



**PURDUE
UNIVERSITY**

School of Nuclear Engineering

NUCLEAR ENGINEERING NEWSLETTER

FORGING the FUTURE

Fall 2023 | Issue 5



Professor Chatzidakis' Research Group Creates a Digital-Twin Reactor Control System for PUR-1

MESSAGE FROM THE THE HEAD

As we near the end of the 2023 Fall semester, we are reminded of the many triumphs and victories the School of Nuclear Engineering has been part of the last two years!



Our world-renown faculty have continued to push the boundaries of knowledge with cutting edge research and extraordinary teaching. Drs. Hany Abdel- Khalik and Allen Garner were promoted as Full Professors in 2023. Additionally, Drs. Hitesh Bindra and Xiaoyuan Lou joined the Nuclear Engineering faculty as Associate Professors in 2022, and have already begun performing innovative research focused on advanced nuclear manufacturing and nuclear energy systems.

Purdue University and Duke Energy are jointly exploring the feasibility of using advanced nuclear energy to meet the West Lafayette campus' long-term energy needs. In the Interim Feasibility Study Report, it has been determined that SMRs are a viable solution to meeting Purdue University's emissions goals. We continue to work diligently with Duke Energy to explore a giant leap towards a carbon-free energy future.

Our school has met tremendous milestones in 2023! We moved into our new home located in Lambertus Hall in the Gateway Complex, where we enjoy a suite and several lab spaces, established our inaugural summer camp, 'Atoms at Work,' and held our second 'Atoms for Humanity' Symposium with the Center for Intelligent Systems (CIENS).

Over the last 5 years our research expenditure has tripled, allowing us to perform groundbreaking research, such as the first digital-twin system for a research nuclear reactor at a university. Additionally, our student enrollment is at an all-time high, empowering our school to educate and train more nuclear engineers.

We are excited to share our news and accomplishments with you and look forward to the opportunities that await us!

Wishing you a Happy Thanksgiving and Hail Purdue!

Seungjin Kim
Capt. James F. McCarthy, Jr. and Cheryl E. McCarthy Head of the School of Nuclear Engineering
Purdue University

TABLE of CONTENTS



4 FEATURED RESEARCH

6 FACULTY PROMOTION

8 NEW FACULTY

12 FEATURED FACULTY

14 SMR FEASIBILITY STUDY

16 ATOMS FOR HUMANITY

18 ATOMS AT WORK

20 SPRING GRADUATES

21 NE NEWS

28 STUDENT AWARDS

30 STAFF AND FACULTY AWARDS

FEATURED FACULTY RESEARCH: PUR-1 DIGITAL TWIN REACTOR

DR. STYLIANOS CHATZIDAKIS

Leading the charge in improved nuclear reactor operations and technology.



Dr. Stylianos Chatzidakis, an expert in computational radiation imaging and nuclear instrumentation and control, Assistant Professor at the School of Nuclear Engineering, Associate Reactor Director and Director of the Nuclear Engineering Radiation Laboratory (NERL), is executing research aimed to optimize nuclear reactor operations, performance and associated costs.

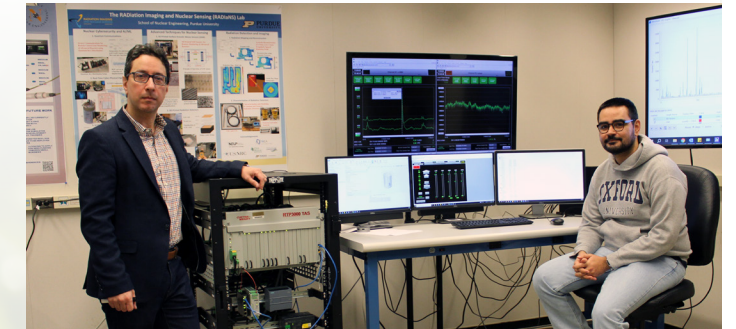
In the pursuit of creating a sustainable and climate-resilient future, Dr. Chatzidakis and his students are working to progress the field of nuclear engineering by improving nuclear reactor design and costs. With a growing number of countries, cities, businesses and institutions that have set net-zero emissions targets, there is greater need and demand for efficient nuclear reactors.

“One major challenge I see in the nuclear industry is the costs associated with building nuclear power plants,” said Dr. Chatzidakis. “The costs are higher than other alternative energy sources, which means that nuclear energy could be considered as less competitive than other energy fields. At Purdue, we are performing research every day to address this challenge.”

Purdue is active in educating and teaching students to become nuclear engineers that are capable of designing, operating and advancing the current condition of nuclear reactors and nuclear engineering overall. The School of Nuclear Engineering operates the Purdue University Reactor Number One (PUR-1), the first and only nuclear reactor operating in Indiana. It is the first and only US NRC facility to be licensed for a fully digital safety and control system.

As a Professor of nuclear engineering and the Director of NERL, Dr. Chatzidakis not only teaches students about nuclear energy, but he also trains students as nuclear operators to receive their reactor license upon graduation. He also assists students in the evolution, expansion, and improvement of nuclear reactor operations and technology.

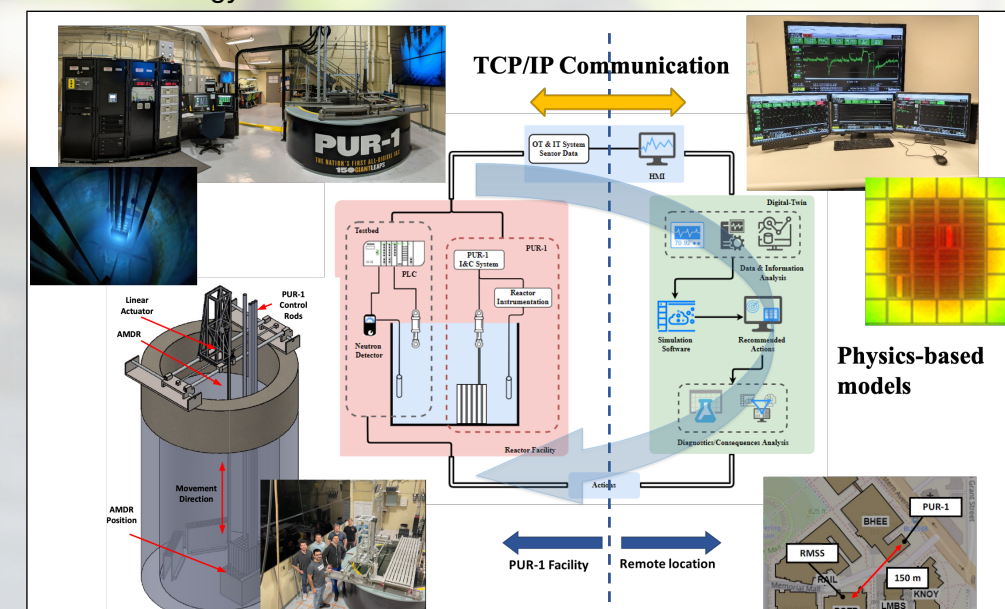
Dr. Chatzidakis is also leading the charge to create a **digital-twin nuclear reactor control system** that will improve reactor operation long-term.



Dr. Chatzidakis and Graduate Research Assistant Vasileios Theos

“We have found that there is a lot of information operators have to absorb and process in real time,” explained Dr. Chatzidakis. “Our reactor has more than 2,000 signals that are counted any time in the reactor console. Reactor operators can only filter the most critical signals. We found that if you have a digital twin that mimics the reactor operator, the digital-twin can process the same signals and run artificial intelligence to predict what happens every time an action is taken.” This digital-twin reactor will serve as a virtual simulation of the PUR-1 research reactor control system to help operators understand real reactor data and feed processed information back to the reactor operator.

“Once we develop this digital-twin and test it, we hope that this will scale up to an actual reactor and help with lowering cost, perform predictive maintenance, and do prognosis and diagnosis in real time.”

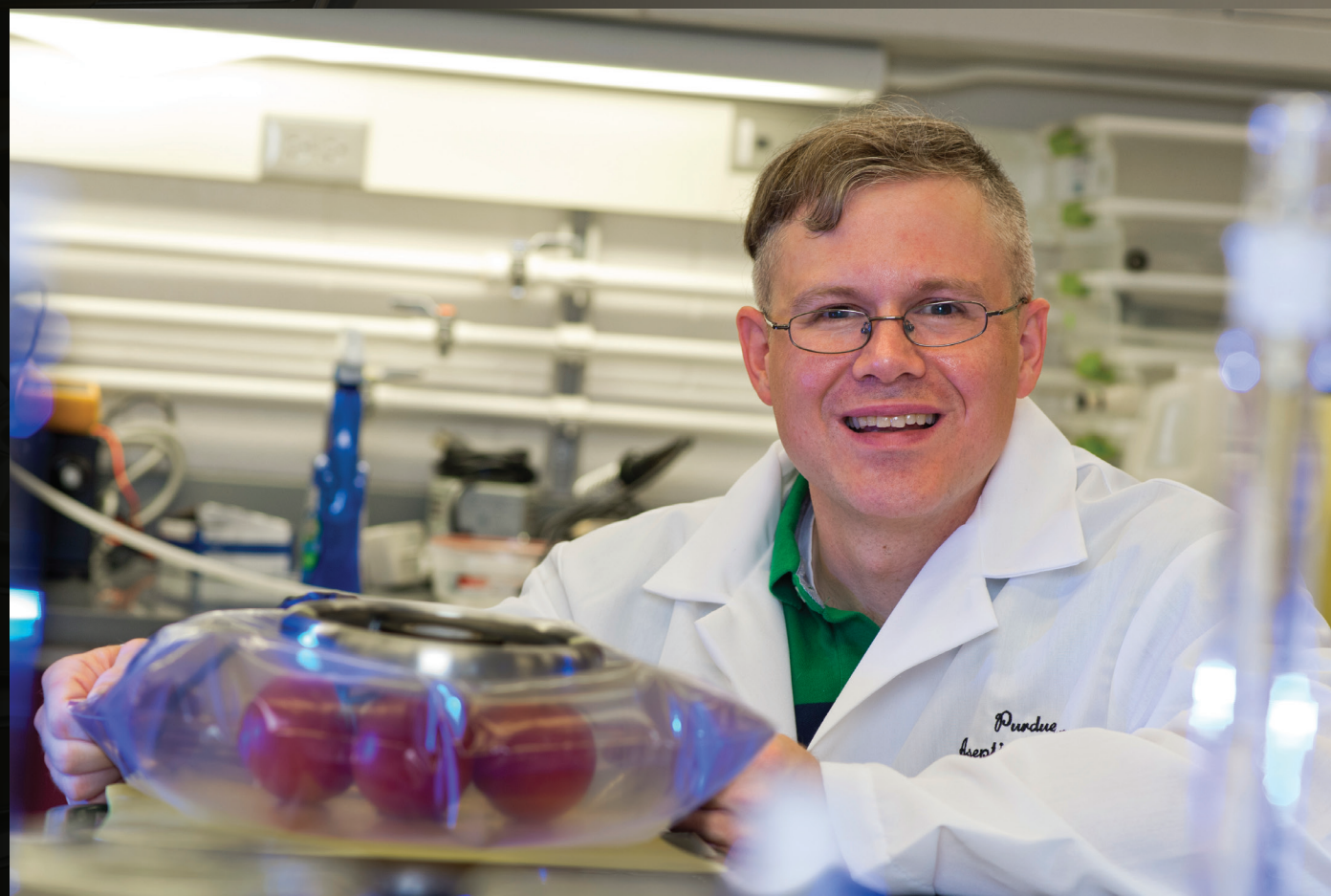


PUR-1 Digital Twin main components

FACULTY PROMOTION

DR. ALLEN GARNER

Collaborating with others to bring **new opportunities** to students and engineers.



An expert in biomedical and biophysics applications of pulsed power and plasma, Dr. Allen Garner is internationally recognized for his impactful research and commitment to advancing bio-nuclear engineering.

Dr. Garner began his career at Purdue University School of Nuclear Engineering in 2012 as a tenure-track Assistant Professor. He was promoted in 2019 to Associate Professor, and promoted again to full Professor in 2023.

"When I first started at Purdue, my main emphasis was looking into non-ionizing radiation biology, studying medical applications, wound healing, antibiotic resistance, and stem cell stimulation. I then shifted into plasma breakdown and electron emission, which is what I initially studied," explained Garner. "After working in the military and industry, I wanted to transition to academia, where I can work more broadly with different people and disciplines and work with students interested in these fields."

Dr. Garner is the Principal Investigator for the BioElectrics and ElectroPhysics (BEEP) Lab, which explores the interaction of intense electromagnetic radiation with materials, particularly biological cells and tissues. Dr. Garner's research group has grown significantly and made notable strides in advancing nuclear and biological technologies.

"We've gotten to broaden a lot of what we do from when we first started - mainly because of the students! The first students were very instrumental in starting up the experimental and theoretical parts of the group in high-voltage electronics and bioelectrics," said Garner. "Through the years, with grants from many entities including the Department of Defense, we have been able to accomplish a lot."

Dr. Garner separates his group's work into four segments - experimental versus theoretical and biological versus non-biological.

On the biological side, the group is studying how electric fields affect cells and tissues. People who work next to high power electronics systems may experience occupational exposure to non-ionizing radiation. Currently, there are increasing questions about what occupational exposure means for high-power microwave systems. Dr. Garner's research group aims to help the Department of Defense define what exposure in regards to those systems mean, and ultimately leverage these fundamental mechanisms to help develop treatments and therapies. This will include prior work done by his group on using electric fields for inactivating micro-organisms and stimulating stem cell division.

On the non-biological side, BEEP is studying electron emission under various conditions, including vacuum, atmospheric pressure air, and liquids. This work has included theoretical work developing novel methods to calculate the maximum current possible to inject into vacuum devices with various geometries and experimental work examining the transitions in electron emission behavior and breakdown for smaller gaps. Their new project will extend these theoretical and experimental approaches to semiconductor materials to assess their behavior at higher electric fields.

Dr. Garner's research group is composed of one research scientist, ten graduate students and five undergraduate students. "The best part of my job is working with the students," exclaimed Dr. Garner. "Seeing them become excited about research or whatever their next step is, is a lot of fun!"

Dr. Garner continues his work with students outside his lab, working with Scalable Asymmetric Lifecycle Engagement (SCALE). SCALE provides unique courses, mentoring, internship matching and targeted research projects for college students interested in five microelectronics specialty areas: radiation-hardening, heterogeneous integration/advanced packaging, system on a chip, embedded system security/trusted AI, and supply chain awareness. Dr. Garner is part of SCALE's radiation hardening team and is currently serving as a Principal Investigator for SCALE's latest grant.



BEEP Research Group

Dr. Garner is excited about the synergies in these different research areas and what this can mean for students. "Just over the past month, I have met with scientists at various laboratories and small companies and am excited to expand our research into other areas, most notably understanding fundamental plasma physics for fusion. This will help us learn new science through new collaborations and perhaps open up new career opportunities for our graduates."

NEW FACULTY MEMBER

DR. HITESH BINDRA

Inspiring the next generation, and shaping the future of nuclear engineering.



Hitesh Bindra is an Associate Professor specializing in the fields of nuclear engineering and thermal sciences. With a rich academic background and a passion for pushing the boundaries of energy research, Dr. Bindra has established himself as a prominent scholar in the field of nuclear energy and sustainable energy solutions.

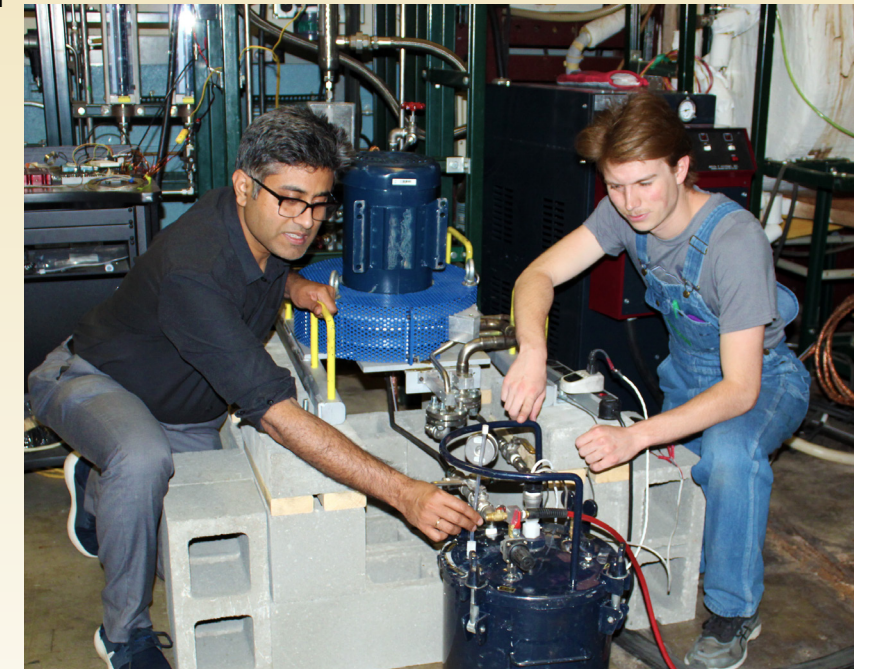
Dr. Bindra earned a Bachelor of Engineering in Chemical Engineering from Panjab University in 2002. He then earned his masters and doctoral degrees in Nuclear Engineering from the University of Illinois at Urbana-Champaign in 2007 and 2010 respectively.

In 2022, Dr. Bindra joined the Purdue University faculty, bringing a wealth of knowledge and a strong commitment to education and research. His decision to join Purdue was driven by the institution's

recognition as a major player in thermal sciences and nuclear energy, and its alignment with his industry and research experience.

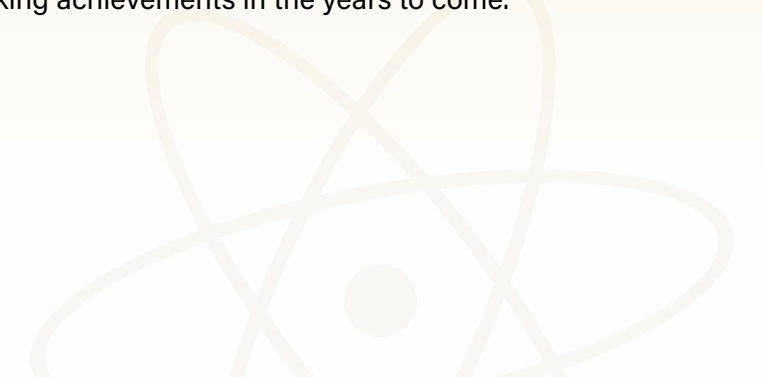
Dr. Bindra's current research interests are in advanced reactors, energy storage, novel algorithms for reactor systems, and multiscale and multiphysics coupling. Within his laboratory, Dr. Bindra plans to expand his at-scale experimental research capabilities. Performing experiments with advanced nuclear reactor coolants and at prototypic conditions is essential for the rapid deployment of next generation nuclear energy. Additionally, Dr. Bindra aspires to increase the fundamental understanding of thermo-fluid physics related to advanced nuclear reactors, build more pilot projects, and develop economical thermal energy storage solutions.

Dr. Bindra leads a diverse research group within the School of Nuclear Engineering, which includes four graduate, one post-doctoral and several undergraduate students. This diverse and talented team shares his passion for research and innovation.



(Left to Right) Dr. Hitesh Bindra and Graduate Research Assistant Broderick Sieh

At Purdue University, Dr. Bindra's contributions to research and education have been invaluable, inspiring the next generation and shaping the future of the field. We look forward to witnessing and being part of Dr. Bindra's continued success and groundbreaking achievements in the years to come.



NEW FACULTY MEMBER

DR. XIAOYUAN LOU

Committed to **educating** students and **developing** the next generation of nuclear reactors.



School of Nuclear Engineering Fusion Energy Summer Camp



Xiaoyuan Lou, a new Associate Professor at the School of Nuclear Engineering with a courtesy appointment in Materials Engineering, is a professor excited to begin a "new era in his career at Purdue University."

Dr. Lou earned his PhD in materials science and engineering from the Georgia Institute of Technology in 2010. After a seven-year lead nuclear materials scientist at GE Global Research and a four-year professorship in the Department of Materials at Auburn University, Dr. Lou joined Purdue's faculty in 2022.

"Purdue has an excellent reputation in engineering research, renowned faculty, world-class research facilities, and good student body," expressed Dr. Lou. "It feels great being a part of a culture with so many elements that are critical to my research career."

Dr. Lou's commitment to education inspires the Lou Research Group, a group of six graduate students from both the School of Nuclear Engineering and School of Materials Engineering. This group is specialized to study the mechanical-related material degradation behavior in nuclear environments, such as environmental assisted cracking and high-temperature creep. Dr. Lou's research also focus on advanced manufacturing of structural alloys. Currently, Dr. Lou's research addresses the feasibility of using 3-D printed materials to build nuclear reactor components, and the potential risks of using such materials in the reactor.

"We are mostly interested in grain-boundary related failure mechanisms under high temperature, corrosion, radiation, and complex loading," said Dr. Lou. "We also develop advanced manufacturing methods and discover novel structural alloys for applications in extreme environments."

Dr. Lou's commitment to educating and developing students pushes beyond the walls of Purdue University. Funded by the U.S. Department of Energy Fusion Energy Sciences, over the summer, Dr. Lou organized Purdue's Fusion Energy Summer Camp for minority students, in collaboration with Florida International University and Miami Dade College. The program aimed to elevate research interests in fusion energy science and nuclear engineering from minority groups, create a training pipeline to develop diverse workforce in nuclear engineering, and support the Biden-Harris Administration's efforts to increase the success of students from underrepresented communities.

Dr. Xiaoyuan Lou is an expert in the field of nuclear engineering and manufacturing. Throughout his career, he collaborates widely with universities, national labs and industry to address material and manufacturing challenges. He is looking forward to working together with experts in different fields at Purdue University. He hopes to help further establish Purdue as a go-to place for nuclear advanced manufacturing.

Currently, Dr. Lou is part of a university-wide manufacturing research initiative. "I am very fortunate to be a part of the initiative from the beginning," said Dr. Lou. "My research supports the manufacturing needs to deploy next generation nuclear reactors and develop the manufacturing workforce. By working with experts from different disciplines, it is my hope to advance the state-of-the-art manufacturing and material science to construct the most complex structures that are necessary to support the next generation reactor design."

Krach Institute of Tech Diplomacy at Purdue

DR. LEFTERI TSOUKALAS

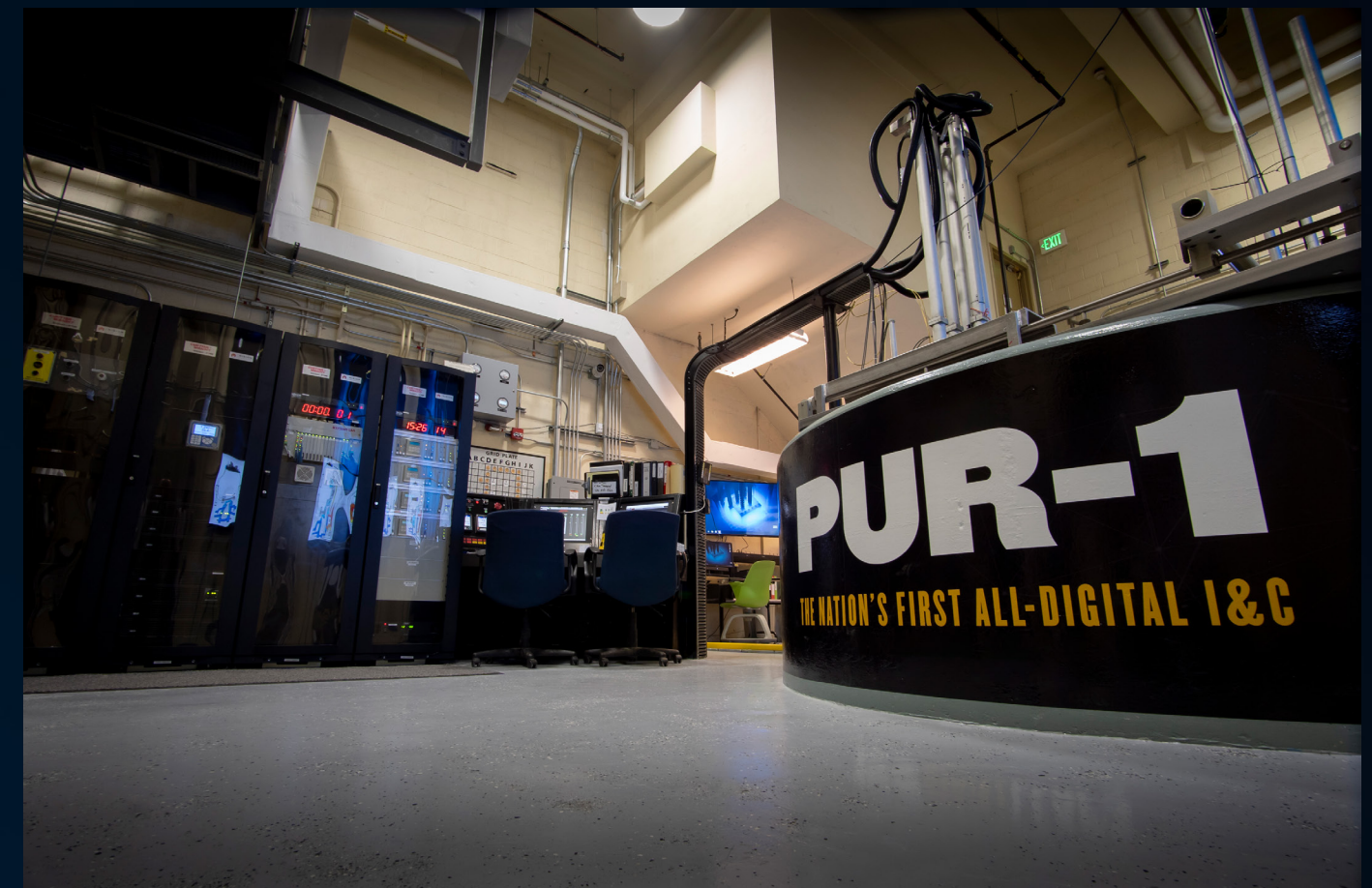
"Tech-diplomacy is the most important tool we have today for addressing globally, the grand challenges of **inequality** and **climate change**."

Dr. Tsoukalas, a former Head of the School of Nuclear Engineering at Purdue University, former Chairman of the U.S. Nuclear Engineering Department Heads Organization (NEDHO) and current Professor of Nuclear Engineering, has joined the Krach Institute of Tech Diplomacy at Purdue University as a Senior Research Fellow.

Dr. Tsoukalas brings extensive engineering leadership in AI and machine-learning methods for nuclear applications, as well as expertise in digitization and nuclear fusion to the institute's world-class technology network.

In partnership with the Krach Institute of Tech Diplomacy at Purdue, Purdue Nuclear Engineering Researchers Professor Lefteri H. Tsoukalas, Ph.D. Student Konstantinos Prantikos, Professor of Nuclear Engineering Dr. Stylianos Chatzidakis, and Argonne National Laboratory Principle Electrical Engineer, Dr. Alexander Heifetz, Purdue engineers have introduced a machine learning method, TL-PINN, to predict nuclear reactor transients with high accuracy that requires low computational time. In addition, they developed a correlation between TL-PINN performance acceleration and similarity measure of reactor transients, which can be used as a guide for application of TL-PINNs.

Published in *Nature Scientific Reports* in October 2023, the study offers valuable insights into transfer learning, an important enabler of trustworthy and explainable AI. In critical applications such as nuclear power plants, refineries and steel mills, resilience is the top system requirement. AI in such systems must be trustworthy and explainable and transfer learning is sine qua non for achieving it. Using the Purdue University Research Reactor - One (PUR-1), the team of researchers developed a transfer learning approach using physics-informed neural networks (TL-PINN), which accelerates model training and achieves highly accurate predictions with a mean error below 1%. The study demonstrates that (a) transfer learning is possible, and (b) pre-training a model on one reactor transient significantly speeds up predictions for different reactor transients. Furthermore, a correlation is established between TL-PINN performance acceleration and reactor transient similarity, which can be used as a guide for application of TL-PINNs. Demonstrating transfer learning unleashes the great potential of AI to reactor safety and resilience.



Purdue University Research Reactor Number One

SMR FEASIBILITY STUDY



(Left to Right) Seungjin Kim, Head, Purdue School of Nuclear Engineering; Stan Pinegar, President Duke Energy Indiana; Ryan Gallagher, Associate Vice President, Facilities Operations and Environmental Health and Safety; Lee Grzeck, Licensing Manager, New Nuclear Generation, Duke Energy; Michael B. Cline, Purdue, Senior Vice President, Administrative Operations; President Mung Chiang, Purdue University; Timothy Hanley, Senior Vice President and Chief Operating Officer Constellation Nuclear; Chris Nolan, Vice President, New Nuclear Generation Strategy and Regulatory Engagement, Duke Energy; Ahmed Tokpinar, Principal Vice President and General Manager of Nuclear, Bechtel Power; Luis Reyes, Former Executive Director for Operations, U.S. Nuclear Regulatory Commission; Kelley Karn, Duke Energy of Indiana, Vice President, Regulatory Affairs & Policy; Norman Kunkel, Duke Energy, Engineering Manager, New Nuclear Generation; Brad Runda, Purdue, Former Director of Energy and Utilities

In May of 2023, Purdue University and Duke Energy released an interim report outlining the feasibility of small modular reactors (SMRs) as a promising solution to meet future energy needs. The report emphasizes the potential of SMRs to provide carbon-free, continuous power and their compatibility with renewable energy sources.

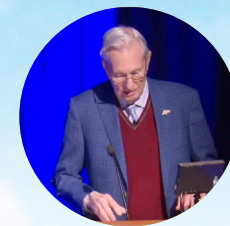
The interim report reveals that SMRs have appeared as a frontrunner in supplying carbon-free energy. Their adaptability to fluctuating power demands makes them a valuable complement to renewables. Additionally, SMRs boast advanced safety features and a simplified design compared to traditional nuclear plants. This simplification potentially allows for faster, more affordable construction, making them an attractive possibility. The deployment of SMRs is expected to bring substantial economic advantages, including generating tax revenue, creating jobs, and attracting businesses to Indiana.

Federal and state governments have an essential role to play in supporting advanced nuclear development. Recommendations include advocating for policies such as insurance options, workforce development programs, tax credits, and support for initial planning and development activities.

While the report highlights the potential of SMRs, it also acknowledges various challenges. These challenges include public acceptance, regulatory conditions, cost competitiveness, technology development, used fuel management, and workforce availability. To address these challenges, the report suggests advocating for federal and state policies that support advanced nuclear development, including insurance options, workforce development programs, and fuel availability programs. Additionally, building on successful engagement efforts, Purdue University and Duke Energy aim to continue dialogue at regional and national levels to ensure a broad understanding of the benefits and challenges of new nuclear development. Monitoring the progress of first-of-a-kind projects, and conducting economic studies, site evaluations, and technology assessments will be vital to determine the path forward. Should Purdue University and Duke Energy decide to pursue SMRs in the future, public and stakeholder input will be a crucial part of the process.

The Duke Energy and Purdue University feasibility study was initially announced in April 2022. This latest report is the result of hundreds of hours of research and evaluation by roughly thirty leaders and industry experts, including renowned experts who serve on the team's executive and technical advisory committees.

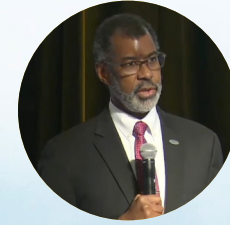
Lecture Series Overview



Aug. 30, 2022: *Clean Nuclear Energy: Past, Present and Future*
Dr. Arden Bement, David A. Ross Distinguished Professor Emeritus of Nuclear Engineering, Purdue University



Oct. 5, 2022: *A New Landscape for New Nuclear*
Maria Korsnick, President and CEO of the Nuclear Energy Institute



Oct. 24, 2022: *The 21st Nuclear Resurgence: Opportunities and Challenges*
Director-General William D. Magwood, IV, OECD Nuclear Energy Agency



Nov. 30, 2022: *Tough Tech' for Climate: Innovation Challenges, University Responsibilities, and Some Comments on the Nuclear Role*
Dr. Richard K. Lester, associate provost of the Massachusetts Institute of Technology



Jan. 18, 2023: *Nuclear Power in 2050*
Dr. Kathryn D. Huff, assistant secretary for nuclear energy, Department of Energy



Feb. 22, 2023: *Implementing Advanced Nuclear Technology*
Tim Hanley, Constellation Nuclear; **Luis Reyes**, U.S. Nuclear Regulatory Commission; **Ahmet Tokpinar**, Bechtel

Advocating for the SMR Study



During the 'Understanding Tomorrow's Nuclear Energy' Lecture Series, Purdue President Emeritus **Mitch Daniels** states, "Many times great steps forward start with very small and modest ideas. This may be one of those."



"Our two organizations have diligently explored the feasibility of transforming our existing power system into a new system that uses advanced nuclear technology," said Purdue President **Mung Chiang**.



Dr. Seungjin Kim, was invited to the Investing in Indiana - Clean Industries Summit to discuss the SMR study and how nuclear energy can make an impact in decarbonizing Indiana and bringing opportunities for jobs and workforce development.



The SMR Feasibility Study Continues into 2024...

Center for Intelligent Energy Systems Presents

ATOMS FOR HUMANITY

SYMPOSIUM

OCTOBER 25-26

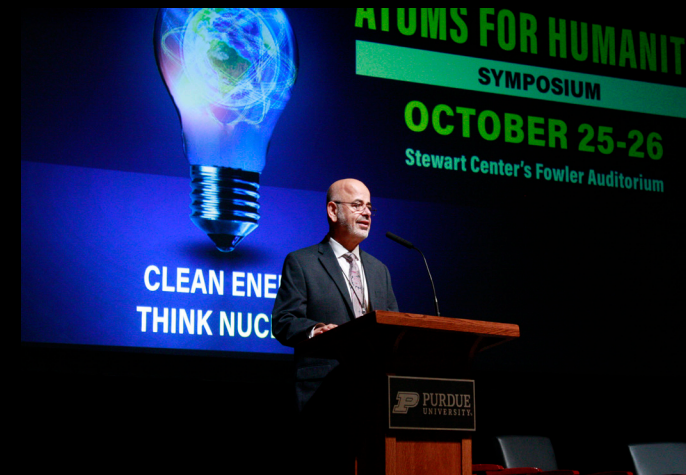
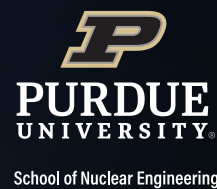
Stewart Center's Fowler Auditorium



The 2nd Atoms for Humanity Symposium took place on October 25-26, 2023, at Purdue University's Fowler Auditorium.

Atoms for Humanity aims to highlight the role of nuclear energy in achieving a clean energy ecosystem through synergisms and complementarities with various energy sources. Topics include, but are not limited to, decarbonization, hydrogen production, electrification of transportation, integrated energy storage with renewables, district heating/CHP, desalination, agriculture, and manufacturing.

**CLEAN ENERGY
THINK NUCLEAR**



CIENS Director, Prof. Tsoukalas welcoming guests

Atoms for Humanity brings together a committed community of scholars from a wide range of technological domains leading the development and integration of clean energy and its impact on value-adding enablers for sustainable growth in health, prosperity, and the environment.



Nuclear in Space-Industry and NASA representatives discussing the state of nuclear energy propulsion systems

The symposium featured distinguished speakers from leading research institutions, organizations, and corporations, including Argonne National Laboratory, Idaho National Laboratory, Oak Ridge National Laboratory, BWX Technologies, Inc., Duke Energy, and Westinghouse Electric Company. The event also featured speakers from Purdue University's School of Nuclear Engineering, Davidson School of Chemical Engineering, School of Aeronautics and Astronautics, Office of Research.

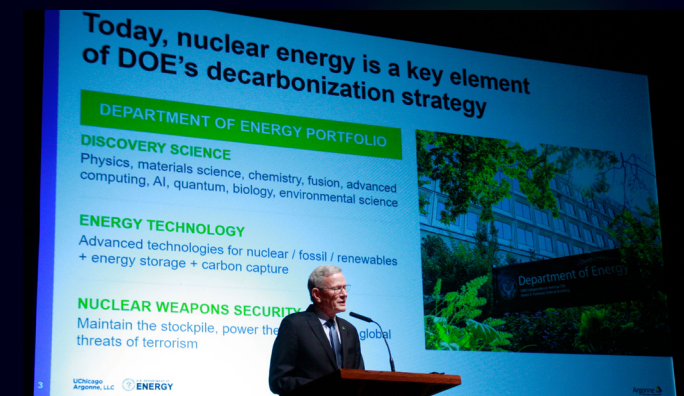


Speakers and guests tour PUR-1 with faculty members

These experts discussed a wide range of topics related to clean energy and nuclear technology, making Atoms for Humanity a significant platform for advancing discussions on sustainable energy solutions.

The 2-day symposium was organized by the Center for Intelligent Energy Systems (CiENS) as part of Purdue's technical and scientific leadership in clean energy. CiENS is a renowned innovation hub, whose objective is to create new ideas, approaches, and methodologies for digitalized massive energy systems, such as artificial intelligence, neural networks, and learning systems to achieve net zero carbon emissions by 2050.

To critically assess, advance, and integrate current and upcoming energy research, CiENS brings together a dedicated community of academics and industry leaders, encouraging cooperation between many technological fields. Their expertise is distributed in many fields such as avionics, semiconductor manufacturing, transportation systems, power and chemical plants, specialty steel production, and other manufacturing businesses.

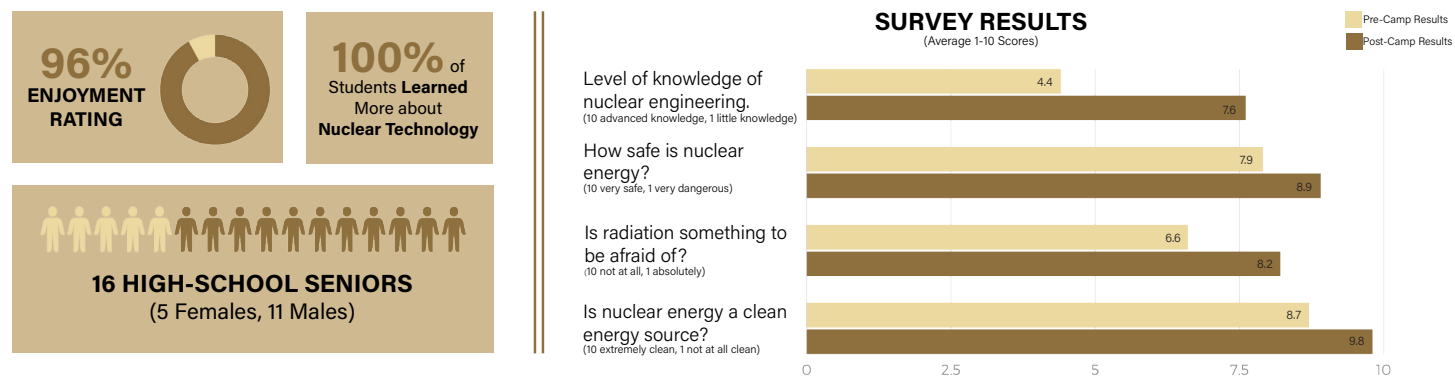


Argonne National Laboratory Director, Dr. Paul Kearns presenting the plenary lecture



The School of Nuclear Engineering's Inaugural Summer Camp

In June of 2023, the School of Nuclear Engineering hosted its inaugural Atoms at Work Summer Camp, a for-credit fun-sized course for rising high-school seniors interested in nuclear energy.

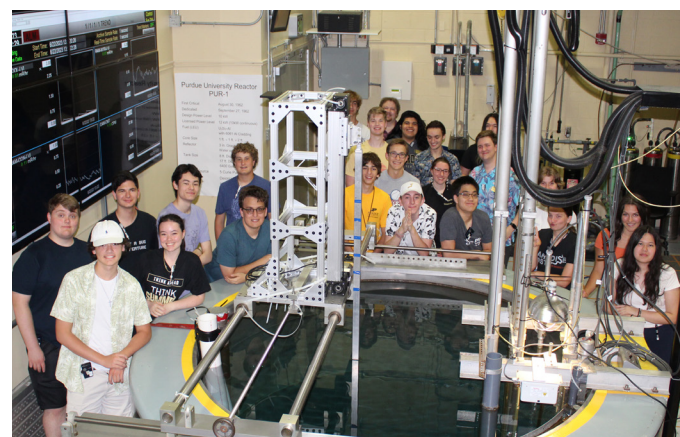


TOPICS

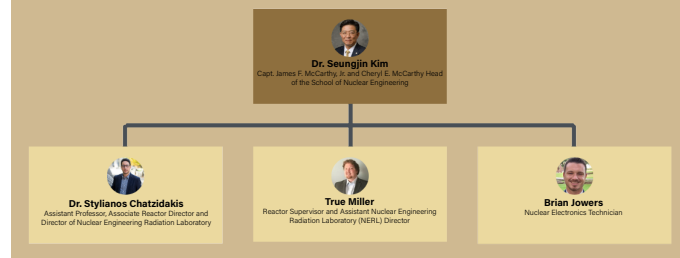
- Radiation
- Detectors & Shielding
- Neutron Activation, Sources, Gamma Spectroscopy
- Nuclear Fuel
- Laminar Flow
- Gamma Attenuation
- Fission & Fusion
- Reactor Physics
- Power Production
- Thermal Hydraulics
- SMR's and Advanced Reactors
- Nuclear Fuel Cycle

FACILITIES

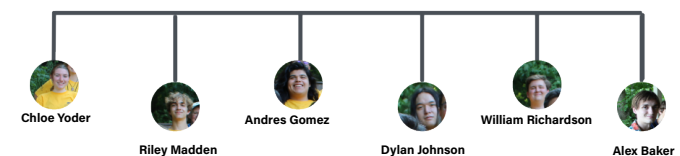
- PUR-1 Nuclear Reactor
- Nuclear Energy Radiation Lab
- Thermal Hydraulics Research Facility
- Multiphase & Fuel Cell Research Laboratory
- Clinton Nuclear Power Plant (Illinois)



SUMMER CAMP LEADERS



NUCLEAR ENGINEERING STUDENT WORKERS



CAMPER TESTIMONIALS

"I really enjoyed it, thank you for putting in so much time and effort into this program. I learned so much about nuclear engineering, Purdue, and our world. Thank you!!!"

"For the first time doing this, it was great, balanced, educational and fun; I wish there were some experiments we could take home!"

"This definitely helped push me to go into nuclear."



CAMPER TESTIMONIAL

This camp definitely helped push me to go into nuclear!

PURSuing THE

NEXT GIANT LEAP.



In collaboration with faculty guest lecturers, the Atoms at Work summer camp was taught by Purdue nuclear engineering undergraduate and graduate leaders. Each day of the one-week course, the high-school students participated in a combination of interactive lectures and hands on experiments, where they watched and took part in demonstrations of concepts ranging from radiation detection to reactor physics. The experience culminated, at the end of the week, with a hands-on lab where students used the PUR-1 research reactor for their final experiment. Students also took a tour of a commercial nuclear power plant.

The six nuclear engineering student leaders, Chloe Yoder, Riley Madden, Andres Gomez, Dylan Johnson, William Richardson, and Alex Baker, prepared presentations several months before the students arrived and did an excellent job at providing a glimpse of what nuclear engineering can look like as a college student.

To mark the completion of the camp, students were presented with certificates that signified the fulfillment of the 2-credit fun-size course requirements. "It was encouraging to see the level of excitement for nuclear technologies that this up-and-coming generation has," said camp organizer, True Miller. "With this course students can test the waters of what a career in nuclear may look like for them and learn about topics they might not be exposed to during their high school career."

Atoms at Work was organized by Reactor Supervisor and Assistant Nuclear Engineering Radiation Laboratory (NERL) Director, True Miller together with Assistant Professor, Associate Reactor Director and Director of Nuclear Engineering Radiation Laboratory, Dr. Stylianos Chatzidakis; Electronics Technician, Brian Jowers; and Head of the School of Nuclear Engineering, Dr. Seungjin Kim. The camp was also supported by the Associate Administrative Assistant, Teresa Luse; Executive Assistant to the Head, Kellie Reece; and Associate Marketing and Communications Specialist, Jessica Johnson.

CONGRATULATIONS

SPRING 2023 GRADUATES

The School of Nuclear Engineering participated in two graduation ceremonies held Friday, May 12th and Sunday May 14th.



18 BSNE, 7 MSNE and 4 PhD degrees were issued.

Morgan Smith, the former President of the Purdue University's Women in Nuclear organization, was peer nominated and selected by the College of Engineering Undergraduate Education group as the 2023 College of Engineering Banner Bearer.

"Being elected as the College of Engineering Banner Bearer is a huge honor. I am very excited to be representing my class during our graduation, May 12th.

Morgan is currently a Graduate Research Assistant at the Purdue University School of Nuclear Engineering.

Dr. Allen Garner was elected by graduating seniors as the 2023 Faculty Marshal for the 2023 Spring commencement ceremony. Dr. Garner stated, "It is an honor and a privilege to be elected by the students to serve as the faculty marshal. I wish them the best for graduation and their future endeavors!"

Dr. Garner is a Professor of Nuclear Engineering with two courtesy appointments in electrical and computer engineering and in agricultural and biological engineering. Dr. Garner is also the Undergraduate Program Chairman for the Purdue University School of Nuclear Engineering.

FACULTY PROMOTIONS

ALLEN GARNER & HANY ABDEL-KHALIK

Purdue University's Board of Trustees approved two School of Nuclear Engineering faculty members for promotion to Full Professor on Friday April 14th, 2023.



Dr. Hany Abdel-Khalik joined Purdue University in 2014 as a tenured Associate Professor. He is an internationally recognized expert in the development of data-driven/physics-guided algorithms. More specifically, he has made seminal contributions in predictive science including; uncertainty quantification & inference and the security of critical systems via a novel paradigm referred to as covert cognizance. To date, he has published 52 peer-reviewed journal papers and has advised 9 PhD and 3 MS students to degree completion. Currently, he is advising 2 PhD and 4 MS students. His entrepreneurial work has been recognized by Impactful Inventor Award and Purdue Foundry's Black Award. Among many international activities, he serves on International Atomic Energy Agency (IAEA) Expert Consultancy Group on the use of Artificial Intelligence in Nuclear Engineering.

Dr. Allen Garner joined Purdue University in 2012 as a tenure-track Assistant Professor, then was tenured & promoted to an Associate Professor in 2019. He is internationally recognized for his impactful research on Electron Emission and Gas Breakdown; and Biomedical Application of Non-ionizing Radiation. To date, he has published more than 90 peer-reviewed journal papers and has advised 7 PhD and 8 MS students to degree completion. Currently, he is advising 5 PhD and 3 MS students. Among many external honors and awards he received, some notable ones include; Election to 2013 IEEE senior member; 2016 IEEE Nuclear and Plasma Sciences Society Early Achievement Award; and Oak Ridge Affiliated University Fellow in 2021. He also received Purdue Excellence in Research Award in 2020.



This is a great milestone to be celebrated not only for Drs. Abdel-Khalik and Garner, but for the entire School of Nuclear Engineering. Congratulations to Drs. Abdel-Khalik and Garner for their great achievement!

OUTSTANDING

NUCLEAR ENGINEERING PROFESSORS



(Left to Right) Lefteri Tsoukalas, Ahmed Hassanein, Stylianos Chatzidakis

Dr. Lefteri Tsoukalas and **Dr. Ahmed Hassanein** were recognized for their outstanding teaching in the 2022 spring semester. **Dr. Stylianos Chatzidakis** was recognized for his phenomenal teaching in the 2022 spring and fall semesters.

For this recognition, Drs. Chatzidakis, Hassanein and Tsoukalas each scored a ranking in the 75th percentile or higher on teacher survey questions completed during the 2022 school year. Courses were divided into four groups according to class sizes (small, medium, large and very large), with class size corresponding to each quartile of enrollment size distribution. Individual teachers received an average score on ten Center for Instructional Excellence teacher evaluation survey questions related to instruction and teacher effectiveness on a 5-point scale and received a 50% or higher response rate.

These three professors' dedication to their students is recognized and celebrated!

NEW STAFF

JESSICA JOHNSON & BRAD MCDANIEL



Jessica Johnson graduated from Purdue University with a BS in Sales and Marketing. She is currently the Associate Marketing and Communications Specialist for the Davidson School of Chemical Engineering and the School of Nuclear Engineering. Jessica previously held positions with a recruitment marketing and technology company and with a marketing agency in Indianapolis, IN.

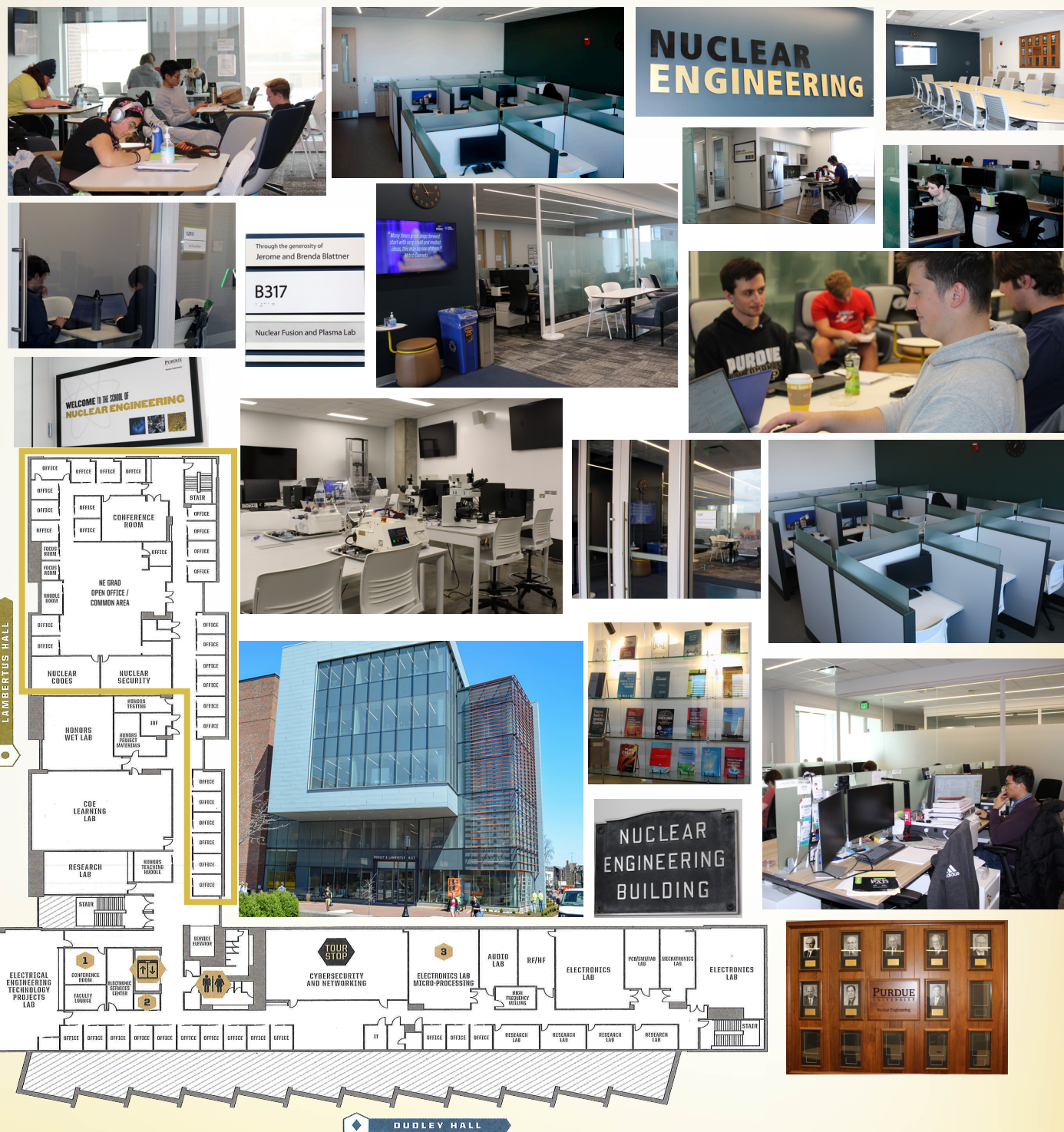
Brad McDaniel has been a member of Purdue University since July 2021. He graduated from Oklahoma State University and has accumulated approximately 10 years of experience in international student advising and academic advising. In his free time, he likes to spend time with his partner Randy and their dog Hoss. He is also passionate about quilting and traveling. Brad is very enthusiastic about being a part of the School of Nuclear Engineering!



GATEWAY COMPLEX

NUCLEAR'S NEW HOME

The completion and opening of Purdue's new Gateway Complex building, Dudley and Lambertus Halls, marked a momentous occasion for both Purdue University and the School of Nuclear Engineering.



Mitch Daniels & Maria Korsnick

AS SPEAKERS



During the 2023 ANS Annual Meeting Opening Plenary titled, "Failure is not an Option," Purdue University President Emeritus and Former Indiana Governor, Mitch Daniels served as the Keynote Speaker. Mitchell E. Daniels, Jr. became the 12th President of Purdue University in January 2013, at the conclusion of his second term as Governor of the State of Indiana.

Maria Korsnick, President and CEO of Nuclear Energy Institute and Purdue University School of Nuclear Engineering Advisory Board Member was also featured as a panelist. Maria joined the advisory council in 2019.

The panel also included Mark Peters, Executive Vice President for National Laboratory Management & Operations, Battelle, Dr. Michael Goff, Principal Deputy Assistant Secretary at the U.S. Department of Energy's Office of Nuclear Energy, and Grace Stanke, Miss America 2023 and Zero-Carbon Advocate and Student at University of Wisconsin-Madison.

REPRESENTATIVE GREG PENCE

VISITS NUCLEAR ENGINEERING

Representative Greg Pence, a member of the U.S. House of Energy & Commerce Committee, recently visited Purdue University to discuss the School of Nuclear Engineering's innovation in energy research.

Purdue University has unique nuclear infrastructure facilities that can support the development of new advanced nuclear reactors as well as needs of the existing fleet. Specifically, the School of Nuclear Engineering houses the Purdue University Reactor Number One (PUR-1) and Purdue University Multi-Dimensional Integral Test Assembly (PUMA).

During his visit, Representative Pence toured PUR-1 and PUMA with Dr. Lefteri Tsoukalas, a professor of nuclear engineering, a member of the Technical Advisory Committee for the Duke-Energy and Purdue University SMR Study, and Director of Center of Intelligent Energy Systems (CiENS) and Dr. Bryan Boudouris, the R. Norris and Eleanor Shreve Professor of Chemical Engineering, Professor of Chemistry, by courtesy, and Associate Vice President for Research, Strategic Interdisciplinary Research.



(Purdue University photo/Kelsey Lefever)

(Left to Right) Bryan Boudouris (Chemical Engineering), Mung Chaing (Purdue President), Greg Pence (Indiana Representative), Karen Plaut (Purdue Office of Research), Lefteri Tsoukalas (Nuclear Engineering)

GIFTS

The School of Nuclear Engineering aims to increase our pace of transformational innovation by increasing our number of faculty, undergraduate and graduate students, and facility enhancements. Only through such growth will the Purdue family be able to realize our potential for impacting the world.

Your support in three key areas – undergraduate student scholarships, graduate fellowships, and professorships – is critical in positioning Purdue at the forefront of advances in nuclear engineering. Our goals are bold, but the possibilities are limitless.

Give to the School of Nuclear Engineering

<https://bit.ly/45W0NH2>



Alumni Jerome and Brenda Blattner gifted the School of Nuclear Engineering a new Nuclear Fusion and Plasma teaching laboratory. This teaching lab will provide nuclear engineering students with hands-on experience in both the basic knowledge and emerging technologies on nuclear fusion and plasma physics topics.



Dr. Arden Bement Jr. established the Arden L. Bement, Jr. Early Faculty Development Fund at the Purdue University School of Nuclear Engineering. The primary purpose of this fund is to provide early-stage research support for a promising pre-tenured faculty member in the school.



Clifford and Suzanne Hill established and endowment to support and maintain one or more annual scholarships for undergraduate students who demonstrate academic merit.

OUTSTANDING

NUCLEAR ENGINEER AWARD

The ONE Award is presented annually to outstanding School of Nuclear Engineering alumni in appreciation of their monumental contributions to the nuclear engineering field.



Dr. Seungjin Kim and Dr. Han Gyu Joo with ONE Award Plaque

HAN GYU JOO

Ph.D. 1996

Presented in recognition of outstanding scholarly accomplishments, visionary leadership, and remarkable contributions to nuclear power engineering.



ONE Award group photo



Dr. Seungjin Kim presents Dr. Han Gyu Joo with a School of Nuclear Engineering brick

STUDENT AWARDS

2022-2023



Second Consecutive U.S. Women in Nuclear Excellence Award:
Purdue's Women in Nuclear Chapter



1st Place NEUP 2023 Innovations in Nuclear Energy Research and Development Student Competition:
Adam Dix



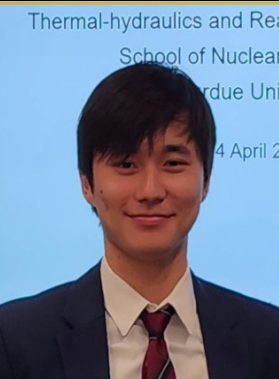
Purdue Engineering Fellow:
Jake Marr

2023 NEA Global Forum Rising Star Award:
Molly Ross



2023 DEPS Grant Award:
Travis Crawford

Rickover Fellowship:
David Kang



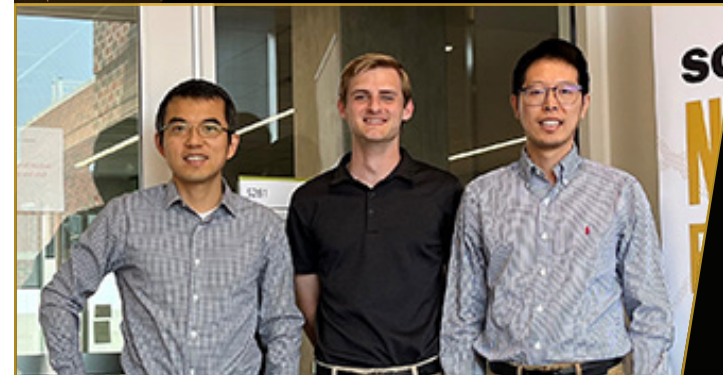
Outstanding Senior Award:
Jake Halpern

Nuclear Engineering Graduate Research Recognition Seminar Award:
Darrell Cheu



Nuclear Engineering Graduate Research Award:
Sree Harsha Naropanth Ramamurthy

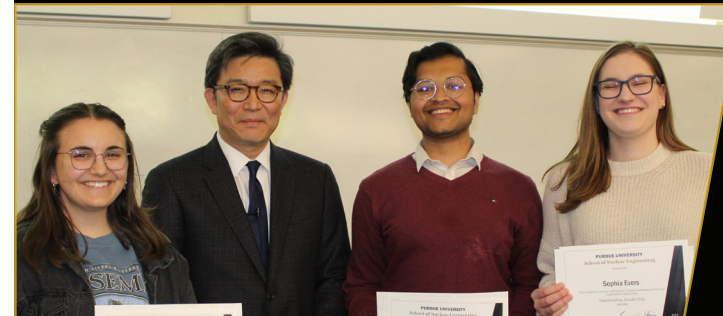
Excellence in Equity Award:
Asif Anwar



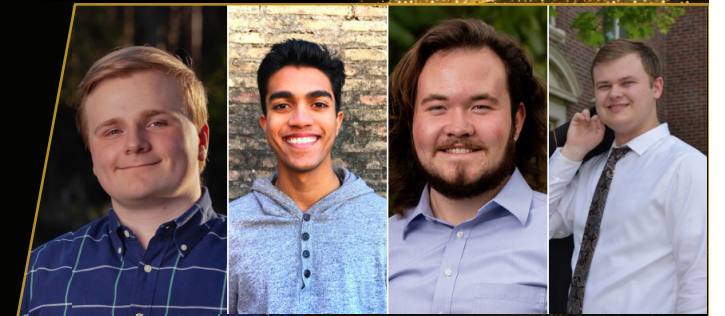
NSUF RTE Grant Awardees:
John Snitzer, Jingfan Yang



Senior Design Awardees:
Team U.S. NRC - Jacob Halpern, Sophia Shick, Samuel Wyss



Outstanding Leadership Awards:
Asif Anwar, Jennah Bari, Sophia Evers



2022-23 Nuclear Engineering Undergraduate Research Scholarships:
Evan Frishholz, Girik Jain, Jake Marr, Samuel Wyss

STUDENT AWARDS

2022-2023

Nuclear Engineering Early-Career Graduate
Research Award:
Adam Dix

Outstanding Sophomore Award by National &
International Scholarships Office (NISO):
Sophia Evers
Alicja Stoppel

Ross Fellowship:
Abdulrasheed Sado

Donnan Fellowship:
Jeongwon Seo

Magoon Excellence in Teaching Award:
Troy Barlow

Outstanding Graduate Service
Scholarship:
Adam Dix

Outstanding Research:
Shunjiang Tao

ANS Scholarship
Denver Bush

DOE UNLP Scholarship
Jake Marr
Jackson Cowan
Trevor Hylan
Niels Eysturlid
Adam Hermann

NRC Graduate Fellowship
Zachary Dahm
Logan Joyce
David Kang
Charie Tsoukalas

Gerondelis Foundation Scholarship
Konstantinos Gkouliaras
Vasileios Theos

Roy G. Post Foundation Scholarship
Jake Marr

ANS Alan F. Henry / Paul A. Greebler
Graduate Scholarship
Rizki Oktavian

U.S. DOE Computational Science Graduate
Fellowship
Jacob Halpern

FACULTY AND STAFF AWARDS

2022-2023

2022 COE Outstanding Engineering Teachers:
Dr. Stylianos Chatzidakis
Dr. Ahmed Hassanein
Dr. Lefteri Tsoukalas

2023 COE Outstanding Faculty Mentor Award:
Dr. Lefteri Tsoukalas

Best Undergraduate Teacher Award:
Stylianos Chatzidakis

Best Graduate Teacher
Award:
Lefteri Tsoukalas

Best Staff Award:
Teresa Luse

AMBASSADORS 2023-2024

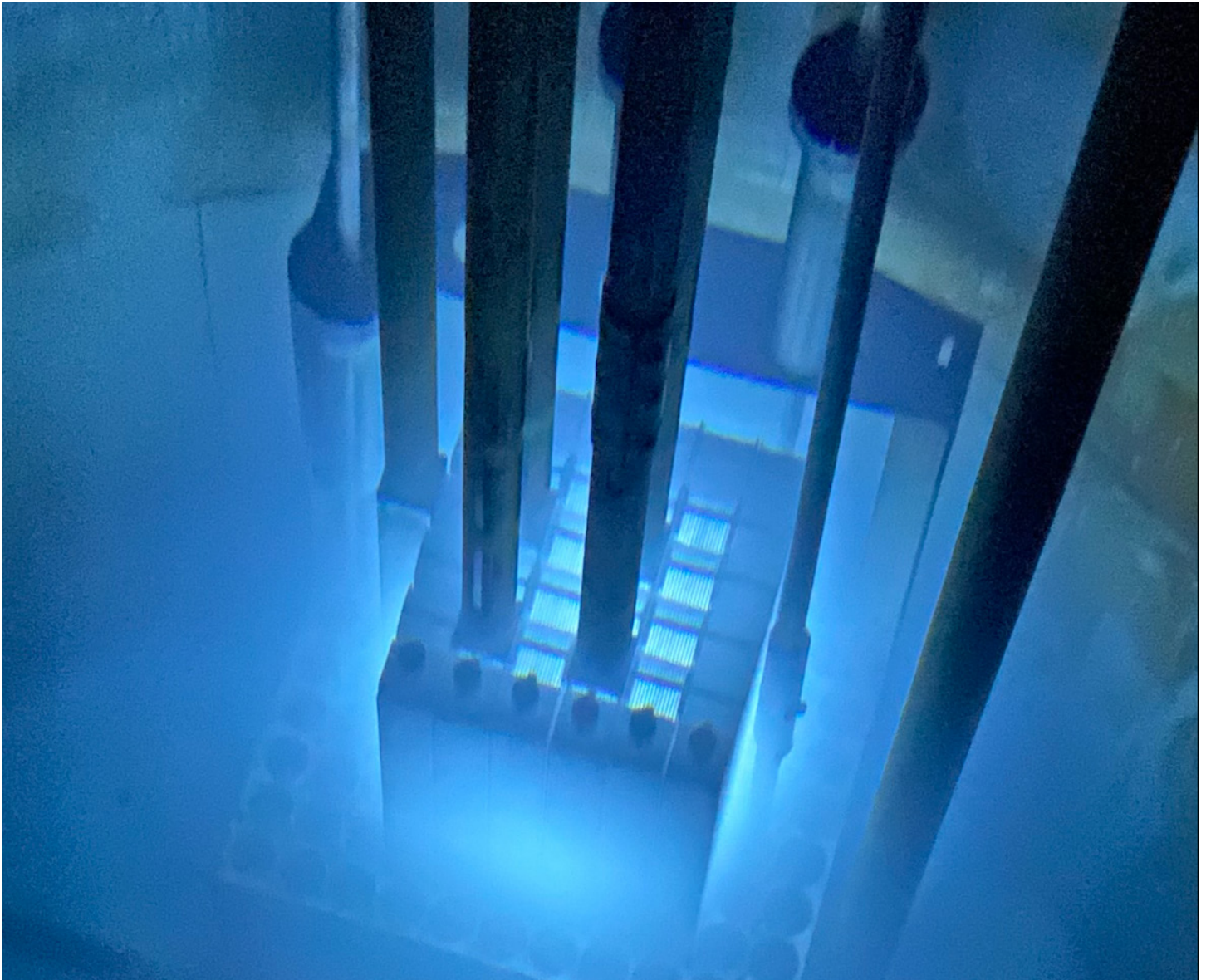
Jake Marr, Anna Rose, Andrew St. Aubin, Niels
Eysturlid, Preston Kilzer, Luke Oukrop, Omar Saad



WHERE FUTURE LEADERS

of the
Global Nuclear Engineering Community

ARE CULTIVATED



CONNECT
WITH US



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