



INSTITUTE OF NUCLEAR MATERIALS MANAGEMENT

Pebble-Bed and TRISO-Fueled Reactor Nonproliferation

WORKSHOP

College Station, TX

3 - 6 February 2025



NSSPI
Center for Nuclear Security
Science and Policy Initiatives





Howdy!

Welcome to the Pebble Bed and TRISO-fueled Reactors Nonproliferation Workshop hosted by the Texas A&M University Institute of Nuclear Materials Management (INMM) Student Chapter. TRISO-fueled reactors are set to play an important role in the nuclear industry, with notable recent highlights including

the NRC voting to issue a construction permit for Kairos Power's Hermes 2 reactor and X-energy progressing with their plans to build a TRISO-X fuel fabrication plant in Oak Ridge, TN. Given these advances, we here at Texas A&M wanted to play a role in facilitating necessary conversations on nuclear nonproliferation considerations and advancements relating to these technologies. We are very excited to be hosting you all in College Station and hope you have an amazing time in Aggieland. We would also like to express our deep gratitude for our speakers for helping to ensure the success of this workshop and to Ortec-Ametek for their sponsorship of the workshop!

Sincerely,

Christine Mathew, Texas A&M INMM Student Chapter President

Thomas DeGuire, Texas A&M INMM Student Chapter Workshop Chair



STUDENT CHAPTER



Texas A&M INMM Student Chapter Officers

President: Ms. Christine Mathew

Vice-President: Ms. Grace Long

Treasurer: Mr. Dillon Caldwell

Secretary: Mr. Carlo Dal Colletto

Social Chair: Mr. Jason Scott

Undergraduate Liason: Mr. Dylan Frank

Faculty/Staff Co-Advisor: Dr. Mansung Yim

Faculty/Staff Co-Advisor: Ms. Kelley Ragusa

Workshop Planning Committee

Workshop Committttee Chair: Thomas DeGuire

Welcome Coordinator: Mr. Ebube Oklo

Reception Coordinator: Mr. Dillon Caldwell

Volunteer Coordinator: Mr. David “Zach” Lassater

Hospitality Coordinator: Ms. Christine Mathew

Student Volunteers: Arianna Bar, Eric Serrano-Chavez, Sohil Goswami, Peter Halaska, Zachary Harbert, Jordan Hillis, Julia Jiang, Jacob Lowy, John Ludwick, Stephen Miles, Ana-Maria Pope, Brianna Rivas, Jack Warman, Vahayra Velasquez, Anh Vo.



Welcome to A&M

Places to See



The George H.W. Bush Presidential Library and Museum: This museum offers exhibits on the life and career of the 41st U.S. President, including a WWII Avenger Torpedo Bomber and a piece of the Berlin Wall.



Rudder Theatre Complex: Hosting a variety of performances, lectures, and events, this complex is a cultural hub on campus. The group the 5 Browns performs February 6th at 7:30 PM!



Kyle Field: Home of the Texas A&M Football team and one of the five largest stadiums in college football.



Bonfire Memorial: A tribute to the 12 Aggies who lost their lives in the 1999 Bonfire collapse; this memorial is a place of reflection and remembrance.



Aggie Park: Opened in 2022, Aggie Park is one of the most idyllic parts of campus. This park is a hub of activity and features a fishing pond, outdoor concerts, and tailgates during football season.

Dining Nearby



Food Truck Row: Located between the Dwight Look Engineering Building and the Zachry Building. Usually includes vegetarian and halal options.



Century Square: A half mile walk Northeast of Zachry, Century Square offers a wide variety in dining including a Blaze Pizza, Cava, Houston Hot Chicken, Mess Waffles, Piada, Pokeworks, and Velvet Taco.



Polo Road Garage: The Polo Road Garage facility contains a Houston Street Subs, Panda Express, Salata, and Shake Smart.



Einstein Bros. Bagels: Approximately a 10-minute walk from Zachry, Einstein Bros. is located behind Sbisa Dining Hall.



Azimuth Café: Located on the bottom floor of the Langford Architecture Center, this café serves artisan sandwiches.

WORKSHOP SCHEDULE

Monday, February 3, 2024

12:00pm – 6:00pm | Workshop

Registration and Badge Pickup

Location: Zachry Chevron Room 297 and Atrium



6:00pm – 9:00pm | Opening Reception

Location: Zachry Chevron Room 299 and Atrium

- Keynote Speakers: Dr. K.L. Peddicord, Texas A&M Senior Professor and Professor Emeritus and Dr. Warren “Pete” Miller, former Assistant Secretary for Nuclear Energy at the U. S. Department of Energy and Texas A&M Professor of Practice

Tuesday, February 4, 2024

8:30am – 10:00am | Opening Plenary

Location: Zachry Chevron Room 297

- Texas A&M University/INMM Welcome and Introductions
 - Ms. Evelyn Mullen, Special Advisor to the Texas A&M Vice Chancellor for Research, National Laboratories Office, Texas A&M University System;
 - Dr. Mansung Yim, Director of the Center for Nuclear Security Science and Policy Initiatives (NSSPI);
 - Dr. Karen Kirkland, Associate Department Head, Department of Nuclear Engineering at Texas A&M University
- Mr. Mark Schanfein, Senior Nonproliferation Advisor at Idaho National Laboratory and Immediate Past-President of INMM
- Mr. Thomas DeGuire, Workshop Committee Chair
- Keynote Speaker: Dr. Jeremy Whitlock, Former Senior Technical Advisor in the Department of Safeguards of the IAEA, “Non-proliferation Aspects of HTGR TRISO-Fuelled Reactors”

WORKSHOP SCHEDULE



10:00am – 10:20am | Coffee Break

Location: Zachry Chevron Room 298

10:20am – 11:20am | Material Control & Accounting, part 1

Location: Zachry Chevron Room 297

- Mr. Donald Kovacic (Oak Ridge National Laboratory), “Nuclear Material Control & Accounting for Pebble Bed Reactors”
- Dr. Tomi Akindele (Lawrence Livermore National Laboratory), “Advancing Measurement Tools for Pebble Bed Reactors”

11:20pm – 12:30pm | Lunch break

12:30pm – 2:30pm | Assay Techniques, part 1

Location: Zachry Chevron Room 297

- Dr. Emily Paige Abel (Idaho National Laboratory), “Measurement of TRISO Fuel at the Analytical Research Laboratory with Microcalorimetry”
- Dr. Stefania Dede (Los Alamos National Laboratory), “NDA Characterization of TRISO Burnup”
- Dr. Jianwei Hu (Oak Ridge National Laboratory), “Gamma Spectrometry Measurements of Irradiated TRISO Fuel”
- Dr. Carlos Soto (Brookhaven National Laboratory), “Determining Fuel Burnup in Pebble Bed Reactors with Machine Learning”

2:30pm – 3:00pm | Coffee Break

Location: Zachry Chevron Room 298

3:00pm – 5:00pm | Modeling and Simulation, part 1

Location: Zachry Chevron Room 297

- Dr. Ramon Pulido (Sandia National Laboratories), “TRISO Fuel Fabrication Safeguards Modeling for Statistical Evaluation of Material Control & Accounting Measurement Technologies”
- Mr. Liam Carlson (Texas A&M University), “The Current State of High-Fidelity PBR Neutronics Modelling”

WORKSHOP SCHEDULE

- Mr. Arif Rangon (Texas A&M University), “High-Fidelity PBR Depletion Calculation in Griffin using Artificial Neural Network”
- Dr. Arantxa Cuadra (Brookhaven National Laboratory), “Design of a New Transmutation Data Repository”

5:00pm – 5:45pm | IAEA Perspective

Location: Zachry Chevron Room 297

- Dr. Alexis Trahan (IAEA), “Preparing to Safeguard Pebble Bed and TRISO-Fueled Reactors”

7:00pm | Optional Social at the Dixie Chicken (a Texas A&M tradition!)

307 University Dr, College Station, TX 77840

- Join the group for snacks and drinks at the oldest bar on Northgate!



Wednesday, February 5, 2024

8:30am to 10:30am | Physical Protection and Security

Location: Zachry Chevron Room 297

- Dr. Ben Cipiti (Sandia National Laboratories), “Gen-IV Proliferation Resistance and Physical Protection Aspects of Very High Temperature Reactors”
- Mr. Alan Evans (Sandia National Laboratories), “Pebble Bed Reactor Analysis: Theft and Sabotage”
- Dr. Lee MacCarone (Sandia National Laboratories), “Cybersecurity-by-Design for Advanced Reactors: Research Efforts for High Temperature Gas-Cooled Reactors”
- Mr. Ali Alkis (NATO Defense College), “Challenges and Safeguards for Pebble Bed Modular Reactors”

10:30am – 11:00am | Coffee Break

Location: Zachry Atrium

WORKSHOP SCHEDULE

11:00am – 12:00pm | Modeling and Simulation, part 2

Location: Zachry Chevron Room 297

- Dr. Ryan Stewart (Idaho National Laboratory), “The General Pebble Bed Reactor: Applications of high-fidelity modeling for proliferation resistance”
- Dr. Dany Mulyana (Indonesian Research and Innovation Agency), “A non-proliferation study of a typical pebble bed reactor”

12:00pm – 1:00pm | Lunch Break

1:00pm – 2:30pm | Assay Techniques, part 2

Location: Zachry Chevron Room 297

- Dr. Tashiema Ulrich (Oak Ridge National Laboratory), “Evaluation of Gamma Imaging for TRISO Fuel Fabrication Manufacturing Holdup Monitoring”
- Dr. Ruth Kips (Lawrence Livermore National Laboratory), “Expanding our understanding of nuclear forensic signatures in Advanced Reactor Fuels”
- Mr. Austen Ocanas (Texas A&M University), “Assessment of self-interrogation safeguards signatures for pebble bed reactor fuel”

2:30pm – 3:00pm | Q&A Panel

Location: Zachry Chevron Room 297

3:00pm – 5:00pm | Optional Facilities Tours: Center for Advanced, Small, and Micro Reactors (CASMR) – NuScale Simulator and experimental SMR facilities





WORKSHOP SCHEDULE

Thursday, February 6, 2024

8:30am – 9:30am | Fuel Cycle Considerations

Location: Zachry Chevron Room 297

- Dr. Tomi Akindele (Lawrence Livermore National Laboratory), “NNSA’s Proliferation Resistance Optimization Program for Advanced Reactors and their Fuel Cycles”
- Ms. Sylvia Saltzstein (Sandia National Laboratories), “Sandia Holistic Advanced Reactor Capabilities Center (SHARCC) for Pebble Bed Reactors”

9:30am – 10:00am | Coffee Break

Location: Zachry Chevron Room 298

10:00am – 11:30pm | Material Control & Accounting, part 2

Location: Zachry Chevron Room 297

- Ms. Margaret Ellenson (Kairos Power), “Kairos Power Domestic Advanced Reactor Safeguards Strategies”
- Dr. Claudio Gariazzo (Argonne National Laboratory), “Eddy Current Inspection of Graphite Pebbles for Pebble Bed Reactors”
- Dr. Ming Fang (University of Illinois Urbana-Champaign), “Identification of TRISO-Fueled Pebble Based on Neutron Multiplicity Counting and X-Ray CT”

11:30am – 12:00pm | TRISO Facilities

Location: Zachry Chevron Room 297

- Mr. Zach Lemke (Los Alamos National Laboratory), “Deimos: A Benchmarked Critical Experiment to Support Advanced Reactors using HALEU TRISO Fuel”

12:00pm – 1:00pm | Lunch Break

WORKSHOP SCHEDULE



1:00pm – 1:30pm | Safeguards Implementation Experience

Location: Zachry Chevron Room 297

- Mr. Collins Omondi (African Commission of Nuclear Energy), “Lessons from Enhancing Nuclear Safeguards in Africa Programme”

1:30pm – 2:30pm | Closing session

Location: Zachry Chevron Room 297

- Keynote Speaker: Ms. Laura Rockwood, Non-Resident Senior Fellow of the Vienna Center for Disarmament and Non-Proliferation (VCNDP) and INMM Vice President

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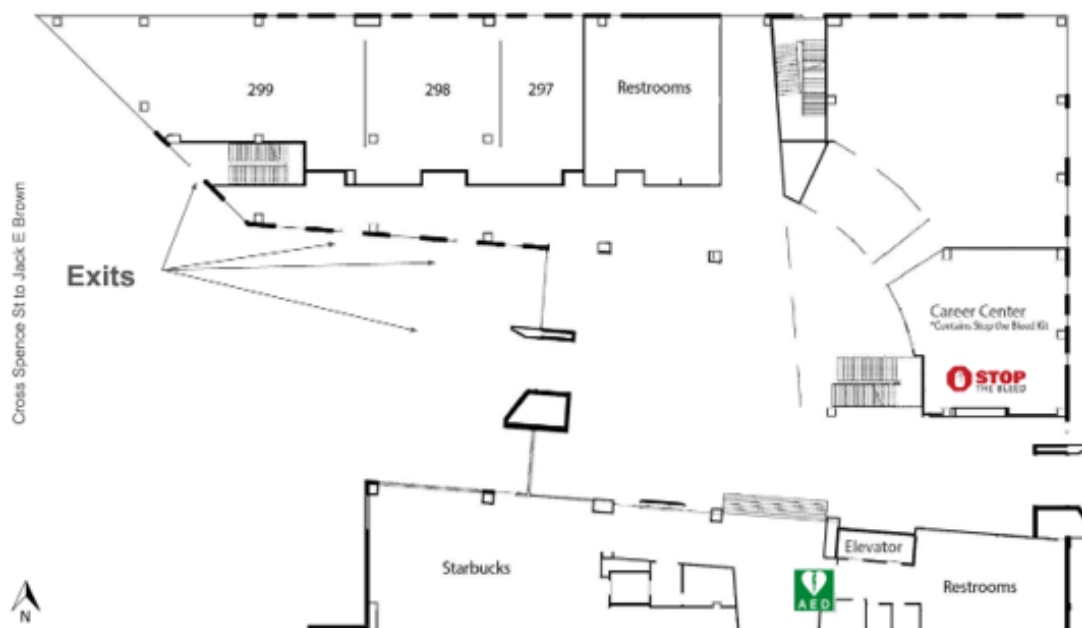


PARKING & LOGISTICS

Getting There

- The Zachry Engineering Education is located at the corner of University Drive and Bizzell Street
- Parking is available at the Polo Road Parking Garage (paid parking open to the public near the Zachry building)

Map/Emergency Information for the Zachry Rooms 299, 298, 299:

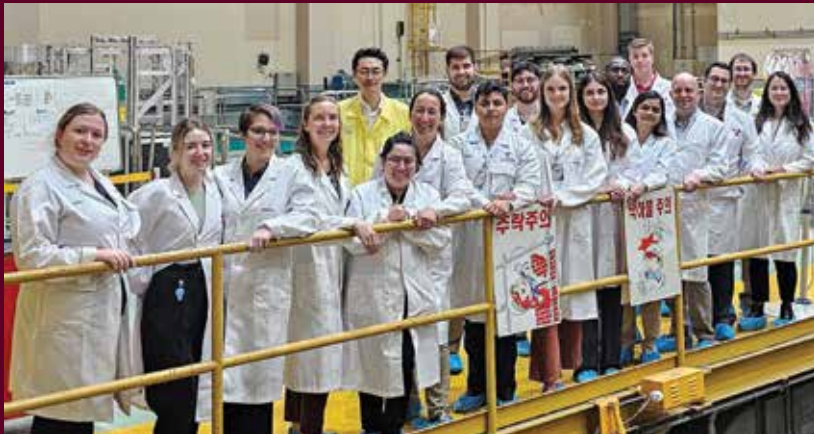


- If you enter the Zachry Building from the East Entrance (facing the parking garage), the Chevron rooms and Atrium are directly in front of you and to the right (Room 297 is our main workshop room). This entrance is shown on the right of the map, above.
- If you enter the Zachry Building from the South Entrance (Welcome center), you will need to either take the elevator to Floor 2 or walk to the learning stairs and go up one floor, then continue to a small half stairway (there is an elevator located to the right of these stairs). The small staircase and elevator are shown on the map, above. This will lead you to the Atrium and the Chevron Rooms. The rooms are facing the Starbucks at the bottom of these stairs.
- If you enter the Zachry Building from the West Entrance (from Spence Street), you arrive directly into the Atrium. This entrance is shown on the left of the map, above, and marked "Exits."



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WORKSHOP MAP

