end; Joseph continued to revise and refine the software. With support from the Physics Department and the Provost's Office, Joseph presented his work at the American Biophysical Society Conference in San Francisco this past spring, which was an amazing experience for him. Finally, with assistance from Wayne Bowie, a freshman Physics and Computer Science double major, a substantial suite was developed, suitable for public release to the wider scientific community. A small part of this work was recently used in a study by one of Dr. Spies's graduate students; her paper will be submitted for publication to the journal Science. Joseph is currently working on a methods paper describing the larger application suite, which, when released, could aid in single-molecule studies across the nation.

Joseph plans to do some of his writing this summer while participating in an undergraduate research program at Yale University. He will be working with Dr. Michael Murrell, a collaborator of Dr. Tabei's. Joseph's prior work with Dr. Tabei and Dr. Spies should serve him well during his stint at Yale.

PHYSICS EDUCATION

Implementing New Standards for High School Science

Three years ago, Iowa adopted a new set of science teaching standards that promise to increase exposure to physics concepts and engineering practices for all K-12 students in the state. While it is too early in the process to determine whether or not this will have an impact on enrollments in engineering and physics programs, including those within our department, the transition is currently challenging physics teachers statewide to rethink how they present concepts and measure proficiency.

Iowa adopted a slightly modified version of the Next Generation Science Standards (NGSS). Twenty-six states, including Iowa, contributed to writing the standards, and Iowa was the 15th state to officially adopt them. By 2020, the NGSS will replace the current Iowa Core science standards.

While the NGSS include disciplinary core ideas within the domains of physical, life, and earth and space science that are in some ways similar to previous standards, they differ from previous documents in their inclusion of science and engineering practices and cross-cutting concepts that build connections between multiple areas of science. Many standards include performance expectations that all students are expected to meet, creating a challenge for science educators statewide as they grapple with how best to deliver content, some of it new, and assess student learning. We reached out to some recent graduates of the department's physics teaching program and asked how their districts are handling the transition.

Kristen Olson (B.A. Physics Teaching, 2017) teaches physics and chemistry courses at Cedar Falls High School. She

Kirsten Olson

reports that Cedar Falls is in the midst of their three-year implementation plan; NGSS standards for grades 6-8 debuted this year, ninth grade students will take a new course of earth science and some introductory chemistry and physics next year, and the following year all high school courses fulfill the NGSS. Tenth grade students will take a year long biology course, while 11th grade students will take semester-long courses in chemistry and physics that address the majority of the physical science standards. Students with specific interest in science may opt for year-long chemistry and physics courses if they prefer.

Eric Clausen

Other schools are removing barriers between traditional disciplines and rolling out new integrated science courses. Eric Clausen (B.A. Physics Teaching, 2014) joined the faculty at Fairfield High School in the second year of a three-year implementation plan that will culminate in Fairfield offering Integrated Science 1, 2, and 3 to all students. Though he taught Chemistry 1 this past year under the current Iowa Core, he will teach Integrated Science 1 in future years, a course for ninth grade students with an emphasis on physical science standards. Fairfield students with interest in science will still have the option of taking an elective Advanced Physics course.

Jeremy Hulshizer

Many teachers are wrestling with how best to fit all standards into existing courses. Jeremy Hulshizer (B.A. Physics Teaching, 2012) teaches STEM courses at St. Albert Catholic High School in Council Bluffs. St. Albert has two paths for science courses: physical science, biology, and an elective, or biology, chemistry, and physics. For students selecting the first track, Hulshizer has been challenged to address all physical science standards, as well as some of the earth

science standards, within the ninth grade physical science course. Track two offers fewer problems as physical science standards are embedded within existing year-long chemistry and physics courses.

Matt Hanselman

Ankeny High School is also building dual tracks. Matthew Hanselman (B.A. Physics Teaching, 2014) shares that Ankeny students will select either a "Science Essentials Pathway" or (for students with established interest in science-oriented careers) the "Science Career Pathway." In both tracks, students will take earth and space science and life science courses in the 9th and 10th grades. In the 11th grade, students opting for the first pathway will take a year-long Exploring Chemistry and Physics course addressing the physical science standards; students taking the second track will have separate year-long courses in both chemistry and physics.

Madi Ramaekers

Marion High School has been gradually adding the NGSS to required science courses for several years and plans to have full implementation achieved by the coming school year. Madi Ramaekers (B.A. Physics Teaching and Chemistry Teaching, 2011) shares that, with Marion's block schedule, students will be required to complete six terms of science: General Science Matter, General Science Motion, Earth and Space Science, Biology, Botany/ Zoology, and Environmental Science. Students with deeper interest in science can opt for Physics 1 and 2 in place of the Motion course, and Chemistry 1 and 2 in place of the Matter course.

While there are a diversity of approaches to offering students access to all standards, the science content and practices studied by all Iowa K-12 students should become more uniform and more challenging in the near future. However, the difficulty of finding qualified teachers remains. Iowa has a well-documented shortage of physical science teachers, and the inclusion of earth and space science standards for all students at all levels is presenting new hurdles. The Physics Department, which in the past collaborated with other UNI science departments to offer professional development for teachers focused on the cross-cutting concepts within the NGSS, is beginning discussion on other ways we can provide appropriate, targeted content courses that will prepare preservice and inservice teachers for this new challenge.

ALUMNI PROFILE

CODY WILSON

In the fall semester of 1999, Charles City resident Cody Wilson came to UNI intending to major in physics teaching. But things did not quite work out that way. "I originally wanted to teach high school physics and UNI's reputation for educating teachers was attractive," Wilson says. "As I took more classes, I decided that a B.S. in physics was the direction I wanted to go." However, this path was not an easy one for Wilson. "When I began studying physics, I was hopelessly unprepared," he states matter-of-factly. "A lot is made of the smaller size of UNI and the commitment to teaching, but in my case, it was truly the difference between making it or not." These distinctive attributes of the university were the keys to Wilson's success. He proudly graduated with a B.S. degree in physics in 2002.

Asked to recount some of his experiences on the way to his bachelor's degree, Wilson recalled that the Modern Physics course he took with Dr. Shand was his favorite course. "It was a course that introduced many surprising ideas about the way the universe works," Wilson enthuses. Wilson also has pleasant recollections of time spent in the student room on the second floor of the Physics Building (now on the first floor of the renovated Begeman Hall). "I fondly remember the student room. We shaped it into a room where 5–10 people could study at the same time and had many ping-pong and dart games," Wilson recollects. "I believe Professor Shand finished my years undefeated in ping-pong."

After graduating from UNI, Wilson attended the University of Massachusetts at Lowell where he was admitted into the Ph.D. program in physics. "By the time I left UNI, I felt I wanted to pursue physics as far as possible," he says. Wilson eventually opted to seek employment in industry after receiving a master's degree. He is currently the director of research and development at Passport Systems, Inc. in the greater Boston area. In this position, Wilson manages and directs Passport's government, product, and internal research and development programs. This involves interfacing with customers to understand existing and new requirements, and developing new technologies to support product growth. He has the leadership role on the research and development team for a shipping cargo container scanning system consisting of an electron-beam accelerator, many different types of radiation detectors, a cargo transport system, and a control system. He manages a multidisciplinary team of 15 members consisting of scientists, algorithm development engineers, embedded software engineers, mechanical engineers, electrical engineers, and technicians. Wilson is also responsible for discovery and exploitation of new radiation signatures for the non-intrusive inspection of fully loaded shipping containers.

Wilson asserts that his UNI education has contributed significantly to his success. "The process of learning that I experienced at UNI is really what made me succeed as a professional," he declares. "I learned at UNI to never be afraid to ask questions about the things I don't know. It formed the foundation for learning that I have used ever since." When asked what advice he has for current students as they prepare to seek employment, Wilson responded readily. "Seek experience in collaborative research," he avers. "Much of research and studying in academic environments focuses on individual work. However, the experiences gained in working in teams and the accountability to report and justify the direction you choose is extremely valuable for an industrial physicist."

When not working on better methods to scan shipping containers, Wilson likes to travel and enjoys the outdoors. "I dedicate time each year to some outdoor adventure," he reports. "I enjoy open water and I have run three marathons in the last four years. Wilson's first son was born last November. Undoubtedly, he has started a marathon of another kind.

ALUMNI NEWS

Kevin Junck

The 2018 Alumnus in Residence for the Physics Department is Dr. Kevin Junck. On April 12, Kevin was "in residence" in Begeman Hall, where he met with students, faculty members and staff. He also toured the campus, which had changed somewhat since his last visit. Baker Hall, for example, had disappeared, replaced by a parking lot (what else?). Kevin also gave a talk entitled "An Introduction to Physics in Medicine," which captivated all the attendees. Finally, Kevin advised the physics students that they needed a more comfortable couch for the Physics Majors' Room since he could never have napped on the current one. Since it is important for physics majors to have their naps, Kevin generously donated funds for the acquisition of a more comfortable couch. We are happy to report that the students have acquired a couch and have moved it into place. Let's see if the nap frequency increases.

Dr. Kevin Junck graduated from UNI in 1986 with a double major in physics and mathematics and a minor in computer science. He earned an MS in physics and a Ph.D. in nuclear engineering from the University of Michigan. To the envy of most of us, Kevin held a postdoctoral research position at Fermilab, after which he went down a different path – a postdoctoral fellowship in radiology at the University of Alabama at Birmingham (UAB) hospital. Kevin subsequently obtained a permanent position at UAB hospital and has been there ever since. He is currently Chief of Radiology Informatics. Kevin has two daughters and lives with his wife Karen in Birmingham.

Matt Boucher (right) and emeritus faculty member Roger Hanson pose for a "selfie."

Matt Boucher

Matthew Boucher (born in Des Moines, IA) graduated from the University of Northern Iowa (BA in Physics and Music) in 2004. His undergraduate research with Emeritus Prof. Roger Hanson focused on string vibrations. After receiving a Masters in Music at Indiana University (Bloomington, IN), he worked as a musical instrument craftsman at S.E. Shires, Co. (Hopedale, MA), where he created custom design solutions and played a leading role in the construction of some of the world's finest brass musical instruments. His graduate studies in acoustics led him to Europe where he earned a Masters in Acoustics Research at l'Université du Maine (LAUM, France) and a Ph.D. from KU Leuven (Belgium) in the Noise & Vibration Research Group of Prof. Wim Desmet. As an Early Stage Researcher, his Ph.D. work was funded by the FP7 Marie Curie ITN project "GRESIMO" (Best Training for Green and Silent Mobility). His research focuses on phased geometrical acoustics methods, room acoustics, auralization, absorption measurements and vibro-acoustics. Matt currently works on vehicle flight acoustics at NASA Langley Research Center in Hampton, Virginia.

Adam Perkins

Adam Perkins graduated from UNI in 2005 with a B.S. in Physics. His undergraduate research work on capillary waves was done under the supervision of Dr. Fred Behroozi (now professor emeritus). He subsequently pursued a Ph.D. in physics at Georgia Tech, which he obtained in the summer of 2011. His area of research was experimental non-linear dynamics, specifically, using a laboratory Rayleigh-Benard fluid convection system to explore the role of local defects in driving global chaos. This system is a very simplified but useful model of convection dynamics in weather so in parallel, they were actually doing "forecasting" by taking images (measurements) of the convection patterns and feeding them back into a theoretical model built upon the governing equations.

Adam and his wife Joanna now live in the Portland, Oregon area. Both work for Intel Corporation, helping to develop the manufacturing processes for upcoming chip technologies. Intel does all of its manufacturing development at the facility in Oregon.

People often comment that Adam's background does not exactly match semiconductor development. His response is that a strong physics background has provided his most useful set of skills over the past seven years that he has been with Intel. Adam's specific area of focus is enabling electrical characterization of partially or fully processed die (chips). It has been very interesting for Adam to see just how much a solid understanding of the basics of electronics has allowed him to contribute to technical development and troubleshooting even outside of his "specialty."

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