THE SOURCE

ALUMNI MAGAZINE • FALL 2022

A HEALTHY START

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TENNESSEE NUCLEAR ENGINEERING

Casali Earns DOE Early Career Award / Sobes Cracks Code on Better Cross-Sections / Nuclear Energy Program Supports Trio of Projects

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THE**SOURCE**
MAGAZINE

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On the Cover
A linear accelerator in use at Tennova North in Knoxville, Tennessee. Students in the medical physics program are able to gain hands-on experience using this device.

From the Department Head

As many of you know, our departments motto is "Study Nuclear Engineering: Save the World." This statement has never been more on target than it is today. Nuclear has moved to the forefront as a carbon-free energy producer and the Knoxville/Oak Ridge area is energized with new nuclear investments. As cleanup finishes at East Tennessee Technology Park, several new companies are moving in: Ultra Safe Nuclear Corporation's Pilot Fuel Manufacturing Facility, X-energy's TRISO-X Fuel Manufacturing Facility, Kairos Power's Hermes Low-Power Demonstration Reactor, and Coqui Radio Pharmaceuticals Corporation's medical isotope production facility to name a few. We look forward to partnering with these innovators both in research and in developing career pipelines for our graduates.

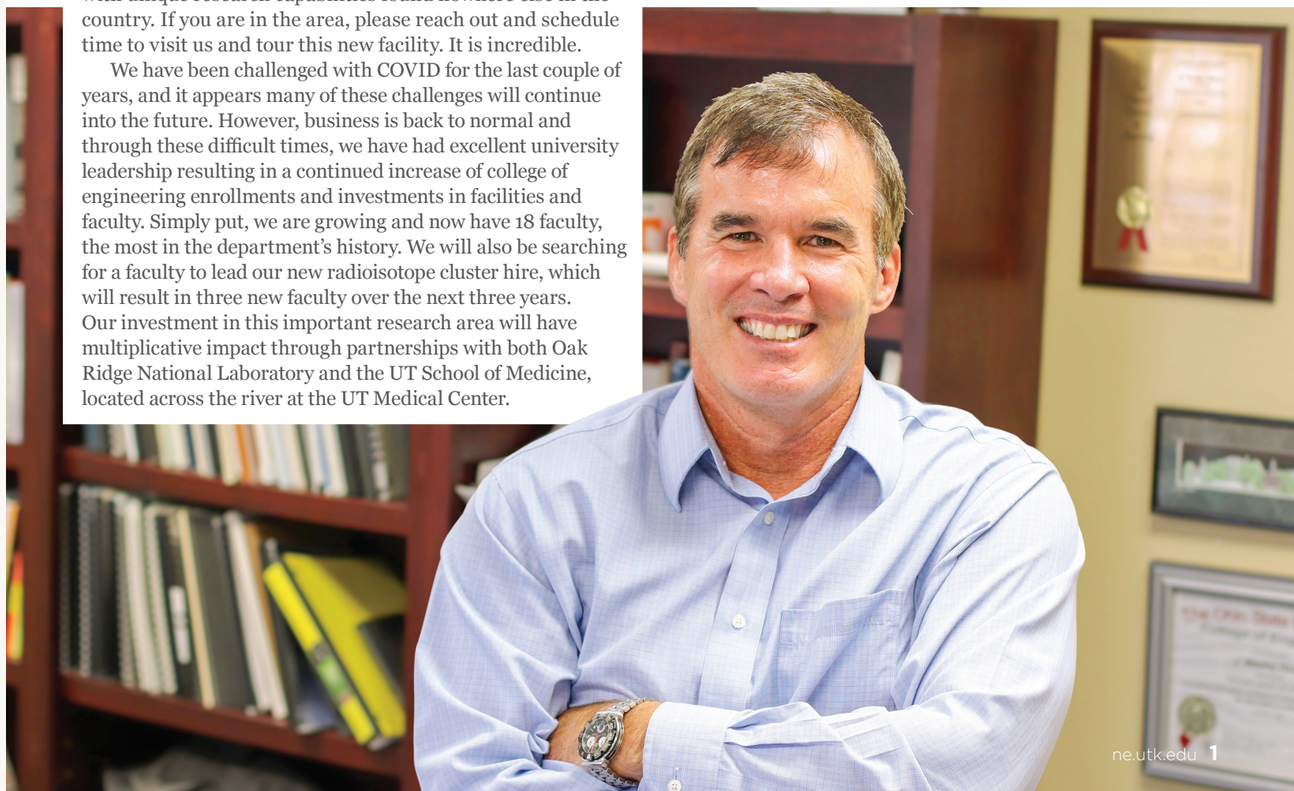
This last year has been one of many successes, including moving into our new building, the Zeanah Engineering Complex. This is a $129M, six-story building located just east of the stadium with a great view of the Tennessee River and Smokey Mountains. We started classes there on August 18th, 2021, and moved our faculty in a few months later. It hosts 26 nuclear engineering labs, of which over half are completed and in use. Several of these labs have experimental facilities with unique research capabilities found nowhere else in the country. If you are in the area, please reach out and schedule time to visit us and tour this new facility. It is incredible.

We have been challenged with COVID for the last couple of years, and it appears many of these challenges will continue into the future. However, business is back to normal and through these difficult times, we have had excellent university leadership resulting in a continued increase of college of engineering enrollments and investments in facilities and faculty. Simply put, we are growing and now have 18 faculty, the most in the department's history. We will also be searching for a faculty to lead our new radioisotope cluster hire, which will result in three new faculty over the next three years. Our investment in this important research area will have multiplicative impact through partnerships with both Oak Ridge National Laboratory and the UT School of Medicine, located across the river at the UT Medical Center.

Our enrollment remains strong, with our PhD program continuing to be the largest in the country seven years running. Not only are we large, we are also very scholarly. Our nuclear engineering department is currently ranked 3rd in the country in scholarship by Academic Analytics, which benchmarks using objective, accurate, and comprehensive research metrics. This is due to the exceptional and impactful research conducted by our faculty and students. I hope you enjoy reading this issue of the Source which is filled with their success stories.

Lastly, I wish to thank our alumni and friends for their continued support and partnership. Your investments in our department through philanthropic endowments, working with and supporting our students, and through strategic partnerships are all imperative for our continued success and the success of reaching our goal to "Save the World".

J. Wesley Hines



A HEALTHY START

Medical Physics Program Provides a Pathway to Oncology Careers

By David Goddard. | Photography by Shawn Poynter.

A patient lies nervously on their back, their head secured inside a helmet of sorts that is designed to hold it perfectly still.

Medical personnel begin their final preparations for the upcoming procedure.

Finally, the patient is moved into the device so their head is inside it. The medical team leaves the room to go to a control center where they will carry out the task at hand: destroying a malignant brain tumor through the use of a device known as a linear accelerator.

Such devices have been game changers in brain-related treatments, as they focus several beams of radiation—each too weak to damage cells on its own—onto a targeted area, helping improve outcomes and patient experiences.

There's no incision, no general anesthesia required, and patients can typically undergo treatments in an outpatient manner, meaning there's no hospital stay.

Like other recent technological advancements, these devices are helping medical personnel gain some advantage in the fight against cancer, but they need trained professionals to operate them.

A closeup of one of the form-fitting head guards that are used to keep patients perfectly still during treatment.

Those professionals—perhaps the most vital thing that the devices need to work—are something that UT's Department of Nuclear Engineering is in an ever-growing position of strength to provide, thanks to a relatively new program with origins dating back about a decade.

"We've had some related courses for students for a while now, but we formally launched a program in medical physics in 2019, giving them an opportunity to earn a master's degree and gain practical experience while doing so," said Wes Hines, department head, Postelle Professor, and Chancellor's Professor. "We were hoping for a good response, but it has garnered interest well beyond our highest expectations."

The original goal was to have perhaps six new students enroll in the program each fall. In reality, 18 students have enrolled in the first two years, attesting to the attraction that the program has for students.

To be prepared to use their expertise in the real world, students need to be able to practice using the equipment—and

Medical physics graduate student Annette Robbins, left, listens as Michael Howard discusses a device that allows them to calibrate the linear accelerator in the back.

that experience is a key component. One thing that sets the program apart is that the two people most responsible for carrying out the coursework are themselves professionals in the medical physics field.

Michael Howard, the program's director, and Chet Ramsey help lead the medical physics courses, bringing with them years of expertise from Tennova and Covenant Health, respectively. Together they translate their experiences into lessons and play a vital role in helping students gain the skills that can be learned only in a clinical setting.

As proud alumni of the Tickle College of Engineering, both have given their time and efforts to creating the program with a sense of serving humanity as a driving force.

"We are super excited about this program because medical physicists are an integral part of the oncology field, which continues to grow in importance," said Howard. "Getting the students involved is vital to training them to be professionals in the field, whether it be behind the scenes of research and development, actually treating patients, or working with diagnostic imaging to help diagnose patients. We have a wealth of faculty, not only academic but clinical as well."

Ramsey explained that to become a medical physicist requires completion of an accredited course of study and a two-year residency, much like other careers in medical fields.

The Commission on Accreditation of Medical Physics Education Programs gave its approval to UT's program in

Robbins positions a head guard in front of a linear accelerator, a device used to deliver targeted laser therapy to cancerous spots in the head.

2019, making it one of just 60 accredited programs in the US and Canada.

While there is a demonstrated growing need for professionals in the field, the rigorous process and relatively small numbers of accredited educational programs have led to a situation where demand far exceeds supply.

For programs like UT's, that means there's no shortage of interested students, allowing the department to be selective while also filling a national need.

"You have to have a degree from one of these accredited degree programs and then you have to complete a two-year residency in either diagnostic imaging or radiation therapy before you're allowed to sit for your board exam," said Ramsey. "So in addition to the training students get in the classroom, our program connects them with residencies at places like Covenant, Tennova, UT Medical Center, and Provision, allowing them to take clinical rotations and complete that crucial step."

Howard points out that the experiential requirement is so important that it was a part of the discussions on how to build out the program from the very start.

It also led to them placing a soft cap on the number of students that they admitted to the program in a given year, so that they could be certain that anyone who came for the

"When you can train students that can go out and help fight cancer, help change lives, it's its own reward." **-Michael Howard**

courses could also meet the clinical experience requirement when applying for residencies.

"We didn't want to build a program where students came, graduated, and couldn't get into residencies, so that was something that was a key to our plans from the start," said Howard. "In setting it up, we also determined that we wanted to try to limit each new class of students to 10 people, so that there would be plenty of hands-on training to go around."

Clinical experience also gives students the chance to learn and research the latest technologies in the field, something Ramsey said would also make the students attractive candidates for residencies that lead to eventual certification.

"It's a highly in-demand job right now and will only get bigger," he said. "But even within that, our students will stand out because of their experiences and exposure to different machines and techniques. If you have two candidates that are otherwise equal but one has experience with performing task A and the other can perform tasks A, B, C, and D, it obviously elevates them. And that's what we're doing for our graduates."

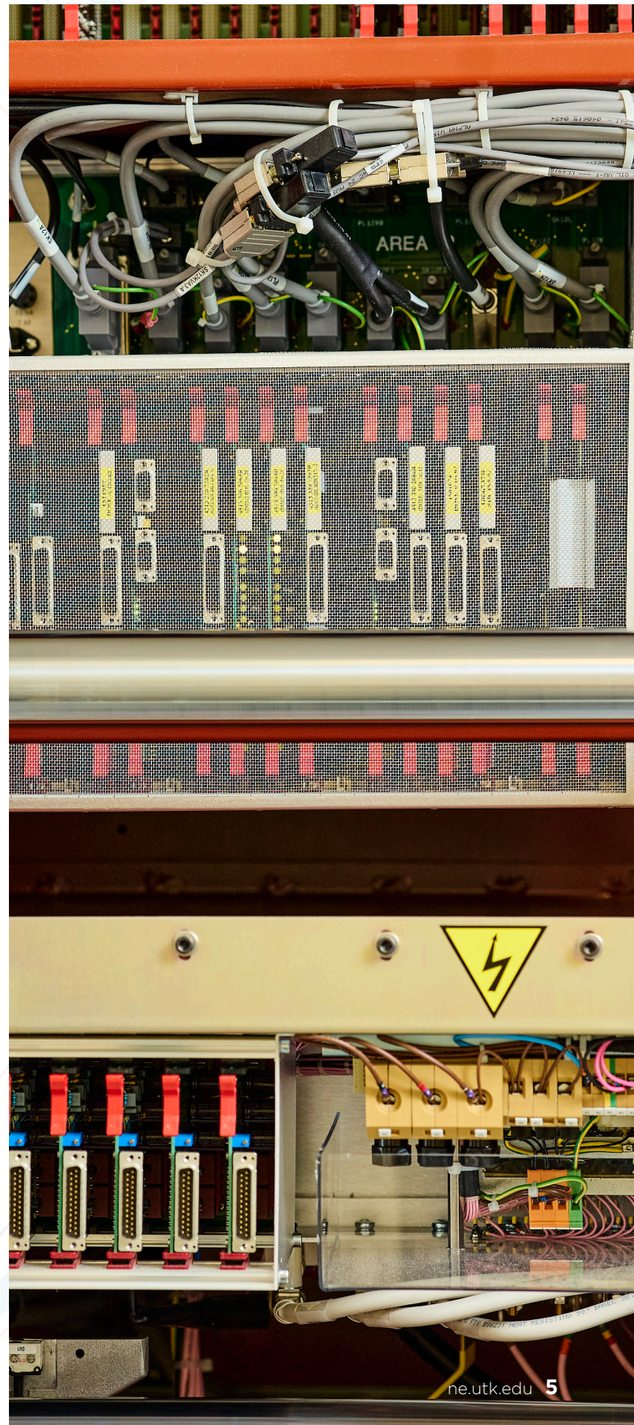
One of the concerns they had for the new program was that students might be hesitant to come since there wasn't a long history of successes.

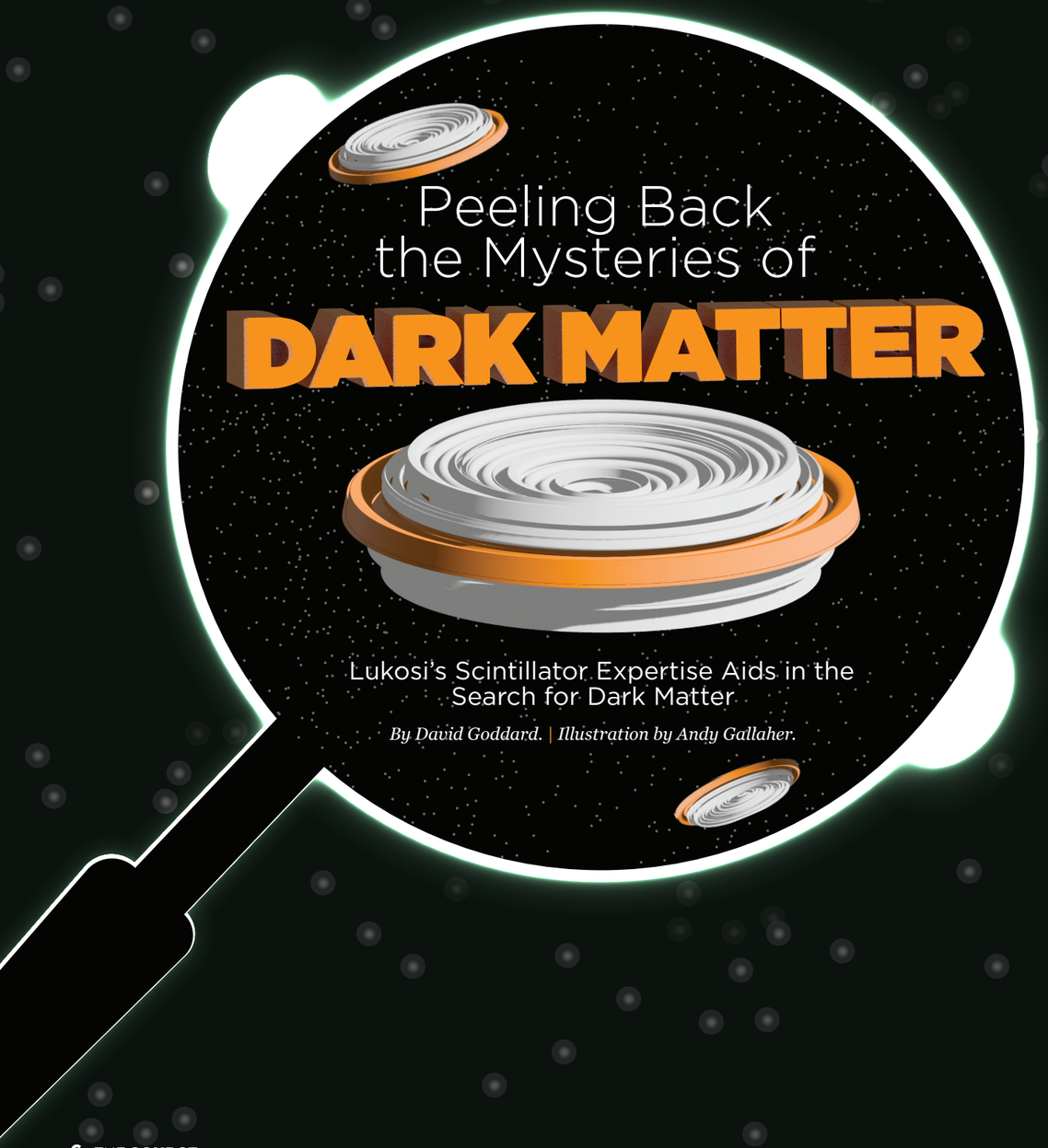
Their successes so far have allayed those fears. A steady stream of inquires has continued to come in, reflecting the desire for the program in general and the early success that the department has had with it.

Those accomplishments, ultimately, will help improve the lives of millions of people stricken with cancer.

"Pretty much everyone in the world has been touched by cancer—whether they had it themselves or a friend, or a loved one, or a coworker had it," said Howard. "When you can train students that can go out and help fight cancer, help change lives, it's its own reward."

One student at a time.





Could a banana contain the necessary ingredients to solving one of the great mysteries of science? If so, it might actually be two bananas—specifically, two bananas' worth of potassium.

Unlocking the connection between precise measurements of potassium and a potential discovery of dark matter requires world-class expertise in radiation detection. Associate Professor Eric Lukosi and his research team have utilized potassium-containing scintillators grown in UT's Scintillation Materials Research Center to help further the quest to understand dark matter—a field with numerous other applications for life on earth.

When astronomers started looking at the universe, it seemed that there was a lot more matter than they could observe visually. It is hypothesized that most matter in the universe—about 85 percent—is made of unknown dark matter.

In essence, the search for dark matter is a search to understand what the universe is made of. Scientists don't really know what dark matter is, just that it interacts gravitationally, and theories hold that it is made up of exotic newly identified particles.

Experiments throughout the world have been looking for this dark matter for over three decades without much success. The DAMA (DArk MAtter) experiment, running since 1997, claims to have observed dark matter, although that finding is countered by the results of many other experiments in the field and there is no widely accepted explanation for the DAMA claim.

Part of the answer may lie with radioactive isotopes of potassium, an extremely widespread element. Some theorists hypothesize that understanding how the radioactive potassium in dark matter decays could help build an understanding of DAMA's claim.

With that end in mind, Professor Philippe Di Stefano in the Department of Physics, Engineering Physics, and Astronomy at Queen's University in Canada is leading a collaboration that is working to measure a rare decay mode of potassium.

"Studying potassium will help understand the background in DAMA and other experiments," said Di Stefano. "If this rare decay is found to be relatively frequent, theorists have argued it would tend to disfavor the DAMA dark matter interpretation."

The results will also help the geochronology community improve the precision of the K-Ar dating technique, which determines the age of rocks by measuring their ratio of radioactive argon to radioactive potassium.

The collaborative study, which involves several UT graduate students, utilized an enriched potassium source prepared by Oak Ridge National Laboratory with the radioactivity equivalent of two bananas, a silicon drift detector developed by the Max-Planck Semiconductor Laboratory in Munich, and the modular total absorption spectrometer at ORNL to obtain the first experimental measurements of this rare decay mode.

For statistical and independent verification reasons, Di Stefano sought Lukosi's expertise using potassium-containing scintillators. Unlike the silicon drift detector, these scintillators contain the radioactive element itself, greatly increasing the data rate and reducing the required measurement time.

The scintillator used potassium strontium iodide, or $KSr_2I_5(Eu_{2+})$, with a double window readout.

"The two windows helped with reducing noise, because the rare decay we seek emits very low energy electrons and X-rays around 3 keV, very close to the noise floor," said Lukosi. "Therefore, real events are identified when both readouts on the scintillator fire and are correlated to signals in MTAS [the modular total absorption spectrometer]. By measuring the rate between the two scintillator readouts and coincident events in MTAS, we are able to determine the probability of the rare decay mode of potassium."

The methodology has been tested and published, and the team is now applying the methodology to potassium decay.

SOBES CRACKS CODE

ON BETTER CROSS-SECTIONS

By Élan Young.

Neutrons in a reactor may move at a variety of speeds, but the slow-moving ones have the highest probability of creating fission. The quantification of this probability, known as a cross-section, is important for nuclear reactor engineers to be able to increase the incidence of fission.

UT Assistant Professor Vladimir Sobes and MIT PhD student Pablo Ducru, along with other collaborators at MIT, recently demonstrated a new formula that streamlines the calculations of cross-sections and adds rigor to the results.

The research, which took seven years to complete, was recently published in *Physical Review C*. The contribution to science could change the industry's approach to cross-section modeling.

"It was a great pleasure to work with Pablo and our other collaborators at MIT," said Sobes.

Nuclear reactor engineers purposefully slow down neutrons in a reactor with hydrogenous materials such as water or graphite to get them to the speed at which they are likely to cause fission. A fission event then creates more fast-moving neutrons that will need to be slowed down again. Thus, the neutrons that create fission energy in a nuclear reactor travel in a closed loop.

To keep this loop producing the right amount of energy, engineers need to be able to predict the behavior of nuclear reactors, which depends on knowing the probability that a neutron will create fission as a function of kinetic energy. This requires computer simulations that use collected cross-section data—every known incident of a neutron hitting another atom. This data is stored in vast digital libraries managed by international communities, such as the US database in the Evaluated Nuclear Data File at Brookhaven National Laboratory's National Nuclear Data Center.

The research sought the best formula to accelerate the simulation of the nuclear reactors. Sobes and Ducru's contribution is a mathematically optimal way to store the cross-section information.

The results are much clearer than the current industry standard, the Wigner–Eisenberg parameters. Changing the format for how cross-section information is stored for the future creates a formula that—much as the Kelvin scale of temperature resolved ambiguities between the Celsius and Fahrenheit scales—can serve as a universal standard.

Vladimir Sobes

Star Power

Casali Named ITER Scientist Fellow

Earns Department of Energy Early Career Award

By David Goddard. | Photography by Randall Brown.

Zinkle Faculty Fellow and Assistant Professor Livia Casali is a well-known figure in the world of nuclear fusion. She spent several years with General Atomics, where she worked on the DIII-D tokamak, the largest magnetic fusion device in the US, and where she still leads the core-edge research area. She also spent several years at the Max Planck Institute for Plasma Physics in Germany working on another world-leading tokamak, the ASDEX Upgrade, on both experiments and state-of-the-art computational modeling.

Now she's getting double honors for her contributions to the study of fusion, as ITER has named her an ITER Scientist Fellow and the US Department of Energy (DOE) has recognized her with an Early Career Award.

"I'm extremely honored to have received these recognitions, which also highlight and validate the work we are doing in the department to achieve fusion," said Casali. "Fusion has the ability to solve our energy needs in an environmentally friendly way, and we are working to overcome some of the challenges that are keeping it from commercial viability. These honors will help my research in those efforts."

Casali's focus is on what is known as core-edge integration, where the need to get temperatures in the core hot enough for plasma to be produced is met in a way that doesn't impair the fusion reaction by degrading the edges of the vessel containing the plasma.

Because the core and the edge of the plasma are governed by different physics, understanding how these regions interact and can be integrated represents an extraordinary challenge that encompasses a wide range of spatial scales and a broad energy and temperature range. Core-edge integration represents a critical step toward fusion and the limitless source of clean energy it can provide.

ITER Scientist Fellows are chosen from leading researchers who have achieved international recognition for their contributions to fusion research. One of the many benefits of Casali's selection is the opportunity for her graduate students to spend time in France at ITER with scientists from around the world, boosting their experiences as well as the reputation of the department, college, and university.

Her DOE-funded project, "Innovative Core-Edge Solutions for Tokamaks," is providing new modeling in core-edge plasma integration and applying the knowledge gained to obtain feedback on current experiments and help plan future ones.

"Students will benefit from close ties to the ITER team and access to a world-class scientific and technological environment while also having the chance to participate in my DOE project," said Casali. "Students will be instrumental in the next generation of fusion devices, and this gives them exposure to that."

While the awards honor Casali's past achievements, they also help build a better future for all.

Faculty, Staff, & Students Honored for Achievements

By Kathy Williams.

Each spring, the Department of Nuclear Engineering honors its most outstanding students, faculty, and staff with awards. The recipients are chosen based on academic achievement, excellence in research, and impact over the previous year. Below are this year's departmental award winners:

Faculty and Staff Awards

Sandra Bogetic & **Jason Hayward**
NE Professors of the Year

Jun Ren
Research Excellence Award

Tonya Mathes
Outstanding Staff Award

Eric Lukosi
Faculty Service Award

Ashley Nelkin
Staff Service Award

Gina Hale
Outstanding Staff Peer Award

Student Awards

Jose March-Rico
PhD Graduate Research Excellence Award

Jack Morrison
Master's Graduate Research Excellence Award

Son Quang & **Khian Skidmore**
Outstanding Graduate Teaching Assistants

Gabe Lentchner & **Darrell Russell**
Outstanding Undergraduate Researchers

Everett Cavanaugh, Sydney Copp, Ed Duchnowski, Alyssa Hayes, Emma Houston, & **Katy Worrell**
Monthly Student Service Awards

Bailey Bertrand
Outstanding Undergraduate Tutor

Sophie Hitson, Libby Smoak, & **Anthony Tom**
Outstanding Student Ambassadors

Academic Student Awards

First-years: **Evan Brown, Adam Buchalter, Rory Coll,** & **Madison Vandergriff**

Sophomores: **Cade Abbott, James Carnal,** & **Bradley Moore**

Juniors: **William Fritsch, Frederic Harris, Sophie Hitson, Marissa Knofczynski,** & **Gabe Lentchner**

Seniors: **Annie Berens, Kenneth Bott,** & **David Burgess**

NE Professors of the Year Sandra Bogetic and Jason Hayward

Outstanding NE student ambassadors (from left) Anthony Tom, Professional Advisor Amanda Lovelace, Sophie Hitson, and Libby Smoak

NE student academic award recipients (from left) Cade Abbott, Bradley Moore, Gabe Lentchner, Sophie Hitson, and Frederic Harris

UT AGAIN TOPS NUCLEAR ENGINEERING UNIVERSITY PROGRAM SCHOLARS LIST

By Melissa Callahan.

The US Department of Energy's Nuclear Engineering University Program recently announced more than $5 million in undergraduate scholarships and graduate fellowships. UT students received a total of 12 of the 61 awards—putting the university at the top of the 32 schools whose students received awards.

The recipients are students pursuing degrees in nuclear engineering and other fields relevant to nuclear energy.

"We are incredibly proud of the caliber of students that our program attracts," said Wes Hines, department head, Postelle Professor, and Chancellor's Professor. "These scholarships are very competitive and demonstrate the quality of the talent pool that UT cultivates to advance the field of nuclear engineering."

Undergraduate scholarship recipients are Riley Burnette, James Carnal, Frederic Harris, Zach Hughes, Gabriel Lentchner, Eli Logan, and Hayden Sobas, all studying nuclear engineering, and Paul Harmston, studying physics. Undergraduate awards provide $10,000 to help cover education costs for the upcoming year.

Three-year graduate fellowships went to UT students Annie Berens, Jack Fletcher, Mason Fox, and Kyra Lawson. Fellowship awards provide $52,000 a year to help pay for graduate studies and research, and an additional $5,000 to fund an internship at a US national laboratory or other approved research facility.

Since 2009, the program has given almost 900 scholarships and fellowships totaling approximately $55 million to students pursuing degrees related to nuclear energy.

UT HOSTING 2023 ANS STUDENT CONFERENCE

By Adria Amos.

UT has been selected to host the 2023 American Nuclear Society student conference, to be held April 13–15, 2023. The conference is expected to attract around 450 students and 120 professionals to campus and Knoxville, which is good for both UT and the more than 100 nuclear-related companies in the region.

Wes Hines, department head, Postelle Professor, and Chancellor's Professor, called the opportunity a game changer. The department will be able to showcase its state-of-the-art facilities in the new Zeanah Engineering Complex, while industry partners will be able to connect with talented researchers from across the country.

"This will help us all recruit the best and brightest to the greater Knoxville area," Hines said.

The conference will provide students with opportunities to present research in 16 technical tracks and attend professional development workshops and panels. In addition, the committee is organizing tours of leading research facilities like ORNL and Y-12 National Security Complex.

UT's ANS student organization first considered hosting the event in summer 2021 after Associate Professor Nicholas Brown, who was the faculty advisor at the time, suggested the possibility. They were excited by the idea and quickly organized, preparing a bid in time for the October deadline.

American Nuclear Society
University of Tennessee

"We had a really solid group of people working on it, and we were able to divide the work," said Sydney Copp, communications chair for the planning committee.

Several sponsorship tiers are available for those who want to help support the event and participating nuclear engineering students. If you're interested, please email the planning committee at *ans23stucon@gmail.com*.

week in the life

Alex Solomon and Evan Williams

By Alex Solomon.

Pietro F. Pasqua Fellow and Associate Professor Maik Lang and graduate students Alex Solomon and Evan Williams traveled to the GSI Helmholtz Center for Heavy Ion Research in Darmstadt, Germany. Once there, they did just that: heavy ion research. The students are part of the Disordered Materials (DISMAT) Group, led by Lang.

"The experiment we performed utilized a synchrotron accelerator which produced uranium ions with extremely high energies of 60 GeV, or about 60 percent of the speed of light," said Solomon. "These uranium ions bombard both macroscopic single-crystal samples and microscopic polycrystal samples. The latter were maintained at extremely high pressure (500,000 atm); normal atmospheric pressure is 1 atm) while RAMAN spectroscopy was used to observe changes in the crystallinity of the samples under these extreme environments."

However, there was also time for cultural activities while being in Germany.

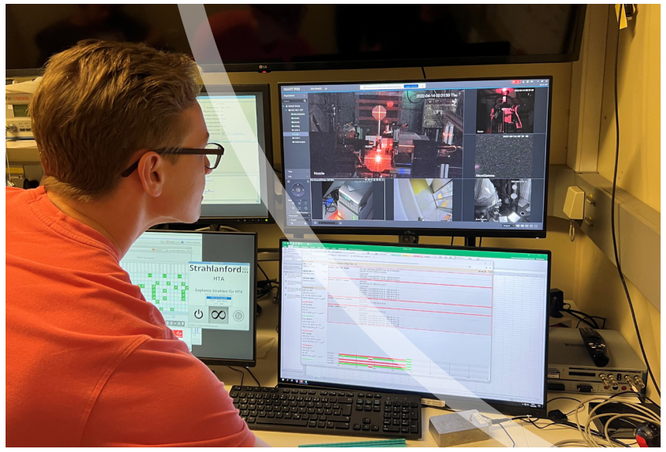
Here we are shown in front of the gate entering the GSI complex, which will soon undergo some restructuring (one of the largest research projects worldwide) and will be renamed FAIR (Facility for Antiproton and Ion Research). Upon arriving at the GSI Helmholtz facility, we were given a tour of the GSI complex.

During our time at GSI, we were able to tour the facility and learn about their many labs. We saw a wealth of accelerator technologies in action, starting with the linear accelerator that was responsible for the first creation of elements Bohrium (107) through Copernicium (112).

Our tours extended to the detector laboratory, which has produced advanced instrumentation for the detection of new particles at both GSI and CERN. In the detector laboratory we were shown the large clean room where nano-thickness semiconductors and high spatial resolution ionization chambers are used to fabricate many of the world's premier particle detectors.

This photo shows me demonstrating the secure entry process that must be used due to the use of radiation. The extremely high energies used allowed us to fully penetrate crystal samples with millimeter thicknesses.

As the heavy uranium ions are slowed from 60 percent of the speed of light to a halt, they impart massive amounts of energy to the crystals, changing them significantly. The research group we were with focuses on understanding the interaction of these heavy, fast ions with materials. Once these samples are no longer radioactive, we will characterize their structural modifications using domestic synchrotron X-ray light sources (electron accelerators).



In this image, I am looking at the beamline controls and monitor. Each bunch contains approximately 100,000,000 ions, providing a sufficient particle flux to extensively modify our samples.

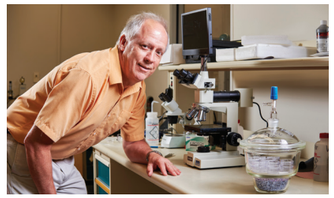
Upon arriving in Germany, we traveled to the romantic town of Heidelberg, nestled in a valley along the Neckar River, about an hour south from the accelerator facility. There, we explored the local cuisine and springtime scenery before setting off for our experiment.

Accelerator technologies are always advancing, with new facilities expanding on their predecessors to explore higher energy physics. The FAIR site is one such example. Here we stood atop the construction site of the massive synchrotron accelerator that will be used for antimatter experiments.

Here, Williams is shown adjusting the output frequency utilized to count the numerous ions imparted on the samples.

After the conclusion of a successful experiment, we spent our remaining time in Germany visiting the cities and the countryside, which is riddled with castles spanning one millennium of European history.

FACULTY NOTES



Zinkle Receives TMS Leadership Award

UT-ORNL Governor's Chair for Nuclear Materials **Steven Zinkle** is the 2022 recipient of the Minerals, Metals, and Materials Society Leadership Award. The society gives this award annually to an individual with exceptional leadership in the national and international metallurgy and materials fields from within an industrial, academic, governmental, or technical organization.

Zinkle was recognized for his research utilizing microstructure–property relationships, which has enabled improved understanding of operational limits and design strategies for high-performance radiation-resistant materials. He has also been active in a variety of national materials research leadership roles, including membership on the National Academies National Materials and Manufacturing Board and the Condensed Matter and Materials Research Committee.

The award was formally presented in March during the society's annual meeting in Anaheim, California.

Lukosi Wins ARPA-E OPEN Funding

Associate Professor and Assistant Head for Research and Facilities **Eric Lukosi** recently received funding from the US Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E) OPEN program for the grant "Microfluidic Alpha Spectrometer for Materials Accountancy and Control in Liquid-Fueled Molten Salt Reactors," which was funded for $2,418,576 over a period of three years.

ARPA-E was implemented to advance high-potential, high-impact energy technologies that are not yet ready for private investment. With this financial boost, Lukosi and his research team aim to develop an alpha spectrometer that can withstand heat and the corrosive environment of a liquid-fueled molten salt reactor and be used by in-house operators for on-site measurements.

One of the goals of this project is to develop a technology that can guide policy development for the Nuclear Regulatory Commission. Lukosi's system aims to be less complex, less expensive, and deliver results with the accuracy to hold up to the rigorous NRC regulations.

Faculty Take on New Leadership Roles in Department

Associate Professors **Eric Lukosi** and **Nicholas Brown** have taken on new departmental leadership roles. Lukosi is now assistant head for research and facilities and will oversee and review campus and state licenses related to radiological materials, ensure radiological sources and devices are handled and stored safely, assist with development of future core facilities documents and plans, and help with research space needs. Brown replaced UCOR Fellow and Professor Jason Hayward as assistant head for graduate studies and will be responsible for all tasks related to graduate students, including recruitment, admission, orientation, student offers, and advising graduate students who do not have an advisor.

TCE Honors Brown and Maldonado

Each spring during its annual faculty and staff awards celebration, the college honors outstanding faculty who have gone above and beyond to help make the college successful. Two NE faculty received awards this year.

Associate Professor and Assistant Head for Graduate Studies **Nicholas Brown** received the Professional Promise in Research Award, which recognizes tenured or tenured-track faculty members at the assistant or associate professor rank who have received national or international recognition in their field and show professional promise in their research.

Professor **Ivan Maldonado** received the Research Achievement Award, which recognizes tenured faculty members who have been tenure-line for more than 10 years and have received national or international recognition in their field.

Arndt Named American Nuclear Society President

In June, Adjunct Professor **Steven Arndt** began a one-year term as president of the American Nuclear Society. Arndt is an ANS Fellow and has been a member of the society since 1981. Over the years, he has served on the board of directors and as the national ANS treasurer. He worked at the Nuclear Regulatory Commission for 31 years before retiring in 2021. Arndt joined the department as an adjunct professor in 2016 and since 2021 has been serving as a distinguished scientist at ORNL.

Brown Granted Tenure

Associate Professor and Assistant Head for Graduate Studies **Nicholas Brown** has been granted tenure. Brown joined the department in 2019 after working at Penn State University, ORNL, and Brookhaven National Laboratory. He was recently named assistant department head for graduate studies. Brown's research focus includes reactor safety and nuclear fuel safety as well as advanced reactor analysis and design.

New Faculty Member Adds Focus for Medicine Applications

By Randall Brown.

A new assistant professor is adding to the dynamic range of study and approaches for nuclear engineering at UT.

Ivis Chaple came to Rocky Top in August after completing a postdoctoral research associate position at Los Alamos National Laboratory, where she was part of the Inorganic, Isotope, and Actinide Research group in the Chemistry Division.

Chaple earned her PhD in 2021 from the University of Alabama at Birmingham under the supervision of Professor Suzanne Lapi. She offers two main goals as she joins the faculty:

"I hope to develop and expand the medical radiochemistry program, with an emphasis on development of radiopharmaceuticals for diagnosis and targeted therapy of diseases such as cancer. Additionally, as the first Hispanic tenure-track female in the department, I hope to help bring equity and diversity to the department and the field of radiochemistry through my team of researchers and students."

The department welcomes Chaple and looks forward to the knowledge and experience she brings to the spectrum of research and teaching at UT.

NEUP SUPPORTING A **TRIO OF FACULTY-LED PROJECTS**

By David Goddard.

The US Department of Energy created its Nuclear Energy University Program to help the country retain its leadership role in nuclear research by providing funding opportunities for faculty and students across the country.

In addition to UT students who have received undergraduate and graduate student awards through the program (see page 11), three nuclear engineering faculty members recently had initiatives selected for support totaling nearly $5 million. Each of the project teams include multiple department members.

"We are very proud of our faculty and their accomplishments in helping make this department one of the best in the country," said Postelle Professor, Chancellor's Professor, and Department Head Wes Hines, who leads one of the projects.

Familiar Faces

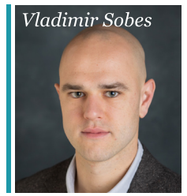
Interestingly, two of the collaborators on the project from Idaho National Lab are UT alumni.

Research Scientist Vivek Agarwal got his master's in electrical engineering in 2005, and Postdoctoral Researcher Cody Walker earned his bachelor's, master's, and doctorate in nuclear engineering in 2015, '17, and '20, respectively.

Southern Company Faculty Fellow and Associate Professor Jamie Coble leads the project, "Developing the technical basis and risk assessment tools for flexible plant operation," along with Associate Professor Nicholas Brown and researchers from other institutions.

It was chosen as a DOE Integrated Research Project, one of just seven so designated in the country. They typically are made up of a group of universities and research entities and offer the capabilities of DOE labs. They also come with multi-million-dollar funding, in UT's case $4 million.

Accordingly, they also aim to tackle in-depth problems. In this case, the goal is to further expand nuclear's important role in fighting climate change by exploring the use of nuclear plants in other "green" areas like hydrogen production, desalination, and production of petrochemicals and synthetic fuels.


Vladimir Sobes


Jamie Coble


Wes Hines

"Our goal is to explore new ways of thinking about what a nuclear plant in the currently operating fleet can accomplish outside of its traditional, baseload power-producing role," said Coble. "This project will help further increase the impact that nuclear energy can have on meeting and exceeding our climate goals, as well as providing a safer, cleaner alternative to the production of some materials that now are done via chemical plants in many cases using electricity and heat produced through 'dirty' means."

The next project is led by Assistant Professor Vlad Sobes, "Extending the HMF71 Benchmark Series for Graphite Reflector Thickness up to 18 Inches." It also includes department Hall of Fame inductee John Mihalczo, among other researchers, and is part of NEUP's Research and Development Awards.

Their goal is to extend the knowledge gained by a series of tests conducted under the International Criticality Safety Benchmark Evaluation Project.

Those tests created a data set that focused on how graphite reflectors affected criticality. Only reflector thicknesses of one and two inches have been studied so far.

What Sobes and his team hope to do is gain a deeper understanding of nuclear reactions in graphite by analyzing the data for critical experiments with graphite reflector thicknesses between three and 18 inches. They gained funding of $400,000 as part of the effort.

"There is real history with these original tests that we felt was at risk of being lost, so the first thing we want to do is make sure that gets saved," said Sobes. "Also, trying to reproduce these tests today would be very cost prohibitive. By accessing the historical data, we can extrapolate out what the results would be for some currently proposed advanced nuclear reactors."

Led by Hines, the third project is, "Construction of a Flexible Fast Flux Facility for Cross Section Measurement, Benchmarking, and Education." Part of NEUP's Infrastructure Grants, it also includes Sobes, Assistant Professor Sandra Bogetic, and UCOR Fellow and Professor Jason Hayward.

The heart of this project also lies in the heart of how the new Zeanah Engineering Complex can help the department with its massive new research spaces, in this case the Fast Flux Facility (FFF).

Through the FFF, Hines and the team will be able to experiment with many different reactor designs, develop new ones, and make them more financially advantageous overall.

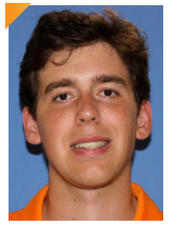
"Modeling and simulation are critical in the design and licensing of advanced nuclear reactors, but there is a shortage of data, resulting in model uncertainty requiring more conservative designs," said Hines. "The FFF will allow us to fill in those gaps, resulting in more cost effective and fiscally competitive designs."

That project is receiving $319,000 in support.

AWARD PROGRAM HIGHLIGHTS **VOLUNTEER SPIRIT**

By Kathy Williams.

Last fall, the department established a Nuclear Engineering Service Awards program to reward students for their voluntary activities and to encourage continued leadership and excellence. Four awards, each including $500 and a certificate, are distributed to both undergraduate and graduate students each academic semester. Below are fall 2021 and spring 2022 recipients (only three awards were given in fall 2021):



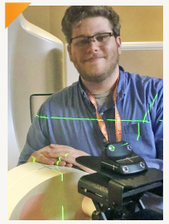
Stanley "Glenn" Parris has worked as a student assistant in the department's business office since 2021 and was a tremendous help when the department moved to the Zeanah Engineering Complex. He has a strong work ethic, is always willing to go above and beyond to help, and is a smiling and welcoming face for students, faculty, and visitors to the office.

Doctoral student **Sydney Copp** (BS NE '22) exemplifies the Volunteer spirit by being a mentor and leader for the department and UT. She has served as the American Nuclear Society chapter's graduate student representative as well as communications chair for the ANS conference proposal committee.

Doctoral student **Edward Duchnowski** was instrumental in making this year's graduate recruitment event a success. He planned and coordinated all the activities during the event and served as the face of the department's graduate student body. He went above and beyond to help the Nuclear Engineering Graduate Student Assembly and department.

PhD candidate **Alyssa Hayes** has taken her passion for nuclear engineering beyond the confines of the classroom and into the political sphere. In addition to working toward enhancing the department's culture of diversity and inclusion, she has devoted much of her time at UT to advocating for nuclear energy policy at the federal level and has even testified to the Illinois legislature to help save nuclear energy in the state's clean energy policy.

Emma Houston (BS NE '22) was an outstanding ambassador for the department and always willing to help with any outreach initiatives or programming events happening in the department. She was a leader for the American Nuclear Society chapter and Women in Nuclear organization, and was instrumental in securing the proposal win for the 2023 ANS student conference to be held at UT.



Master's student **Everett Cavanaugh** is in the medical physics program and is helping develop a new medical physics lab curriculum. He has provided key input as a student advocate by identifying the lab topics and timing that would be most beneficial to incoming medical physics students. He participated in an internship at Thompson Cancer Survival Center, where he showed deep compassion and kindness to the cancer patients he met.

Katy Worrell, now a senior, is both an officer of UT's American Nuclear Society chapter and a crucial member of its Proposal Writing Committee. As ANS secretary, Worrell coordinates events for the chapter that develop its members and help grow the ANS network. Among her other responsibilities, Worrell was logistics chair for the proposal to bring the 2023 ANS student conference to UT.

STUDENT NOTES

Allen Receives Chancellor's Award

Senior **Madison Allen** received the Commission for Disability Undergraduate Student Award at the Chancellor's Honors Banquet in the spring. The award honors an undergraduate student who is a champion for support and recognition of people with disabilities. Allen is a survivor of bilateral retinoblastoma (cancer in both eyes), which left her visually impaired. She is majoring in nuclear engineering and medicine with minors in physics and jazz saxophone. Her career plan is to work in nuclear medicine and radiation therapy treatment.

Reyes Zacarias Selected for IAEA Fellowship

Graduate student **July Reyes Zacarias** is one of 110 women students from 77 countries around the world to be selected to receive scholarships under the International Atomic Energy Agency's Marie Sklodowska-Curie Fellowship Programme. The program offers women an opportunity to pursue studies towards a master's degree in the nuclear field through financial support and practical experience.

Reyes Zacarias wants to help her home country of the Dominican Republic develop nuclear power. A second-year nuclear engineering doctoral student, she is pursuing a concurrent master's degree in materials science and engineering with a focus on nuclear materials. She is a graduate research assistant in Governor's Chair for Nuclear Materials Steven Zinkle's research group, where her research focuses on additive manufacturing techniques for extreme environmental conditions such as power plants.

NE Students Receive Volunteer of Distinction Awards

Four nuclear engineering graduates received Volunteer of Distinction awards from the Office of the Provost last spring. **Annie Berens**, **Kenneth Bott**, and **David Burgess**, who graduated with their bachelor's degrees in May, received the Top Collegiate Scholar Award, which honors seniors who hold the highest GPAs in their college. **Neal Gaffin** (PhD NE '22) received the Professional Promise Award, which honors the professional promise in teaching, research, or other contributions of graduate students receiving their degrees in 2022.

Health Physics Society Wins Student Engagement Award

The Health Physics Society student chapter won the Outstanding Commitment to Innovative and Creative Programming Award from the Office of Student Engagement in honor of its excellence in the development and implementation of an original program. The award is given to registered student organizations that have demonstrated the growth of students and enhancement of campus life, and new ideas, methods, or programs that result in improved educational activities or services for the campus community. The organization is advised by John D. Tickle Professor Lawrence Heilbronn.

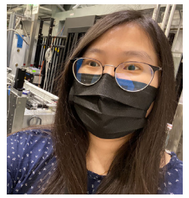
Gaffin and Solomon Receive Innovations in Nuclear Technology R&D Awards

Recent publications relevant to nuclear technology have earned nuclear engineering PhD students **Neal Gaffin** and **Alexandre Solomon** Innovations in Nuclear Technology R&D Awards.

Gaffin won second place in the open competition in the category of advanced fuels. His award-winning research paper, "Consolidation Behavior of Mo30W Alloy Using Spark Plasma Sintering," was published in the *International Journal of Refractory Metals and Hard Materials* in April 2022.

Solomon won a prize in the competition for students at universities with less than $600 million in 2020 R&D expenditures. His award-winning research paper, "Transformations to Amorphous and X-Type Phases in Swift Heavy Ion-Irradiated Ln2O3 and Mn2O3," was published in the *Journal of Applied Physics* in June 2021.

The Innovations in Nuclear Technology R&D Awards program, sponsored by the US Department of Energy and Office of Nuclear Fuel and Supply Chain, awarded 22 prizes this year. Award winners received a monetary gift and will have opportunities to participate in events that are designed to engage students in advancing innovations in nuclear technology research.



Chong's Neutron Scattering Detector Smashes a Scientific Record

Recent doctoral graduate **Su-Ann Chong**, in collaboration with the Spallation Neutron Source detector development group, successfully demonstrated the first scalable neutron detector that can look directly at the world's second-brightest neutron source—the equivalent of taking off the protective glasses to perceive an eclipse directly. Her device represents a breakthrough in scientific achievement that is expected to speed up the time it takes to do high-impact neutron science research by at least three orders of magnitude.

To maximize the rate capability of the neutron detector, Chong emphasized a pixelated design. The challenge of such a design comes from the large number of electronics that scale with the number of pixels. Chong leveraged the use of small, compact ASIC—Application Specific Integrated Circuit—chips that can handle a high number of channels. ASIC chips have an integrated circuit designed for specific user requirements.

Chong spent five years researching how to increase the rate for neutron detectors at the SNS, which is part of a scientific quest spanning the two decades that the SNS has been in operation. Other researchers have sought to make higher-rate detectors, but the results have not been scalable up to necessary sizes or fail to meet other requirements. The difference between the existing neutron detectors and Chong's is comparable to the difference between a camera that shoots pictures one by one and one that can capture a video sequence at a high frame rate.

Now that she has completed her degree, Chong is continuing to work at the SNS, where scientists and engineers are ramping up their efforts to prepare for the installation of the Second Target Station. Her research has been submitted for peer-reviewed publication.

New Members Join Alpha Nu Sigma Honors Society

The Alpha Nu Sigma Honors Society was established to recognize high-achieving students in nuclear engineering. It is highly selective, with only the top quarter of juniors, the top third of seniors, and the top third of graduate students qualifying as candidates.

New members include:

Madison Allen
Ty Austin
Oliver Baldwin
Jonathan Barthle
Bailey Bertrand
Cade Brinkle
Kenneth Bott
Alexander Choi
Kailee Collins
Casey Corbridge
Lance Drouet
Daniel Fishman
William Fritsch
Carlotta Ghezzi
Sophie Hitson
Zachary Hughes
Gabe Lentchner
Marissa Knofczynski
Noah Marks
Nicholas Militello
Miller McSwain
Eric Olson
Cale Overstreet
Hunter Salmon
Ryan Tan
Anthony Tom
Christian Young

Students Receive First Step Award

The First Step Awards recognize nuclear engineering students for publication of their first peer-reviewed journal article. To qualify, the student must be the first author on the article, signifying that they led the research, analysis, and writing of the paper. Here are the 2021–22 recipients:

- **Corey Ahl**—"Initial Evaluation of a Multimodal Diamond Sensor for Simultaneous Temperature and Radiation Measurements," *Applied Physics Letters*
- **Neal Gaffin**—"Consolidation Behavior of Mo30W Alloy using Spark Plasma Sintering," *International Journal of Refractory Metals and Hard Materials*
- **Sawyer Irvine**—"Radiative Transition Probabilities of Neutral and Singly Ionized Europium Estimated by Laser-Induced Breakdown Spectroscopy," *Journal of Quantitative Spectroscopy and Radiative Transfer*
- **Samara Levine**—"Phase Instabilities in Austenitic Steels during Particle Bombardment at High and Low Dose Rates," *Materials and Design*
- **Elizabeth Lindquist**—"Reconfiguration of an Electrothermal Arc Plasma Source for In Situ PMI Studies," *Fusion Science and Technology*
- **Miles O'Neal**—"Assessment of BISON Capabilities for Component-Level Prediction of Tritium Transport in Fusion and Fission Applications," *Fusion Engineering and Design*
- **Alex Solomon**—"Transformations to Amorphous and X-Type Phases in Swift Heavy Ion-Irradiated Ln_2O_3 and Mn_2O_3," *Journal of Applied Physics*
- **Adrian Terricabras**—"Characterization of High Thermal Conductivity Fuel Surrogates before and after Ion Irradiation," *Journal of Nuclear Materials*
- **Pengcheng Zhu**—"Toward Accurate Evaluation of Bulk Hardness from Nanoindentation Testing at Low Indent Depths," *Materials and Design*

PhD Student of the Year

Engineering Vol Community Helps March-Rico Build Multidisciplinary Skill Set

Writing and Photography by Randall Brown.

Knoxville native and 2017 Rickover Fellowship recipient Jose March-Rico earned the department's PhD student of the year recognition for his work with the research team of Governor's Chair for Computational Nuclear Engineering Brian Wirth.

He investigates the breakaway irradiation growth phenomenon in zirconium cladding material to understand the physical mechanisms that occur and to improve predictive capabilities of microstructure evolution in those alloys.

"The recognition of my PhD research largely stems from the scope of my work, which bridges several orders of magnitude in the length and time scales," said March-Rico. "This is necessary in order to develop a cohesive and physically meaningful model."

Most current models use manually adjusted input and unphysical assumptions to get what is considered the right answer, he explains. He seeks to instead develop an accurate model that identifies the specific mechanisms that bring about that answer.

March-Rico's main role within the Wirth group is maintaining innovative and honest research to further the nuclear engineering community's ability to model irradiation damage in materials.

"This includes traveling to conferences to interface with the community at large and share our approach to solving current issues," he said. "My other roles include mentoring incoming students and teaching the occasional lecture to pass on knowledge to the next generation."

His focus on the way materials react to irradiation has a foundation in his undergraduate major in materials science and engineering.

"For my nuclear studies, I am simply applying what I learned in my undergraduate studies to nuclear applications," said March-Rico. "My materials background has helped immensely to understand the physical processes that occur due to incident irradiation in nuclear reactors."

His evolving focus has been greatly supported through the sense of open community that exists in the college and department—an element he considers one of the greatest strengths of the program.

"The faculty have always been willing to spend time and assist in research questions on any topic," he said. "There's really a sense that the faculty want every student to succeed regardless of which research group they belong to."

March-Rico has contributed to that community by helping to organize smaller-scale and socially distanced events within the research group, something that has proved especially important during the pandemic years.

"Mental health has been one of the biggest challenges within the pandemic," he said. "We wanted to ensure that our sense of community persisted through these challenging times."

Moving forward into his postdoctoral career, March-Rico plans to apply himself to lifelong learning and to continue research that pushes the boundaries of design and technology. His first step toward this goal is to perform research at a US naval laboratory.

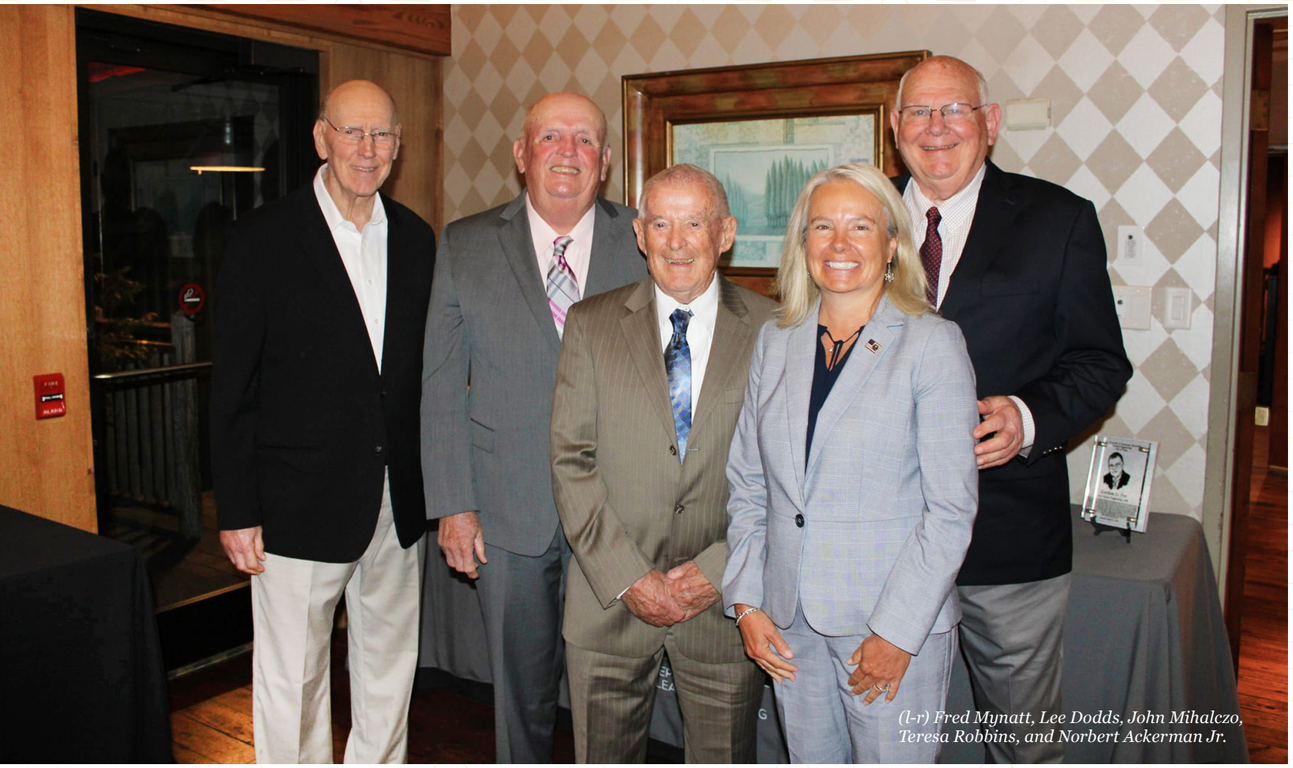
"This opportunity allows me to apply both my materials science and nuclear backgrounds to help improve the reliability of reactor core components aboard our fleets," he said. "I'm excited to work alongside industry professionals and further expand my knowledge and skill set."

Department Celebrates Five Recent Hall of Fame Inductees

By David Goddard.

The department recently celebrated some of its alumni with one of its highest honors, inducting three new members into its Hall of Fame and giving two previous inductees the chance to be publicly celebrated after the pandemic delayed that recognition for two years.

Fred Mynatt (BS ’62, MS ’64, PhD ’69), Norbert Ackerman Jr. (BS ’65, MS ’67, PhD ’71), and Teresa Robbins (BS ’91) are the newest members to be inducted. They were joined by Lee Dodds (BS ’66, MS ’69, PhD ’70) and John Mihalczo (PhD ’70), who were chosen in 2020.



(l-r) Fred Mynatt, Lee Dodds, John Mihalczo, Teresa Robbins, and Norbert Ackerman Jr.

“All of our inductees are people who have demonstrated their expertise in the field as well as a commitment to the department and the university,” said Wes Hines, department head, Postelle Professor, and Chancellor’s Professor. “This year’s group continues that tradition, as all three have had highly successful careers while also fulfilling the Volunteer spirit and are inspirational figures for our current students.”

Mynatt had a successful long-term career at Lockheed Martin Energy Systems in Oak Ridge, where he worked from 1965 to 1997. He was named vice president for compliance, evaluations, and policy in 1990.

His knowledge of reactor theory and operation, nuclear safety, and the application of large-scale computing systems made him an expert in radiation shielding. He received the US Department of Energy’s Ernest Orlando Lawrence Award for radiation shielding analysis and for leadership in the broad application of those methods.

Mynatt’s other honors include being elected a Fellow of the American Nuclear Society, serving as chair of the ANS’s Radiation Protection and Shielding Division, and a 1979 ANS technical achievement award. UT honored him as an outstanding engineering alumnus in 1980.

Ackerman Jr. worked as a contract researcher for Oak Ridge National Laboratory during his time as a both an undergraduate and graduate student at UT, and then as a research staff member in instrumentation and controls from 1968 to 1975.

He left ORNL to establish the Technology for Energy Corporation, where he stayed until 1983. In the following years, Ackermann used his entrepreneurial skills to help several local starts-up get going and was named the Knoxville Area Entrepreneur of the Year in 1990.

UT named him an outstanding engineering alumnus in 1974. In 1994 he was among 200 people recognized as outstanding graduates of UT during the 200th anniversary of its founding. Ackermann played football for the Vols, earning All-SEC academic honors in 1963 and again in ’64, and would go on to serve as a football official for decades.

Robbins is currently serving as manager of the National Nuclear Security Administration’s Production Office. In that role, she oversees the security and safety of operations at the Pantex location in Texas that is responsible for maintaining several areas related to the nation’s nuclear weapons and the Y-12 facility in Oak Ridge that is the country’s source of enriched uranium—both vital parts of national security.

Robbins has served the NNSA and the US Department of Energy in several additional roles, including management, scientific and technical advisor, safety, and project director in Washington, DC, at the Savannah River facility in South Carolina, and at the Rocky Flats Plant in Colorado.

She is the 2007 recipient of the NNSA Safety Professional of the Year Award.

Dodds, Mihalczo Finally Get Pandemic-Delayed Moment of Recognition

Professor Emeritus Lee Dodds and former Ford Foundation Professor and ORNL researcher John Mihalczo, both selected for Hall of Fame induction in 2020, were finally able to get the public recognition that the onset of the pandemic delayed for two years.

Dodds joined the department as an associate professor in 1976 after working for the Savannah River Laboratory, ORNL, and NASA. He became department head in 1997 and led the department to a top 10 national ranking by U.S. News and World Report.

He is a past member of the accreditation board of the National Academy for Nuclear Training, the national board of directors of the American Nuclear Society, and the national board of directors of the Nuclear Energy Institute. He has been recognized with the Arthur Holly Compton National Teaching Award and the Robert L. Long Training Excellence Award, among other honors. He is a licensed professional engineer and a Fellow of the American Nuclear Society.

Mihalczo is a true US nuclear pioneer, having worked at the Curtiss Wright Corporation from 1953 to 1958 on nuclear propulsion and other nuclear reactor applications. He joined the Neutron Physics Division of ORNL in 1958 as a researcher at the Oak Ridge Critical Experiments Facility, where he performed a wide variety of research related to reactor design, nuclear criticality safety, and reactor physics before joining the ORNL Instrumentation and Controls Division in 1973.

His criticality experiments, development of nuclear weapons verification technologies, and other vital research are world renowned, including his development of a technique known in Japan as the Mihalczo Method. For these contributions he was named a Fellow of the American Nuclear Society.

The Hall of Fame was created to inspire current students and honor those who came before and made the department proud to be Volunteer engineers. Honorees are selected following deliberations by the Tickle College of Engineering dean, the head of the Department of Nuclear Engineering, and the department’s board of advisors.

The first class was selected in 2017 to commemorate the 60th anniversary of the department. To date 13 alumni have been inducted.

Engineering Creativity Fuels Maginn's Career

By Randall Brown.

Nikki Maginn graduated with her degree in nuclear engineering in 2013, just two years after the tragic Fukushima nuclear disaster. Lingering industry challenges led her to think outside of traditional paths to build her career. Fortunately, her Vol engineering background gave her the tools to be flexible in her plans.

"Engineering is a deeply creative discipline," said Maginn. "There's no limit, no playbook for what you can use your degree for. Having an engineering degree is more like a blank check—you can create your own career."

She soon landed an engineering job with Dematic, a supply chain company in Atlanta.

"While I was unlike anyone they had hired before, I was so enthusiastic about the opportunity to learn something new, they hired me," she said. "I learned in that moment that I never had to be defined by one aspect of my life—it pays to be creative about applying my experiences."

Maginn found herself the only woman in her office and the youngest person by more than 30 years. She didn't let that culture shock slow her down from engaging in the work.

"One thing my UT professors taught me was how to adapt to change," she said. "So I rolled up my sleeves and started taking on projects. Soon my name was all over the project management documents, and I started getting noticed by senior leaders."

One of those leaders was another woman in the company, who became a mentor for her. One day, she asked the younger engineer for her perspective on a problem project.

"She brought me into a room that I'm convinced is what heaven looks like," said Maginn. "Floor-to-ceiling whiteboards, rainbow sticky notes everywhere, projects and their due dates mapped out, markers galore—I was in our 'war room.'"

> **"It's my honor** to give light to others, and it's my honor to be a light for others to see what's possible.**"**

Maginn went on to spend a good amount of time in that room. She grew a network of colleagues and diversified her experience throughout the company.

"In the typical corporate hierarchy, you move up within your silo," she said. "But I was moving across departments, learning from all aspects of the business, and most importantly, following my own passions. Without realizing it, I was creating new roles for myself that would eventually lead me to the dream job I didn't know existed: nuclear supply chain."

Nikki Maginn

Maginn is now director of engineering operations in the Atlanta office of Last Energy, the commercial arm of the Energy Impact Center. This developer of small modular nuclear power plants works to revolutionize the way nuclear power is delivered to the world. In this role, she creatively combines both her background in nuclear and her industry experience in supply chain, allowing her to focus on finding creative solutions for an industry she loves.

While still in her previous job, Maginn sought to share the lessons she had learned in her career, so she founded the Dematic Women's Network to help create a more welcoming environment. The network grew into a global brand that helped name the company to a list of the best places to work.

"One of the proudest moments of my life was when a young new hire told me she joined the organization just because of this network," she said. "Her career trajectory was changed because of the mentorship she was receiving in our program."

Maginn feels fortunate to also give personal mentorship to a promising electrical engineering student at UT whom a colleague connected her with.

"Every time I speak with this brilliant young lady, I'm brought back to the many women who guided my life," she said. "The idea that I'm able to help her avoid the mistakes I made and pave the way for her to be her most authentic self is what I believe the Volunteer spirit is all about."

Maginn's success fulfills a motto her parents shared: *If you want to be happy for a day, take a nap. If you want to be happy for a week, take a vacation. But if you want to be happy for life, serve mankind.*

"This motto has done more than drive my career choice in the nuclear industry," she said. "It's provided the lens with which I see the world. I believe in servant leadership, like the concept that the Torchbearer and every Volunteer stands for. It's my honor to give light to others, and it's my honor to be a light for others to see what's possible."

ACCOMPLISHED ALUMNUS SAM BEALL DIES AT 103

By Randall Brown.

Samuel E. Beall II (BS IE '42) earned his degree in industrial engineering but carved out a storied career in the nuclear engineering world. Events throughout his long life found him deeply involved in the Manhattan Project, serving as a corporate leader, advising international energy agencies, and enjoying active and fruitful retirement years. He died on April 8 at the age of 103.

Beall was born May 16, 1919, in Plains, Georgia, and grew up in Richland, Georgia. He graduated with his bachelor's degree in industrial engineering in 1942, then went to work for the DuPont Company. This led to his work on the Manhattan Project and contributions to the development of the atomic bomb. Afterward, he worked at Oak Ridge National Laboratory, helping to assemble the graphic graphite reactor, and at the Hanford, Washington, nuclear plant.

He remained engaged in various aspects of nuclear reactor development through 1974, when he directed the Reactor Division and organized and directed the Energy Division at ORNL. After retirement, Beall became a consultant for the Energy Division and an advisor on nuclear energy to the governor of Tennessee.

Internationally, he advised atomic energy agencies in Pakistan and Korea and led a team studying geothermal energy in Iceland.

In later years, Beall served on the boards of Ruby Tuesday Inc, Custom Foods of America, Southeast Service Corporation, the Helen Ross McNabb Center, Pellissippi State Community College, Shannondale Retirement Home, and the Office on Aging. He was also an elder at Sequoyah Hills Presbyterian Church, a Scoutmaster with the Boy Scouts of America, and a Squire on the old Knox County Court.

Beall attended UT with the support of a Rotary Club scholarship, and he returned this support by establishing the Samuel E. And Mary Anne Beall Engineering Scholarship Endowment in 2014 for students majoring in industrial engineering. UT's Beall Family Rose Garden was named in gratitude for the establishment of the Samuel E. & Mary Anne Beall Rose Garden Endowment.

Beall composed his own obituary before he passed.

"I enjoyed playing tennis until the age of 95," he wrote. "I was an avid gardener until my final days, and I went fly fishing at every opportunity. All in all, with the love of Mary Anne, our children, their children, friends, our church, and the pleasure of 103 years of sunsets, I leave this life with few regrets."

TICKLE COLLEGE OF ENGINEERING

DEPARTMENT OF NUCLEAR ENGINEERING

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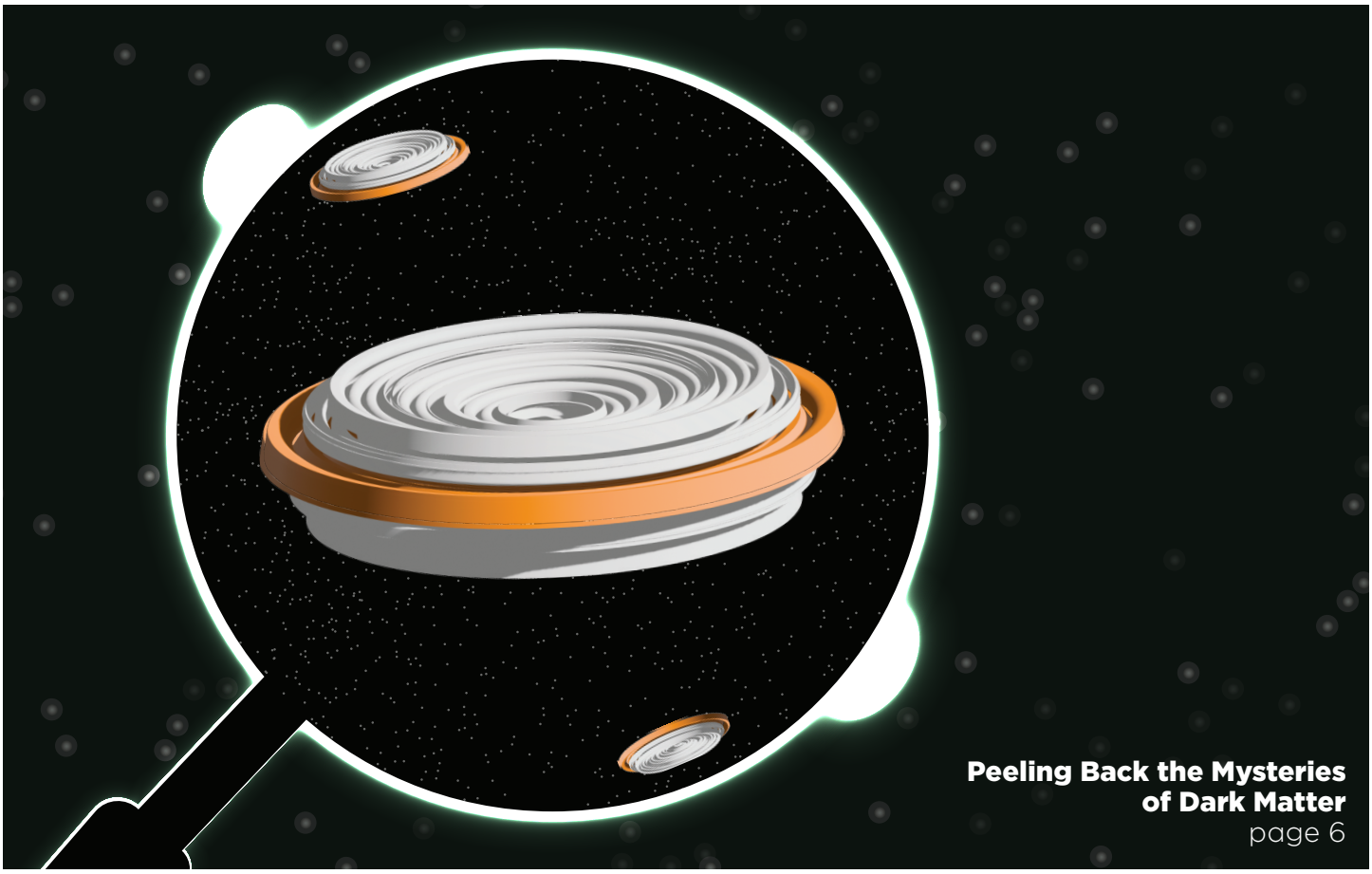

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