Summer 2019

PHYSICS & ASTRONOMY

CrossSections

The Newsletter for UT Physics Alumni & Friends

# Make it **Seven in Seven**

## *Two More NSF CAREER Awards Add to Tally for Physics Faculty*

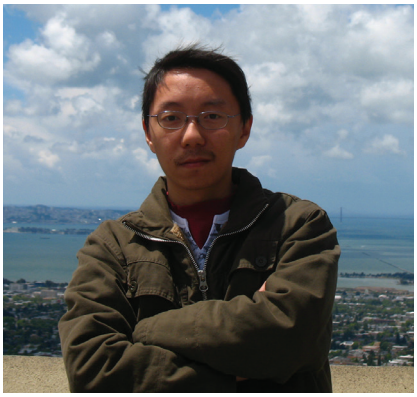
**Associate Professor Steve Johnston and Assistant Professor Jian Liu** have won prestigious early-career awards from the National Science Foundation, bringing the department's total to seven NSF CAREER honors since 2012, with six current grants totaling more than $2.4 million.

The awards came through the NSF's Faculty Early Career Development (CAREER) Program, which supports faculty at the outset of their careers who have shown potential as role models in research and education. Both Johnston and Liu will focus on the properties of quantum materials, which are at the forefront of condensed matter physics research. The rules for macroscopic objects don't necessarily hold in the realm of subatomic—a pitched baseball's path and velocity, for example, aren't mimicked by an electron working through a metal. Johnston will develop new theoretical tools that will help scientists interpret findings from powerful experimental techniques, while Liu will investigate the hidden symmetry of quantum systems to develop new two-dimensional magnetic materials.

### Defining Drivers and Passengers

Johnston's research will help provide new theory frameworks to support current experiments using Resonant Inelastic X-Ray Scattering (RIXS) as well as develop time-resolved RIXS techniques. This method scatters an X-ray beam off a material's electrons and in doing so can probe multiple properties in a single experiment, resulting in rich, yet complicated, data.

As Johnston explained, the remarkable properties of quantum materials often derive from a subtle interplay between their electronic, magnetic, and structural properties, and a central challenge for the community is to separate the drivers from the passengers. Tools like RIXS provide a way to study all of these interactions in a single experiment. But the tradeoff is that interpreting their findings can be a challenge without sophisticated theoretical models. [*Continued on page 2*]



Steve Johnston (left) and Jian Liu won National Science Foundation CAREER Awards to support their research in condensed matter physics. Johnston is a theorist and Liu is an experimentalist: both study the properties of nanoscale materials. Johnston joined the physics faculty in 2014; Liu came to UT in 2015.

## What's Inside

Johnston will work to develop theoretical approaches and computational codes that can help experimentalists determine what their data is truly measuring and what can be determined from those findings. The goal is that these theoretical tools will work across a broad range of quantum materials, including high-temperature superconductors and quantum spin liquids.

Johnston described how, for example, scientists still aren't certain if high-temperature superconductivity is driven purely by magnetic interactions, or if a material's atomic lattice is lending a hand. He hopes to develop causal links for scenarios like this, in part by looking at time scales to see if effects are governed by slow or fast processes.

"This new information can give us clues as to which interaction is the driver and which is the passenger," he said.

He will be working with scientists from the Paul Scherrer Institute in Switzerland and hopes to expand his efforts to RIXS experimental groups in the U.S. His proposal also includes establishing a Bridge Program in the physics department. This American Physical Society initiative strengthens the wider physics community by increasing the number of graduate students from underrepresented minorities via transition programs, mentoring, and networking. Johnston will also involve current students in his CAREER research.

Of the 24 current National Science Foundation CAREER awards listed under the University of Tennessee, Knoxville, on the NSF website, six were awarded to physics faculty members. To date those grants have garnered more than $2.4 million.

## Magnets, One Atom Thick

Like Johnston, Jian Liu is also intrigued by the properties of quantum materials, specifically magnetism. He explained that new magnetic materials are necessary for developing a next generation of processors, memories, and sensors with better security, faster speed, and smaller size. His goal is to build—atomic layer by atomic layer—quantum antiferromagnets that can be controlled externally.

Quantum antiferromagnets are model systems that have great impact for condensed matter physics. For instance, high-temperature superconductivity is known to occur when metallizing quantum antiferromagnets. Their quantum mechanical nature can cause entanglement that is absent in ferromagnets. One chief challenge, however, is that antiferromagnets, unlike their ferromagnetic cousins, by nature resist being controlled by a magnetic field.

"Essentially the material likes to be the opposite of a ferromagnet," Liu said. "And what that means is that it doesn't like to be in a magnetic field. So typically you have two choices. You either apply a magnetic field and get no response, or you apply a very large magnetic field and simply just destroy the antiferromagnetic order. That's usually the only two possible outcomes."

By using laser deposition to synthesize precise two-dimensional oxide materials and implement a hidden symmetry in their structure, Liu sees the promise of overcoming this challenge.

"If you can make things two-dimensional rather than three-dimensional, you save a lot of room—a lot of space," he said. "You basically scale things down to as thick as one atom."

He will take advantage of the hidden rotational symmetry in the materials' spin—where a magnetic field will couple to alternating quantum spins and in doing so cause the material to respond like a ferromagnet. This will require Liu to precisely engineer these tiny structures, designing every minute detail about their thickness, composition, and structural distortions and then study the magnetism in samples a million times thinner than a human hair. He'll do this work in his lab at the UT-ORNL Joint Institute for Advanced Materials and with collaborators at synchrotron facilities.

Liu will share his research through the department's Saturday Morning Physics program and Faceback live chats. He will also work with the university's Governor's School for the Sciences and Engineering and will reach out to area high schools with potential student projects. Like Johnston, Liu is encouraging students from underrepresented groups to take part.

"We are going to invite students from minority-serving institutions to do a project in the summer," he said. "We will try to build a long-term collaboration with those institutions."

Liu also has an eye on incorporating his research into the department's undergraduate physics courses. Having taught for three years he sees that students need examples of the physics behind the ever-evolving smart devices they use every day.

"That's what they're going to be dealing with in their future careers," he said. "It would be beneficial for them to see the bridge between the physics they learn in the textbook and the technology they embrace in life."

# Global **Identity**

At the beginning of the new academic year, let me begin by welcoming our new students. We have 42 new undergraduates, 35 of whom are in their first year of college and seven of whom are transfer students, and 120 returning students. Overall, there are now 162 declared majors, 34 freshmen, 34 sophomores, 34 juniors, and 60 seniors. From a historical perspective, these are impressive numbers for our department. In addition, we recruited 24 graduate teaching assistants (GTAs) and three graduate research assistants (GRAs). Our GTAs will be teaching the undergraduate laboratories or grading homework papers, while taking graduate level classes and (for many) preparing for the PhD qualifying exam. After two years, all of them are expected to find a faculty advisor to work on their doctoral or master's research. The new GRAs already have research support and will be working with their research advisors and take graduate courses. This year's cohort is the largest for as long as I can remember and we are very proud of the fact that they have chosen UT Physics. The graduate recruiting and admissions committee led by **Associate Professor Christine Nattrass** deserves all the credit for a very successful recruiting season.

It is also a great pleasure to welcome **Dr. Nau Raj Pokhrel** as our third full-time lecturer. Nau Raj received his PhD in physics from Florida International University in 2016 with a specialization in radio astronomy. Since Fall 2017, he worked as a full-time lecturer at South Texas College before joining our department on August 1. Nau Raj is joining our other two lecturers, **Margie Abdelrazek** and **Sean Lindsay**, in teaching our general education and service courses.

Historically, the success of American universities and specifically the pioneering role of US physics programs has been largely attributed to the fact that US universities have been able to attract the brightest students from around the world since the very beginning of World War II. Bringing together top students and faculty with very diverse backgrounds has been one of the greatest success formulae for advancing physics both here and abroad. Many graduate physics programs still thrive by admitting a mixture of domestic and foreign applicants, and our department is no exception. Roughly one half of our new students came from abroad, and about one-half of the UT physics faculty originate from foreign nations: 16 in all. Unfortunately, the internationalization of higher education, especially that of the STEM disciplines, is currently under duress. In recent years, US universities have witnessed a sudden decline in international applicants. Again, our department is no exception. We have seen steady declines since 2016 and a dramatic reduction of Chinese applicants just this year. Possible reasons behind this decline include increased international competition, which provides excellent opportunities for students to pursue graduate studies either in their home country or countries other than the US. Indeed, many of us have witnessed up close the incredible rise of physics in China and the enormous investments by the Chinese government in research infrastructure and faculty recruiting. On a smaller scale, similar trends are happening in Korea, where the Institute of Basic Science represents a major investment into top-notch infrastructure and top-level recruits. These are great places to do physics.

Competition is of course very healthy and provides wonderful opportunities for international collaboration. However, the decline in international applicants is also related to recent changes in US immigration policies that make foreign students increasingly anxious about visa and travel restrictions. (For example, among our 24 incoming GTAs, three students are still waiting for their visas to be approved.) While some of these restrictions are driven by legitimate government concerns about military and economy espionage, this change in policy does affect the entire academic enterprise. It particularly raises concerns among some of our foreign colleagues, many of whom still have personal and professional ties to their native countries, that they may be inadvertently singled out and restricted in exercising their profession, or worse. These anxieties are real and affect their research collaborations, their travel plans, and opportunities to present their work at international meetings. They are widespread and also live within the UT community and within our own department. This makes it all the more important that we nurture our global identity and collectively reaffirm our commitment to support our international students and faculty, making sure that our department continues to feel like home to all.

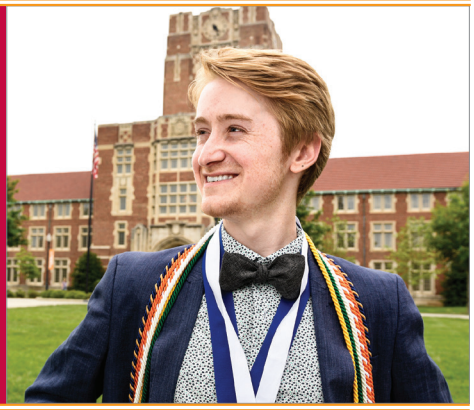
# NSF Graduate Fellowships

Physics faculty members aren't the only ones winning prestigious awards from the National Science Foundation (see page one). Physics alumni Brandon Barker and Chima McGruder have won 2019 NSF Graduate Research Fellowships to support their astrophysics studies. The program offers three years of support during a five-year fellowship for outstanding graduate students pursuing NSF research interests. Barker and McGruder are working in astrophysics research at Michigan State University and Harvard University, respectively.

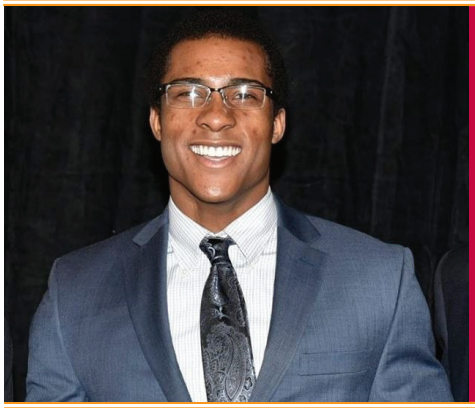
## Brandon Barker
UT Class of 2019

Michigan State University

Graduate Program in Astrophysics



I am now an astrophysics graduate student at Michigan State University working with Dr. Sean Couch. My fellowship will support my investigations into nucleosynthesis in core-collapse supernovae. After the onset of the explosion, a "wind" of material powered by neutrino emission flows off the proto-neutron star, and this material is a site for element production, possibly even part of the r-process responsible for some of the heavy elements. I will be making substantial improvements to the FLASH core-collapse supernova simulation code and investigating the nature of nucleosynthesis in the neutrino driven winds. Subsequently, this will allow for simulation of the full suite of multimessenger signals from core-collapse supernovae—electromagnetic, neutrino, and gravitational waves—with new precision. Ultimately, this will bring us closer to the explosion mechanism of core-collapse supernovae and help us to understand the sources of the chemical enrichment of the universe.



## Chima McGruder
UT Class of 2017

Harvard University

Graduate Program in Astrophysics

I am part of A.C.C.E.S.S. (the Arizona CfA Carnegie Católica Exoplanet Spectroscopic Survey): a huge collaboration aimed to produce a large homogeneous exoplanet spectroscopic dataset. The spectra of exoplanets (planets outside of our solar system) can be obtained by observing a planet in a range of wavelengths as it passes in front of its host star (transits). In such an event, the molecules present in the planet's atmosphere absorb the star's light at different wavelengths depending on the specific molecules present. Thus, the more abundant a molecule, the more the planet absorbs, which allows us to determine its atmospheric composition. Once we obtain the composition of a statistically significant amount of planets we can use that data to determine trends of planet chemistry and physics based on a variety of physical parameters such as planet radius, mass, distance from the host star, etc.

My job is to observe multiple Hot Jupiters: planets with similar mass to Jupiter but very close to their host stars. The Hot Jupiters I am observing have similar physical parameters, but fundamentally different observable features: some of them form clouds in the upper atmosphere and others do not. I'd like to determine what chemistry/physics is causing these different structures. This is important because the formation of clouds in the planet's upper atmosphere prevents astronomers from observing the molecular structure of the planet. Understanding what causes clouds to form should help astronomers screen which planets' spectra are worth thoroughly studying, as well as provide insight to extreme climate atmospheric chemistry/physics.

# Going **Private**

## Undergraduates take their physics experience into the private sector

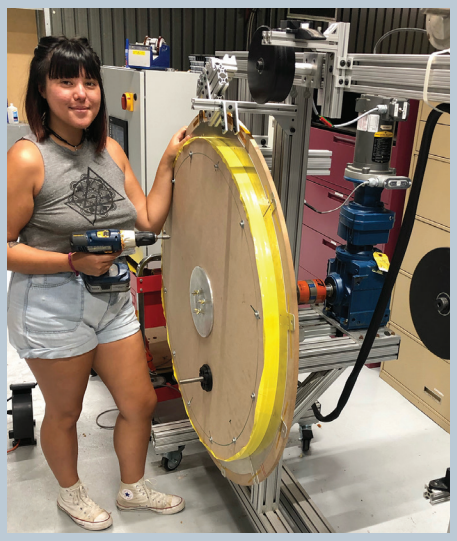
From developing cancer therapy software to building superconducting magnets, our undergraduate majors spent the summer applying their physics education to challenges in the private sector, thanks in part to support from the **Jim Trolinger Endowed Entrepreneurial Scholarship**. **Trolinger** (left) graduated from UT with a bachelor's degree in engineering physics (1963) and a PhD in physics (1967). His career has been dedicated to pioneering laser-based optical diagnostic methods. (For his outstanding contributions to laser physics, optics, and holography, the department named him the 2009 Distinguished Alumnus.) As an entrepreneur who co-founded two successful optical companies, Trolinger established this endowment to support students who are working on research as part of their education, in particular with private companies. The students below held summer internships as part of that initiative.

### Peter Lewiz, Senior

> Physics Major (General Concentration)

> Worked with Pronova Solutions Research and Development physics team in Franklin, Tennessee

> Took daily tests on the cyclotron to see if it were running properly and met criteria; also worked with physicists to commission the proton beam size, roundness, and dose.

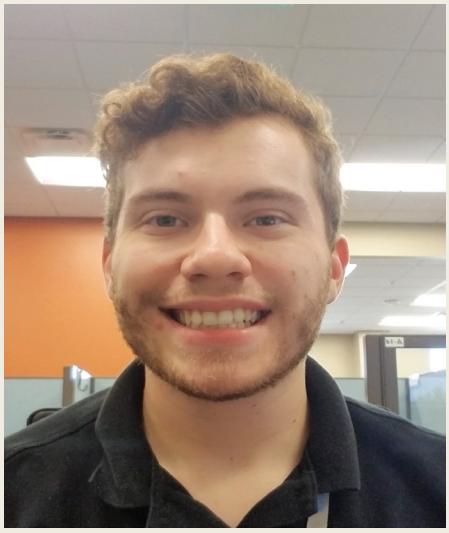


### Tara Skiba, Senior

> Physics Major/Secondary Major in Global Studies/Minors in Chinese and Astronomy

> Worked at Energy to Power (E2P) solutions in Tallahassee, Florida

> Worked on building a 1 m diameter superconducting magnet for Lockheed Martin: winding multiple wires of various materials into coils, which can then have a current run through to generate a magnetic field. The project required incremental testing to ensure coils were wound as perfectly as possible and to avoid larger issues that may arise when in use.



### Thomas Rotunno, Senior

> Physics Major/Minor in Computer Science

> Worked at ProNova Solutions in Maryville, Tennessee

> Developed software for the cutting-edge SC360 Proton Therapy system, which treats cancer patients in Nashville, and soon, Knoxville.

# Summer School: **Nuclear Style**

## *Learning Physics, and Making Friends for Life*

**They came from California and Texas and Florida; Kentucky and New Jersey. They came with different interests and backgrounds, but learned in 11 days what they have in common and how it's possible to learn about physics and make friends for life at the same time.**

The National Nuclear Physics Summer School, held July 8-19 and hosted by UT Physics, brought together roughly 50 graduate students and postdocs to learn how broad the field is and where nuclear physics research is headed.

**Associate Professor Nadia Fomin** served as the summer school's host. She is well acquainted with this kind of professional responsibility: last fall she organized and hosted the Southeastern Section meeting of the APS (SESAPS) at UT. A mini-symposium she hosted on the neutron's lifetime at an April APS meeting was featured on the *Nature* website. Earlier this year she was elected to the American Physical Society Division of Nuclear Physics Executive Committee. Her fellow summer school organizers included **Assistant Professor Miguel Madurga** and **Associate Professor Christine Nattrass**, as well as **Charlie Rascoe of Oak Ridge National Laboratory**.

Together they put together a program that drew on their areas of expertise but also served to represent the whole of nuclear physics to the young physicists in attendance. Among the topics were neutrino physics, fundamental symmetries, Bayesian analysis, the quark gluon plasma, and an overview of the physics program at Jefferson Lab.

"One of the goals is basically to expose the students to the research that is going on in our field right now and that they will be hearing about for the next 10 years," Fomin said. "It's to give them a broad education in nuclear physics because their specific research will be very narrowly focused."

That approach clearly resonated with the students.

**Michelle Gervais**, a PhD student from the University of Kentucky, said the school gave students a wider view of the nuclear physics landscape. Her doctoral research is based at ORNL with the Nab Collaboration, an experiment dedicated to the detailed study of neutron decay via measurement of very specific correlations.

"I think sometimes we kind of pigeonhole ourselves" in sub-disciplines or individual research areas, she said. The summer school helps broaden their perspectives.

**Ibrahim Abdurrahman** is pursuing a doctorate at the University of Washington and attended the school on his advisor's recommendation. The best part of getting this kind of overview, he said, is seeing how his work interconnects with all of nuclear physics.

"I just kind of want to understand where nuclear physics is," as a field, he said. He has worked in computational physics (specifically in theoretical low-energy nuclear physics) and he sees that experience as being adaptable to different research areas.

"It also just motivates you to do research," he said of the summer school: it's a way of "recharging."

Michelle Gervais (University of Kentucky), Ibrahim Abdurrahman (University of Washington), and Stefania Dede (Texas A&M) were among the graduate students taking part in the National Nuclear Physics Summer School, hosted by UT Physics.


The 2019 National Nuclear Physics Summer School cohort and organizers.

The school itself was somewhat intense: speakers gave two or three lectures each and the presentations typically ran from morning through the afternoon. Lecturers often attended one another's talks and when possible shared meals and spent downtime with students. The organizing committee made it a point to break up the schedule with other events, including a standing-room only public lecture on Chernobyl: Fallout, Facts, and Fiction*. A rafting trip and a tour of the ORNL Spallation Neutron Source rounded out the program with a balance of recreation and real-world research exposure. **Stefania Dede**, a doctoral student from Texas A&M, particularly enjoyed the latter.

"Lectures are okay," she said, "but let's go to a lab" she said with genuine enthusiasm. "I like hands-on."

Students also came up with some spontaneous outings of their own.

Gervais is a self-described introverted extrovert who talked about the importance of camaraderie for students—something she has made it a point to encourage in graduate school. She said she enjoyed the time spent with other students, including an off-the-schedule Sunday trip to Fort Dickerson Quarry Lake for some swimming and socializing.

Dede is the point person for a 2020 Conference for Undergraduate Women in Physics (CUWiP) at Texas A&M and said that this experience not only helped her develop skills to organize a meeting, but also made it easier for her to connect with other students at the summer school, in collaborations, etc.

That's one element that prompted a group of nuclear physicists to design the nuclear physics summer school back in 1987. The program has been held every year since with the exception of one summer and is sponsored by the US Department of Energy, the National Science Foundation, and the National Institute for Nuclear Theory at the University of Washington.

Fomin pointed out that it's important to keep abreast of what's going on in your field outside of your very specific research area and the summer school demonstrates that mindset to up-and-coming scientists.

"They'll be going to national meetings—national nuclear physics meetings—and I hope that now they will be able to go to talks in every area and be able to understand them and get something out of them," she said.

That's not the only important element, however, as the impromptu swim party demonstrated.

"There's also a social aspect to it," Fomin said. "They're at similar points in their education and careers; so they'll be going through post-docs together, through faculty searches together, and it's good to keep connections with people throughout your field. They basically made friends for life."

** Chernobyl: Fallout, Facts, & Fiction*
*The UT Office of Information Technology has made this public lecture webcast available on-demand at: oit.utk.edu/news/webcasting-case-story-skutnik/*

# Physics Department **Honors**

## Honors Day Celebration

**From an outstanding freshman physics major to a distinguished alumnus, the department recognized the academic, research, teaching, and service contributions of students and faculty with the annual Honors Day celebration in April. The honorees were:**

» Distinguished Alumni Award: **Dr. Robert Compton**
» Outstanding First Year Student: **William Good**
» Robert Talley Award for Outstanding Undergraduate Research: **Noah Crum**
» Robert Talley Award for Outstanding Undergraduate Leadership: **Annastashia Blesi**
» James W. McConnell Award for Academic Excellence: **Samuel Feldman and Kevin Kleiner**
» Douglas V. Roseberry Award: **James Neuhaus**
» Robert W. Lide Citation: **Brittney Contreras**
» Outstanding GTA Award: **Casey Morean and Shiyu Fan**
» James E. Parks Award: **Kaleb McClure**
» Colloquium Award: **Jesse Buffaloe**
» Paul Stelson Fellowship for Beginning Research: **Himal Acharya**
» Paul Stelson Fellowship for Professional Promise: **Umesh Kumar**
» Fowler-Marion Award: **Joseph Heideman**
» Society of Physics Students Teacher of the Year Award: **Professor Elbio Dagotto**
» Sigma Pi Sigma (Physics Honor Society) Inductees:
**Noah Crum, Ashley Holt, Hannah Miller, and Katie Sylvester**

**Robert Compton (PhD, 1964)** is the department's 2019 Distinguished Alumnus. He spent a career navigating the territory between chemistry and physics at both Oak Ridge National Laboratory and UT. He was recognized "for his seminal contributions to atomic and molecular physics; and especially his pioneering studies of non-linear laser spectroscopy, multi-photon ionization, and multiply-charged negative ions."

Professor Kate Jones with Annastashia Blesi (left) and Professor Adriana Moreo with Jesse Buffaloe at the Honors Day celebration.

**Details on all honorees plus a photo album at: www.phys.utk.edu/news/**

## 2019 L.R. Hesler Awardee

# Dr. Marianne Breinig

Professor **Marianne Breinig** has spent a career dedicated to finding the best tools to teach university physics at every level, and at this year's Chancellor's Honors ceremony she was duly recognized with the L.R. Hesler Award. Since joining the faculty as an assistant professor in 1981, she has taught everything from elementary general education courses to advanced graduate-level physics. In the past three academic years, she has produced nearly one-quarter of the department's student credit hours.

Yet Breinig's remarkable track record in instruction isn't defined merely by *what* she teaches—it includes *how* she teaches as well. She was an early adopter of online tools and modules to make physics concepts more accessible. She developed a physics course where she designed tools allowing students to perform online physics lab experiments, as well as analysis tools so they could make measurements from a video of an experiment. Her technical savvy led to a successful renovation of courses such as optics, as well as a hybrid physics course for life sciences students that blends elements of traditional lecture and lab with Studio Physics—an approach that emphasizes student participation and peer instruction. By introducing instructional technology like a student response system, tablets, and video projection, she has earned high praise from her students. She has generously shared her teaching methods and materials with other faculty members.

Breinig's contributions extend to service to the department, the college, and the university as a whole. She coordinates the physics department's summer research fellowship program for undergraduates, directs the department's graduate program, and has served on numerous department and university committees, including the College of Arts and Sciences Graduate Curriculum Committee and the UT Faculty Senate. She has been an associate department head in physics since 2006. In 2004 and again in 2005 the UT Chapter of the Society of Physics Students presented her with the department's Teacher of the Year Award, and in 2016 she won the James R. and Nell W. Cunningham Outstanding Teaching Award from the College of Arts and Sciences.

The L.R. Hesler Award is named for a longtime head of the botany department who also served as dean of the College of Arts and Sciences. Hesler's students, colleagues, and friends established the honor to recognize exceptional teaching and service.

## University Honors & Awards

**The department had another terrific showing with the university's spring honors: from the prestigious Chancellor's Honors to the awards for undergraduate research and GTA teaching:**

### Chancellor's Honors Awardees

- L.R. Hesler Award: **Marianne Breinig**
- Undergraduate Researcher of the Year: **Brandon Barker**
- Top Collegiate Scholar (Arts & Sciences): **Kevin Kleiner**
- Extraordinary Academic Achievement: **Noah Crum, Samuel Feldman, John Floyd, Brandi Skipworth**
- Extraordinary Professional Promise: **Ian Cox, Noah Crum, Joseph Heideman, Xiaobin Lu, Andrew Mogan, and James Neuhaus**

### EURēCA (Exhibition of Undergraduate Research and Creative Achievement)

College of Arts and Sciences/Natural Sciences/Honorable Mention: **Kevin Kleiner**

### Graduate Student Senate Award

Excellence in Graduate Student Teaching: **Jesse Buffaloe**

# News from **the Physics Family**

## Congrats to Our Grads!

The department hosted a spring reception for our graduating undergrads to congratulate them on this educational milestone. Pictured here: **Annastashia Blesi, Charles Ladd, Jacob Johnson, and Justin Scott** in the front row and **Dean Donahue** in the back row. The department has added 59 alumni since Summer 2018, including 22 bachelor's graduates.

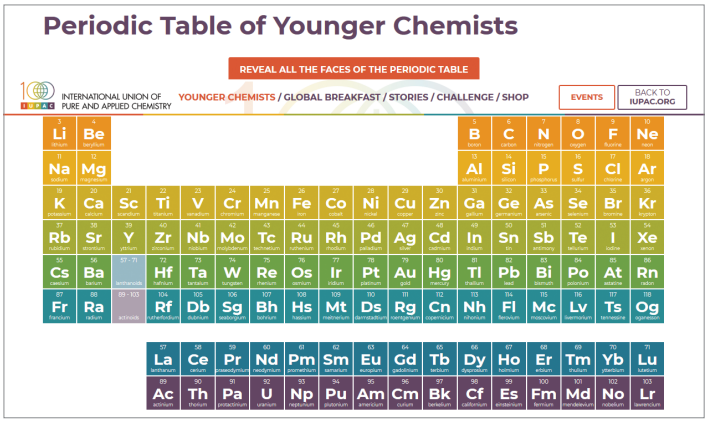
## Physics Postdoc Representing Tennessine

Congratulations to **Nathan Brewer** on his selection as an outstanding young scientist representing the element tennessine on the Periodic Table of Younger Chemists (PTYC).

The International Union on Pure and Applied Chemistry (IUPAC) sponsored an international competition to identify a young scientist for each element to celebrate the International Year of the Periodic Table and the union's 100th anniversary. Candidates were chosen who embody the IUPAC's mission and values, including providing objective scientific expertise and developing the necessary tools for applying and communicating chemical knowledge. Winners were announced in groups each month, beginning in July 2018. Brewer was among the final group of awardees, who were acknowledged during the 47th IUPAC Congress in Paris in July 2019.

Brewer works at Oak Ridge National Laboratory and is a postdoctoral research associate supported by the UT-ORNL Joint Institute for Nuclear Physics and Applications (**Physics Professor Robert Grzywacz** is the JINPA director). Brewer explained that ORNL nominated him "for the place of tennessine in recognition of our accomplishments, including providing data acquisition technology for super-heavy element studies, my paper on the most recent synthesis of element 118 (oganesson), and my involvement in volunteering and outreach."

Element 117 (tennessine) was added to the periodic table in 2016 and its name is a nod to the contributions of scientists from UT (Grzywacz), ORNL, and Vanderbilt University. You can find more information on Brewer and the PTYC at: https://iupac.org/100/pt-of-chemist/.



## Department Hosts Tennessee's Physics Teachers

From updating labs and experiments to engaging kids in science, there were a myriad of ideas to be shared as physics educators met at the annual meeting of the Tennessee Section of the American Association of Physics Teachers (TAAPT) in March. Organized by **Christine Cheney,** the department's director of undergraduate labs, and hosted at the UT-ORNL Joint Institute for Advanced Materials, the program included presentations from invited guests as well as high school and university instructors. Attendees hailed from every region of the state: from East Tennessee State University to Halls High School in Knoxville to the University of Tennessee, Martin. They learned about the Oak Ridge Computer Science Girls organization, whose mission is to inspire middle school girls to explore the possibilities of technology, coding, and science. They heard from Professor **Robert Grzywacz** about the element tennessine and its neighbors, and through talks and discussions offered their perspectives on updating courses, creating fun and interesting demos, streamlining expectations between high school science and college requirements, and getting involved in outreach. Section meetings like these help further AAPT's goal to continually improve physics education across the country.

## Scenes from TAAPT

*Clockwise:* **John Varriano** of Christian Brothers University (left) brought his setup for Acoustic Fun: Simple Speaker and Levitator. | **Erica Johnson** (MS in Physics, 2009), now a teacher at Halls High School, spoke on Quarknet, an outreach project with Fermilab. | **Christine Cheney** (right) presents the 2019 TAAPT Student Poster Award to **Sara Bey** of the University of Tennessee, Chattanooga.

*Photo Credit: Dr. James E. Parks*

## Another Seven in Seven

With their 2018 Outstanding Chapter designation from the national office, the UT chapter of the Society of Physics Students has won Outstanding Chapter Awards every year since 2012.

THE UNIVERSITY OF TENNESSEE KNOXVILLE
COLLEGE OF ARTS & SCIENCES

DEPARTMENT OF PHYSICS AND ASTRONOMY
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physics.utk.edu/alumni-friends/giving.html



## Take a Hike!

For the sixth year in a row, intrepid physics faculty and staffers headed to the Great Smoky Mountains National Park to hit the trail and do a little team-building. This year's adventure was another trip to Mt. LeConte. From left: **Hanno Weitering, Christine Cheney, Catherine Longmire, Brad Gardner, Mike Roach, Randy McMillan, and Robert Grzywacz.**

# CrossSections