

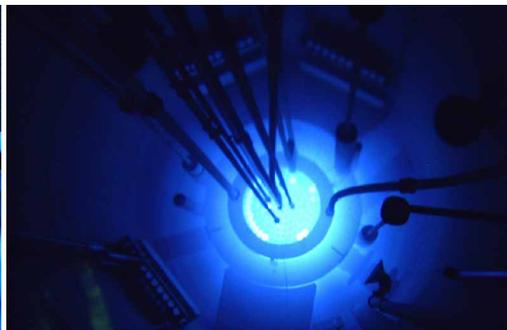


ANS Annual Meeting

2018

Official Program

*DRIVING THE FUTURE OF
NUCLEAR TECHNOLOGY*



June 17-21, 2018
Philadelphia, PA
Marriott Philadelphia Downtown



ANS

Annual 2018

Driving the Future of Nuclear Technology

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Meeting Officials

DRIVING THE FUTURE OF NUCLEAR TECHNOLOGY

2018 Annual Meeting



GENERAL CHAIR
Krishna Singh
Holtec International



ASSISTANT GENERAL COCHAIR
Joy Russell
Holtec International



ASSISTANT GENERAL COCHAIR
Myron Kaczmarek
Holtec International



TECHNICAL PROGRAM CHAIR
Martin Sattison
Retired/Idaho National Laboratory



ASSISTANT TECHNICAL PROGRAM CHAIR
Nicholas Brown
Pennsylvania State University



MEDIA CHAIR
Caitlin Marmion
Holtec International



STUDENT PROGRAM COCHAIR
Evrard Lacroix
Penn State University



STUDENT PROGRAM COCHAIR
Kelley Verner
University of Idaho



TECHNICAL TOUR CHAIR
Kyle Schwirian
Holtec International

Daily Schedule

Sunday, June 17

7:00 am-7:00 pm 6:00-8:00 pm	Registration ANS President's Opening Reception	Grand Ballroom Foyer Grand Salon H
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Monday, June 18

7:00 am-5:00 pm 7:30-8:00 am	Registration Continental Breakfast <i>Sponsored by</i>	Grand Ballroom Foyer Franklin Foyer
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8:00-11:15 am	Opening Plenary <i>Sponsored by</i>	Grand Salon G/H
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11:15 am-1:00 pm 1:00-2:45 pm 1:00-4:15 pm	Lunch on Own NFSM Opening Plenary ANS Technical Sessions	Franklin 8
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- Radiation Protection and Shielding: General
- Challenges of Digital I&C Technology—I-Panel
- Innovations in Radiation Detectors: New Designs, Improvements and Application
- Reactor Physics: General—I
- Effects of Long-Term Operation on Electrical Cable Aging, Condition Monitoring, and Performance
- Criticality Accident Alarm System: Issues and Testing
- Two-Phase and Heat Transfer Fundamentals
- Export Controls-Panel
- Status and Emerging Developments in the Management of Used Nuclear Fuel-Panel
- Hybrid Energy Systems and Energy Storage
- Meet with ANS Staff-Panel
- Students for Nuclear—Telling Your Nuclear Story-Panel
- Current Issues in Computational Methods-Roundtable
- Status on Repository Concepts Internationally-Panel

Grand Salon I
Grand Salon J
Grand Salon J
Grand Salon K

2:45-3:00 pm 3:00-5:10 pm 4:30-6:40 pm	Coffee Break NFSM Session: Development of Advanced Nuclear Fuel Concepts ANS President's Special Session	Grand Salon L Franklin 5 Franklin 6 Franklin 7 Franklin 7 Franklin 9/10 Rooms 411/412 Rooms 411/412 Rooms 414/415 Rooms 408/409 Franklin Foyer Franklin 8 Grand Salon G/H
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Daily Schedule

Tuesday, June 19

7:00 am-5:00 pm 7:30-8:00 am	Registration Continental Breakfast  Sponsored by	Grand Ballroom Foyer Franklin Foyer
8:00-11:40 am	ANS Technical Sessions <ul style="list-style-type: none"> • Training, Human Performance and Workforce Development • Cybersecurity Guidance and Practices—Papers/Panel • Reactor Analysis Methods—I • Nuclear Installations: Safety: General • Data, Analysis and Operations in Nuclear Criticality Safety—I • Molten Salt Thermal Hydraulics and Mass Transport • University Research in Fuel Cycle and Waste Management • All Energy Forum—I—Panel • Aerospace Nuclear Science and Technology: General • Deterministic Transport Methods • Defense Nuclear Nonproliferation Research and Development • Water Technologies and Nuclear Power—Panel 	Grand Salon I Grand Salon J Grand Salon K Grand Salon L Franklin 5 Franklin 6 Franklin 7 Franklin 9/10 Rooms 414/415 Rooms 414/415 Rooms 408/409 Rooms 411/412
8:00-11:45 am	NFSM Technical Sessions <ul style="list-style-type: none"> • Advanced Modeling and Simulation of Nuclear Materials—I • Advanced Modeling and Simulation of Nuclear Materials— II 	Franklin 8 Franklin 8 Franklin Foyer
9:20-9:35 am 11:40 am-1:00 pm 1:00-2:45 pm 1:00-5:25 pm	Coffee Break Lunch on Own General Chair's Special Session NFSM Technical Sessions	Grand Salon G/H
2:45-3:00 pm 3:00-4:15 pm	NFSM Technical Sessions <ul style="list-style-type: none"> • 21st Century Entrepreneurial Nuclear Energy • Enhanced Accident Tolerant Fuels • Fast Reactor Fuels 	Franklin 8 Franklin 8 Franklin 8 Franklin Foyer
2:45-3:00 pm 3:00-4:15 pm	Coffee Break ANS Technical Sessions <ul style="list-style-type: none"> • Applications of DOE-NE Infrastructure Support for University Research Reactors • Advanced Sensor Development and Demonstration • Computational Tools for Radiation Protection and Shielding • Reactor Physics: General—II • Education, Training and Workforce Development: General • Multiscale Thermal Hydraulics • Natural Circulation and Reliability of Natural Circulation Phenomena and Associates Systems • All Energy Forum—II—Panel • Expediting the Licensing and Deployment of Advanced Reactors—Panel • Monte Carlo Methods—I • Advanced Closed Fuel Cycles—The Economic Challenge—Panel 	Grand Salon I Grand Salon J Grand Salon K Grand Salon L Franklin 5 Franklin 6 Franklin 7 Franklin 9/10 Rooms 411/412 Rooms 414/415 Rooms 408/409
4:30-6:40 pm	ANS Technical Sessions <ul style="list-style-type: none"> • Isotopes and Radiation: General • Licensing and Implementation of Digital I&C at Research Reactors—Panel • Preserving Key Nuclear Safety Data—Panel • Computational Fluid Dynamics Codes for Nuclear Thermal Hydraulics Applications—Panel • ANS-8.10 Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement, Uses and Purposes—Panel • Nuclear Nonproliferation Policy: General • Advanced Gen-IV Reactors • Monte Carlo Methods—II 	Grand Salon I Grand Salon J Grand Salon L Franklin 6 Franklin 7 Franklin 9/10 Rooms 411/412 Rooms 414/415 Franklin Foyer
5:30-7:30 pm	NFSM 2018 Poster Session and Reception  Sponsored by	

Daily Schedule

Wednesday, June 20

7:00 am-5:00 pm	Registration	Grand Ballroom Foyer
7:30-8:00 am	Continental Breakfast	Franklin Foyer
8:00-11:40 am	ANS Technical Sessions <ul style="list-style-type: none"> • Technical Grand Challenges—Closing the Nuclear Fuel Cycle—Panel • Experience with Revised Human Factors Engineering Training—Papers/Panel • Reactor Analysis Methods—II • Current Topics in Probabilistic Risk Analysis • Data, Analysis and Operations in Nuclear Criticality Safety—II • Experimental Thermal Hydraulics—I • Computational Thermal Hydraulics—I • Molten Salt Systems for FHRS and MSRS: Chemistry and Mass Transport • Uncertainty Quantification and Sensitivity Analysis • Load Following Attributes for Nuclear—Panel 	Grand Salon I Grand Salon J Grand Salon K Grand Salon L Franklin 5 Franklin 6 Franklin 7 Rooms 411/412 Rooms 414/415 Rooms 408/409
8:00-11:45 am	NFSM Technical Sessions <ul style="list-style-type: none"> • Materials and Research Reactor Fuel Tests • Advanced Materials and Manufacturing 	Franklin 8 Franklin 8
9:20-9:35 am	Coffee Break	Franklin Foyer
9:35-11:40 am	Delivering the Nuclear Promise—Panel	Franklin 9/10
11:40 am-1:00 pm	Lunch on Own	
1:00-2:45 pm	Recent Advances in Decommissioning of Nuclear Plants—Panel	Franklin 9/10
1:00-4:15 pm	ANS Technical Sessions <ul style="list-style-type: none"> • Reactor Physics: General—III • On-Line Monitoring—Prognostic and Health Management for Nuclear Power Plants • The Nuclear Energy Advance Modeling and Simulation (NEAMS) Workbench—I • Safety Aspects of Accident Tolerant Fuels—Panel • Sharing of Good Industry Practices and/or Lessons Learned in Nuclear Criticality Safety—Panel • Computational Fluid Dynamics • Operations and Power: General • Focus on Communications: It's All About the Plant—Panel • Nuclear Advocacy—Panel • Computational Methods and Mathematical Modeling • Recycle and Reuse of Used Nuclear Fuel Resources • Accelerator Applications in Science and Engineering 	Grand Salon I Grand Salon J Grand Salon K Grand Salon L Franklin 5 Franklin 6 Franklin 7 Rooms 411/412 Rooms 411/412 Rooms 414/415 Rooms 408/409 Franklin 9/10
1:00-6:40 pm	NFSM Technical Sessions <ul style="list-style-type: none"> • Radiation Effects and Post-Irradiation Examinations • Used Fuel and Life Management for LWRs • Advanced Characterization of Nuclear Materials 	Franklin 8 Franklin 8 Franklin 8 Franklin Foyer
2:45-3:00 pm	Coffee Break	
4:30-6:40 pm	ANS Technical Sessions <ul style="list-style-type: none"> • Challenges of Digital I&C Technology—II • Advances in Fast Reactor Design and Concepts—Panel • The Nuclear Energy Advance Modeling and Simulation (NEAMS) Workbench—II • Licensing of Medical Isotope Production Facility—Panel • Data, Analysis and Operations in Nuclear Criticality Safety—III • Thermal Hydraulic Analysis in Support of Severe Accident Management • General Thermal Hydraulics • Fuel Cycle and Waste Management: General—I • Challenges Associated with the Back End of the Molten Salt Reactor Fuel Cycle—Panel 	Grand Salon I Grand Salon J Grand Salon K Grand Salon L Franklin 5 Franklin 6 Franklin 7 Franklin 9/10 Rooms 414/415

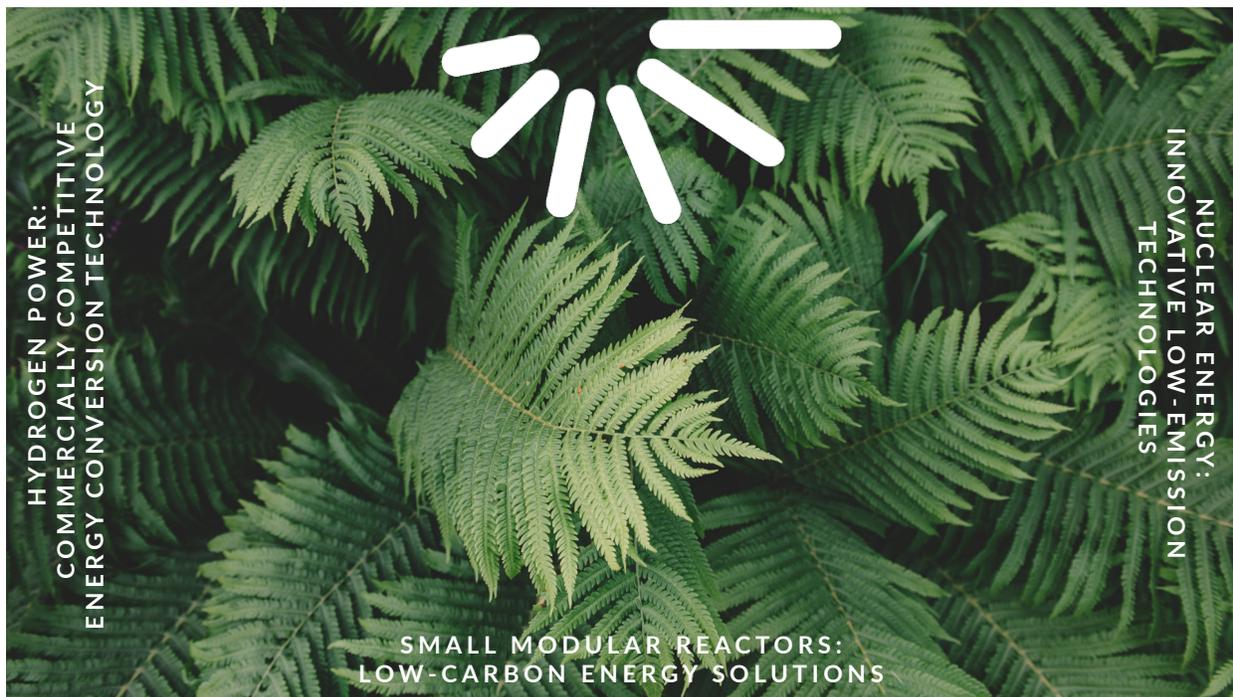
Daily Schedule

Thursday, June 21

<p>7:00 am-12:00 pm 7:00 am-1:00 pm 7:30-8:00 am 8:00-11:40 am</p>	<p>Registration Technical Tour: PSEG's Salem and Hope Creek Continental Breakfast ANS Technical Sessions</p> <ul style="list-style-type: none"> • Fuel Cycle and Waste Management: General—II • Waste Repositories • Reactor Physics Design, Validation and Operational Experience • ANS-8 Standards Forum • Experimental Thermal Hydraulics—II • Computational Thermal Hydraulics—II 	<p>Grand Ballroom Foyer Board Bus at 12th Street Franklin Foyer</p> <p>Grand Salon I Grand Salon J Grand Salon K Franklin 5 Franklin 6 Franklin 7 Board Bus at 12th Street</p>
<p>8:00 am-12:30 pm 8:00 am-12:10 pm</p>	<p>Technical Tour: Holtec Technology Campus NFSM Technical Sessions</p> <ul style="list-style-type: none"> • NSUF Special Session—I • NSUF Special Session—II 	<p>Franklin 8 Franklin 8</p>
<p>9:20-9:35 am</p>	<p>Coffee Break</p>	<p>Franklin Foyer</p>

CANADIAN NUCLEAR LABORATORIES

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General Information

MEETING INFORMATION

The American Nuclear Society is excited to invite you to join us in the city of brotherly love, Philadelphia, PA from June 17-21, for the 2018 ANS Annual Meeting, which will be held at the Marriott Philadelphia Downtown.

In addition to an impressive list of government and industry leaders, we are also planning several outstanding hot-topic technical sessions and popular plenary speakers, along with the Nuclear Fuels & Structural Materials for Next Generation Nuclear Reactors embedded meeting, which will attract professionals from across the nation and internationally.

REGISTRATION

Location: Grand Ballroom Foyer

Name badges must be worn during all technical sessions and events.

Some events require a ticket, and may entail an additional cost.

REGISTRATION HOURS

Sunday, June 17	7:00 am – 7:00 pm
Monday, June 18	7:00 am – 5:00 pm
Tuesday, June 19	7:00 am – 5:00 pm
Wednesday, June 20	7:00 am – 5:00 pm
Thursday, June 21	7:00 am – 12:00 pm

NOTICE TO SPEAKERS

All speakers and session chairs must check in at the ANS Registration Desk.

ANS BUSINESS OFFICE

Room 405

Sunday-Wednesday: 8:00 am-5:00 pm

ANS MEDIA CENTER

Room 406

Monday-Tuesday: 7:45 am-5:00 pm

Wednesday: 7:45 am-4:00 pm

ANS CONFERENCE OFFICE

Room 502

Sunday-Wednesday: 8:00 am-5:00 pm

Thursday: 8:00 am-12:00 pm

ANS STUDENT OFFICE

Room 413

Sunday-Wednesday: 8:00 am-5:00 pm

Thursday: 8:00 am-12:00 pm

ANS MEETINGS APP

Scan this code or type in Attendee Hub to your app store, download the app, then type in ANS Annual Meeting and login to the ANS Meetings App to experience all of the app features! **NOTE: All session evaluations will be done in the app only.**

If you still have the email invitation sent to you by ANS Meetings:

1. Open the invitation in your inbox. Tap Verify Account.
2. Tap **Open App** to complete the verification via the new mobile app.

To retrieve your verification code:

1. From the event homescreen, tap the three white lines icon on the top left.
2. Tap Log in for more features.
3. Enter your name and tap Next.
4. Tap Resend Code to have a verification code sent to your email address.

Or go to event.crowdcompass.com/ans-annual2018 for the online event guide.



General Information

ATTENDEE MEAL FUNCTIONS

Continental Breakfast & Breaks

Continental Breakfast, and morning and afternoon beverages and snacks will be provided to all registered meeting attendees, Monday-Thursday in the Franklin Foyer.

ANS President's Opening Reception

This reception is a ticketed event. (2) Drink tickets are included with a full meeting registration. Additional tickets are available for purchase at the following cost: \$125 (Adult) / \$50 (Child, 16 and under)

INTERNET CONNECTION

Complimentary Internet provided by these sponsors:

Sunday June 17th &
Thursday, June 21st
Network: ANS2018.
Password: AM2018
provided by ANS

Monday, June 18th
Network: ANS2018B.
Password: BalchandBingham
provided by
Balch and Bingham LLP.

Tuesday, June 19th
Network: ANS2018D.
Password: DukeEnergy
provided by
Duke Energy

Wednesday June 20th
Network: ANS2018M.
Password: Mitsubishi
provided by
Mitsubishi Electric

If you are experiencing difficulties logging on, check with the registration desk and a PSAV representative will assist you in connecting to the network. Please limit the number of devices connected WiFi to one per guest to preserve bandwidth.



Our commitment to nuclear energy defines our combined efforts to deliver the most advanced nuclear technology. The latest in development is the eVinci™ micro reactor. Particularly for remote locations, this next-generation, small nuclear energy generator is aimed at improving the reliability, resiliency and affordability of sustainable, low-maintenance power.

Learn more about our pursuit of technical excellence and innovation at <http://www.westinghousenuclear.com/About/Innovation>.



General Information

EMBEDDED TOPICAL MEETING

In conjunction with the 2018 ANS Annual Meeting, the Nuclear Fuels and Structural Materials for Next Generation Nuclear Reactors Embedded Topical meeting will be taking place concurrently. NFSM will begin on Monday, June 18th at 1:00 pm. For additional information, visit pages 46-53.

OTHER THINGS TO ATTEND

Professional Development Workshop

Preparing for the Nuclear Engineering Professional Engineering Exam

Sunday: 8:00 am-5:00 pm – Franklin 7

This course is designed for individuals who have passed the Fundamentals of Engineering Exam (formerly the EIT exam) and who are preparing for the Professional Engineering Exam (PE exam) in Nuclear Engineering. PLEASE NOTE: Registration for the workshop is separate from, and in addition to, the meeting registration fee.

Onsite pricing for the workshop:

\$550 for ANS members and \$650 for non-members

First-Time Attendee Orientation

Sunday: 1:00-1:30 pm – Salon K

The ANS Membership Committee will offer an orientation session for first-time ANS meeting attendees. Learn what goes on at national meetings, how the national organization works, and how to get involved at the national and local levels. Whether you are a member or not, student or professional, if this is your first ANS national meeting, the Membership Committee invites you to attend this session.

Student Program Q&A Meeting

Sunday: 4:00-5:00 pm – Room 414-415

All students participating in the Student Program are encouraged to attend this brief informative meeting. Learn the basic operation of the Program and get your questions answered.

Mentor Meeting

Sunday: 5:15-6:15 pm – Franklin 9-10

All attendees, from seasoned professionals to students, are encouraged to attend this informal one-hour open discussion. Prior mentor/mentoring experience is not required. Simply come share your insights, ask questions, and network in this mentoring experience beneficial to all.

Attention Runners: ANS Fun Run

Tuesday: 6:00 am – Hotel Lobby

There will be a noncompetitive run starting at 6:00 am from the lobby entrance of the hotel. We hope you can join us. Bring shoes and a big smile!

ANS Speakers Bureau and Social Media Team Workshop

Tuesday: 6:00-8:00 pm – Salon H

Join us! The ANS Speakers Bureau and the ANS Social Media Team are combining talents and sharing ideas! Participate in exercises and share your thoughts as we hold a meeting-of-the-minds! We will utilize elements of both groups to help you advance outreach efforts in your town or region.

All national members interested in public speaking at the local level and/or using your social media (including livestreaming) to forward the messages about nuclear science and technology are invited to this event.

Space is limited and reserving your spot is recommended. Email Tracy Marc at TMarc@ans.org or Linda Zec at LZec@ans.org to R.S.V.P. by Saturday, June 16.

General Information

ABOUT ANS

Mission

ANS provides its members with opportunities for professional development. It also serves the nuclear community by creating a forum for sharing information and advancements in technology, and by engaging the public and policymakers through communication outreach.

Statement on Diversity

The American Nuclear Society (ANS) is committed, in principle and in practice, to creating a diverse and welcoming environment for everyone interested in nuclear science and technology. Diversity means creating an environment – both in ANS and in the profession – in which all members are valued equitably for their skills and abilities and respected equally for their unique perspectives and experiences. Diverse backgrounds foster unique contributions and capabilities, and so creation of an inclusive Society ultimately leads to a more creative, effective, and technically respected Society.

ANS believes that everyone deserves opportunities for learning, networking, leadership, training, recognition, volunteering in Society activities, and all the other benefits that involvement in the Society brings, regardless of age, color, creed, disability, ethnicity, gender identity and expression, marital status, military service status, national origin, parental status, physical appearance, race, religion, sex, or sexual orientation. The selection of a member to serve in ANS's volunteer leadership structure shall be based solely on the member's ability, interest, and commitment to serve. In particular, ANS encourages members at each level of the Society and in each Professional Division and Technical Group to make special efforts to recruit underrepresented minorities and women to ensure that they are adequately represented in the Society.

Respectful Behavior Policy (Abbreviated)

The open exchange of ideas, freedom of thought and expression, and productive scientific debate are central to the mission of the American Nuclear Society (ANS). These require an open and diverse environment that is built on dignity and mutual respect for all participants and ANS staff members, and is free of bias and intimidation.

ANS is dedicated to providing a safe, welcoming, and productive experience for everyone participating in Society events and other Society activities regardless of age, color, creed, disability, ethnicity, gender identity and expression, marital status, military service status, national origin, parental status, physical appearance, race, religion, sex, or sexual orientation. Creation of a safe and welcoming environment is a shared responsibility held by all participants. Therefore, ANS will not tolerate harassment of or by participants (including ANS volunteer leaders and staff members) in any form. Disciplinary action for participants found to have violated this principle may include reprimand, expulsion from an event or activity with or without a refund, temporary or permanent exclusion from all ANS events and activities, suspension or expulsion from volunteer leadership positions or groups, and/or suspension or expulsion from Society membership, as appropriate.

If you or someone else experiences harassment, regardless of how you otherwise choose to initially handle the situation, you are encouraged to report the situation to ANS. It is possible that the behavior you experienced is part of a larger pattern of repeated harassment. Please alert ANS to behavior you feel to be harassment regardless of the offender's identity or standing in the Society.

The designated contacts for reports at the 2018 Annual Meeting is ANS President Bob Coward or Executive Director Bob Fine. Bob Coward can be reached at rcoward@mpr.com, Bob Fine can be reached at rfine@ans.org, or you can leave a message at the ANS Registration Desk for one of them to contact you directly.

The complete Respectful Behavior Policy can be found at www.ans.org/about/rbp. If you have questions about the policy, please contact ANS Executive Director Bob Fine at 708-579-8200 or rfine@ans.org.

Consent to Use Photographs and Videos: All attendance of registered participants, attendees, exhibitors, sponsors and guests ("you") at American Nuclear Society ("ANS") meetings, courses, conventions, conferences, or related activities ("Events") constitutes an agreement between you and ANS regarding the use and distribution of your image, including but not limited to your name, voice and likeness ("Image"). By attending the ANS Events, you acknowledge and agree that photographs, videotaping, live feed video and audio, and/or audio recordings may be taken of you and you grant ANS the right to use, in perpetuity, your Image in any electronic or print distribution, or by other means hereinafter created, both now and in the future, for media, art, entertainment, promotional, marketing, advertising, trade, internal use, educational purposes or any other lawful purpose.

General Information

ANS CODE OF ETHICS

Preamble

Recognizing the profound importance of nuclear science and technology in affecting the quality of life throughout the world, members of the American Nuclear Society (ANS) are committed to the highest ethical and professional conduct.

Fundamental Principle

ANS members as professionals are dedicated to improving the understanding of nuclear science and technology, appropriate applications, and potential consequences of their use.

To that end, ANS members uphold and advance the integrity and honor of their professions by using their knowledge and skill for the enhancement of human welfare and the environment; being honest and impartial; serving with fidelity the public, their employers, and their clients; and striving to continuously improve the competence and prestige of their various professions.

ANS members shall subscribe to the following practices of professional conduct:

Principles of Professional Conduct

1. We hold paramount the safety, health, and welfare of the public and fellow workers, work to protect the environment, and strive to comply with the principles of sustainable development in the performance of our professional duties.
2. We will formally advise our employers, clients, or any appropriate authority and, if warranted, consider further disclosure, if and when we perceive that pursuit of our professional duties might have adverse consequences for the present or future public and fellow worker health and safety or the environment.
3. We act in accordance with all applicable laws and these Practices, lend support to others who strive to do likewise, and report violations to appropriate authorities.
4. We perform only those services that we are qualified by training or experience to perform, and provide full disclosure of our qualifications.
5. We present all data and claims, with their bases, truthfully, and are honest and truthful in all aspects of our professional activities. We issue public statements and make presentations on professional matters in an objective and truthful manner.
6. We continue our professional development and maintain an ethical commitment throughout our careers, encourage similar actions by our colleagues, and provide opportunities for the professional and ethical training of those persons under our supervision.
7. We act in a professional and ethical manner towards each employer or client and act as faithful agents or trustees, disclosing nothing of a proprietary nature concerning the business affairs or technical processes of any present or former client or employer without specific consent, unless necessary to abide by other provisions of this Code or applicable laws.
8. We disclose to affected parties, known or potential conflicts of interest or other circumstances, which might influence, or appear to influence, our judgment or impair the fairness or quality of our performance.
9. We treat all persons fairly.
10. We build our professional reputation on the merit of our services, do not compete unfairly with others, and avoid injuring others, their property, reputation, or employment.
11. We reject bribery and coercion in all their forms.
12. We accept responsibility for our actions; are open to and acknowledge criticism of our work; offer honest criticism of the work of others; properly credit the contributions of others; and do not accept credit for work not our own.



Plenary, Special Sessions and Events

SUNDAY, JUNE 17

ANS President's Opening Reception

Location: Grand Salon H **Time:** 6:00-8:00 pm

All attendees are invited to enjoy an evening of networking. This event is included in your full meeting registration. Additional tickets are available for purchase at the following cost: \$125 (Adult) / \$50 (Child, 16 and under).

MONDAY, JUNE 18

Opening Plenary: Global Expansion of Nuclear Energy

Session Organizer and Chair: Krishna P. Singh (*Holtec International*)

Location: Grand Salon G/H **Time:** 8:00-11:15 am

The current technical and socio-political drivers for nuclear new build programs in the U.S. and international markets will be discussed and analyzed by the national and international industry leaders in this plenary session. While some major economies have firmly hitched their energy generation to nuclear energy, new plant construction in the U.S. has lost its momentum. The speakers will address the clean energy paradox in the West wherein nuclear power is losing ground even as its role to combat the increasing carbon burden on the environment becomes ever more imperative. How the industry might regroup and rise again to emulate its impressive growth in Asia will be discussed by the panelists followed by an interactive dialog with the audience.

Keynote Speaker: Chris Mudrick (*Senior Vice President Northeast Operations and COO, CENG, Exelon*)

~~Bryan Hanson (SVP & CNO, Exelon) CANCELED~~

Speakers: Sekhar Basu (*Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy*)

Jose Gutierrez (*President & CEO, Westinghouse*)

Edward McGinnis (*Acting Assistant Secretary, U.S. Department Energy – Office of Nuclear Energy*)

Yuriy Nedashkovsky (*President, National Nuclear Energy Generating Company "Energoatom"*)

Maria Korsnick (*President and Chief Executive Officer, Nuclear Energy Institute*)

Sponsored by



NFSM 2018 Plenary

Session Organizer: Kurt A. Terrani (*ORNL*) **Cochairs:** Kurt A. Terrani (*ORNL*), Heather Chichester (*INL*)

Location: Franklin 8 **Time:** 1:00-2:45 pm

Speakers: U.S. Department of Energy Update: Obstacles and Opportunities for Civil Nuclear, Suzanne Jaworowski (*Senior Advisor, U.S. Department of Energy | Office of Nuclear Energy*)

Overview of the Versatile Test Reactor: Kemal Pasamehmetoglu (*Versatile Fast Neutron Source (VFNS) Director, INL*)

ANS President's Special Session: What Nuclear Needs

Chair: Robert N. Coward (*ANS President, MPR Assoc*)

Location: Grand Salon G/H **Time:** 4:30-6:40 pm

There are many challenges facing the nuclear industry. This session will discuss five topics that the nuclear community will need to focus on to ensure there is a bright future for nuclear energy with leaders in each area; 1) attracting private investment, 2) accelerating the development of advanced nuclear, 3) ensuring that nuclear is recognized as a way to fight climate change, 4) creating a diverse workforce capable of tackling tomorrow's issues, and 5) building political support for nuclear energy.

Moderator: Alyse M. Scurlock, P.E. (*Nuclear Engineer, Duke Energy*)

Speakers: Private Investment Panelist Johanna Wolfson (*Principal, PRIME Impact Fund*)

Advanced Nuclear Panelist Rita Baranwal (*Director of GAIN initiative, INL*)

Environmental Panelist Armond Cohen (*Executive Director and Founder, Clean Air Task Force*)

Political Support Panelist David Fein (*Senior Vice President, State Governmental and Regulatory Affairs, Exelon Corporation*)

~~Political Support Panelist Jacob Smeltz (Chief of Staff to Senator Ryan P. Aument (PA)) CANCELED~~

Workforce Diversity Panelist Fiona Rayment Obe (*Executive Director of NIRO a division of NNL*)

~~Workforce Diversity Panelist Lt. Gen. Jack Weinstein (Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration) CANCELED~~

OPD Honors & Awards Dinner

Location: Maggiano's Little Italy **Time:** 7:00 pm

Join the Operations and Power Division in celebrating the accomplishments of their colleagues and a successful year as a division. This event is not included in your registration fee. The ticket price is \$75. Tickets may be purchased at the Registration Desk, space is limited.

Plenary, Special Sessions and Events

TUESDAY, JUNE 19

All Energy Forum—I–Panel

Sponsored by OPD **Cosponsored by** YMG

Session Organizers: James V. (Vince) Gilbert (*EXCEL Services*), Piyush Sabharwall (*INL*) **Chair:** Jim Conca (*UFA Ventures*)

Location: Franklin 9/10 **Time:** 8:00-11:40 am

This session will provide a unique opportunity to participate in an apples-to-apples comparison of energy sources. Development of efficient and effective energy applications supported by government energy policy is a complex thing to understand for both technical professionals and members of the public. This forum will provide a “safe and level playing field” for discussion of related energy issues, by a panel of industry experts and consultants representing technologies such as fossil, hydro, natural gas, nuclear, wind, solar and the investment community. Valid comparisons and insights using a broad speaking agenda are desired with comparative metrics for R&D, licensing, construction, operations and maintenance and decommissioning development stages. Appropriate U.S. climate policy and the resulting environmental value will also be part of invited discussions. After initial presentations are made a second discussion will take place for questions and answers regarding governmental challenges to manage climate change policy as well as thoughts from the speakers and audience as to the most appropriate energy mix for the future.

Panelists: Vince Gilbert (*EXCEL Services Corp*)

James Conca (*UFA Ventures*)

James Hansen (*Columbia Univ*)

Tom Kiernan (*AWEA*)

Richard Meyer (*AGA*)

David Zayas (*NHA*)

John Kotek (*NEI*)

Stu Bresler (*PJM*)

Josh Rhodes (*UT Austin*)

Chris Gadowski (*Bloomberg*)

General Chair's Special Session: Benefits and Challenges of Shrinking Large Nuclear Units to Small Modular Reactors

Session Organizer: Krishna P. Singh (*Holtec International*)

Chair: Sekhar Basu (*Chairman, Atomic Energy Commission and Secretary, Department of Atomic of Energy, Republic of India*)

Location: Grand Salon G/H **Time:** 1:00-2:45 pm

Small Modular Reactors represent the hope and aspiration of the global nuclear energy as it grapples with loss of momentum and plant closures in the U.S. and some major Western countries. The speakers in this session will articulate why the industry's expectations of small modular reactor are well placed and how the lessons learned from large plant construction may be fruitfully applied to SMRs. Technical and business leaders of companies pursuing the design and licensing of various small modular reactors SMR technologies will present the status of their technologies.

Lead Presenter:

Stuart Crooks (*Managing Director, EDF Energy*)

Speakers: Stephan Dohler (*Sr. Manager, AXPO*)

Kathy McCarthy (*V.P. Research & Development, Canadian Nuclear Laboratories*)

Jose Reyes (*Chief Technology Officer, NuScale Power*)

Thomas Marcille (*VP, Reactor Technologies, Holtec International*)

Preston Swafford (*CNO & EVP, SNC-Lavalin / President & CEO, Candu Energy*)

All Energy Forum—II–Panel

Sponsored by OPD **Cosponsored by** YMG

Session Organizers: James V. (Vince) Gilbert (*EXCEL Services Corp.*), Piyush Sabharwall (*INL*)

Chair: Jim Conca (*UFA Ventures*)

Location: Franklin 9/10 **Time:** 3:00-4:15 pm

An additional session for discussion and Q&A.

Plenary, Special Sessions and Events

WEDNESDAY, JUNE 20

Delivering the Nuclear Promise—Panel

Session Organizer: Krishna P. Singh (*Holtec International*) **Chair:** Peter Sena (*President & CNO, PSEG Nuclear LLC*)
Location: Franklin 9/10 **Time:** 9:35-11:40 am

Nuclear power in the United States is engaged in a fierce battle for its seat at the table as a prominent source of energy. To win this battle, the industry launched a coordinated plan three years ago to make nuclear power more cost competitive. Industry leaders who have led this 3-year industry initiative to improve safety and efficiency of operating nuclear plants will share their perspectives and industry's achievements with the audience.

Speakers: Jose Gago (*CEO, ANAV President, Spanish Nuclear Society*)
Adam Heflin (*President & CNO, Wolf Creek Nuclear Operating Company*)
Ben Mays (*VP, NEIL*)
Bill Pitesa (*CNO, NEI*)
Peter Sena (*President & CNO, PSEG Nuclear LLC*)

Recent Advances in Decommissioning of Nuclear Plants—Panel

Chair: Mark Morant (*Atkins Global President, Energy Americas & Asia Pacific*)
Location: Franklin 9/10 **Time:** 1:00-2:45 pm

Safe and expeditious decommissioning of retiring nuclear power plants is important to the communities that host them and to preserve the image of nuclear plants as a good neighbor. Advances in the decommissioning technologies to fulfill the goal of expedited decommissioning will be discussed. The panelists, each an industry thought leader, will address diverse subjects related to decommissioning of shuttered plants including business transaction models, regulatory and fiscal challenges, impact of tax policy, benefits of proto-prompt decommissioning, dose mitigation, operational safety, and legacy issues.

Speakers: Carol R. Peterson (*SVP, Exelon, Warrenville, Illinois*)
Tom Palmisano (*CNO & VP, Southern California Edison*)
Steven Scheurich (*VP, Entergy Services*)
Pierre Oneid (*SVP/CNO, Holtec International*)

Focus on Communications: Finding the Light at the End of the Tunnel

Sponsored by the ANS Operations & Power Division
Location: Grand Salon H **Time:** 4:30-6:30 pm

We often hear and read about the impending death of the nuclear energy industry in the U.S., but to paraphrase Mark Twain's famous quote, rumors of our demise are greatly exaggerated. In fact, the last several months have brought plenty of good news at the state and federal level, bringing more and more light at the end of the tunnel enfolding our industry. Join Potomac Communications Group's Mimi Holland Limbach and ANS Washington Rep Craig Piercy for a discussion of what's happening in Washington and the states, what's on the horizon, and how you can help. And then, join the ANS Young Members Group team to brush up on your communications skills with their now famous "nuclear speed-dating," (a rapid-fire, role-playing, rotational communications activity). Beer, wine and light snacks will be served, thanks to the ANS Operations & Power Division.

Sponsored by



American Nuclear Society
Operations and Power Division

ANS Annual Business Meeting

Location: Meeting Room 305/306 **Time:** 5:45-7:00 pm

ANS encourages all members to attend the Annual Business Meeting. During the Business Meeting, members will receive reports from the President and other Society leaders, and ask questions and make comments on Society issues.

THURSDAY, JUNE 21

PSEG's Salem and Hope Creek Technical Tour*

Location: Board the bus on 12th Street next to the restaurant **Time:** 7:00 am-1:00 pm

Holtec Technology Campus Technical Tour*

Location: Board the bus on 12th Street next to the restaurant **Time:** 8:00 am-11:30 pm

Technical Sessions by Division

(Parentheses indicate cosponsorship.)

SPECIAL SESSIONS

Opening Plenary: Global Expansion of Nuclear Energy Mon.
8:00-11:15 am

ANS President's Special Session: What Nuclear Needs, Mon.
4:30-6:40 pm

General Chair's Special Session: Benefits and Challenges of
Shrinking Large Nuclear Units to Small Modular Reactors,
Tues. 1:00-2:45 pm

Delivering the Nuclear Promise—Panel, Wed. am

Recent Advances in Decommissioning of Nuclear Plants—Panel,
Wed. pm

ACCELERATOR APPLICATIONS (AAD)

Accelerator Applications in Science and Engineering, Wed. pm

AEROSPACE NUCLEAR SCIENCE AND TECHNOLOGY (ANSTD)

(Hybrid Energy Systems and Energy Storage), Mon. pm

Aerospace Nuclear Science and Technology: General, Tues. am

BIOLOGY AND MEDICINE (BMD)

(Isotopes and Radiation: General), Tues. pm

EDUCATION, TRAINING, AND WORKFORCE DEVELOPMENT (ETWDD)

(Students for Nuclear—Telling your Nuclear Story—Panel),
Mon pm

Training, Human Performance and Workforce Development,
Tues. am

Education, Training and Workforce Development: General,
Tues. pm

Focus on Communications: It's All About the Plant—Panel,
Wed. pm

(Nuclear Advocacy—Panel), Wed. pm

FUEL CYCLE AND WASTE MANAGEMENT (FCWMD)

Status on Repository Concepts Internationally—Panel, Mon. pm

University Research in Fuel Cycle and Waste Management,
Tues. am

Advanced Closed Fuel Cycles—The Economic Challenge—Panel,
Tues. pm

Technical Grand Challenges—Closing the Nuclear Fuel Cycle—
Panel, Wed. am

Molten Salt Systems for FHRs and MSRs: Chemistry and Mass
Transport, Wed. am

Fuel Cycle and Waste Management: General—I, Wed. pm

Fuel Cycle and Waste Management: General—II, Thurs. am

Challenges Associated with the Back End of the Molten Salt
Reactor Fuel Cycle—Panel, Wed. pm

FUEL CYCLE AND WASTE MANAGEMENT (FCWMD)

Recycle and Reuse of Used Nuclear Fuel Resources, Wed. pm

Waste Repositories, Thurs. am

HUMAN FACTORS, INSTRUMENTATION, AND CONTROLS (HFICD)

Challenges of Digital I&C Technology—I—Panel, Mon. pm

Challenges of Digital I&C Technology—II, Wed. pm

Cybersecurity Guidance and Practices—Papers/Panel, Tues. am

Licensing and Implementation of Digital I&C at Research
Reactors—Panel, Tues. pm

Advanced Sensor Development and Demonstration, Tues. pm

Experience with Revised Human Factors Engineering Training—
Papers/Panel, Wed. am

On-line Monitoring/Prognostic and Health Management for
Nuclear Power Plants, Wed. pm

ISOTOPES AND RADIATION (IRD)

Innovations in Radiation Detectors: New Designs, Improvements
and Applications, Mon. pm

Applications of DOE-NE Infrastructure Support for University
Research Reactors, Tues. pm

Isotopes and Radiation: General, Tues. pm

MATHEMATICS AND COMPUTATION (MCD)

Current Issues in Computational Methods—Roundtable, Mon. pm

Deterministic Transport Methods, Tues. am

Monte Carlo Methods—I, Tues. pm

Monte Carlo Methods—II, Tues. pm

Uncertainty Quantification and Sensitivity Analysis, Wed. am

Computational Methods and Mathematical Modeling, Wed. pm

NUCLEAR CRITICALITY SAFETY (NCSD)

Criticality Accident Alarm System: Issues and Testing, Mon. pm

Data, Analysis and Operations in Nuclear Criticality Safety—I,
Tues. am

Data, Analysis and Operations in Nuclear Criticality Safety—II,
Wed. am

Data, Analysis and Operations in Nuclear Criticality Safety—III,
Wed. pm

ANS 8.10 Criteria for Nuclear Criticality Safety Controls
in Operations with Shielding and Confinement, Uses and
Purposes—Panel, Tues. pm

Sharing of Good Industry Practices and/or Lessons Learned in
Nuclear Criticality Safety—Panel, Wed. pm

ANS-8 Standards Forum, Thurs. am

Technical Sessions by Division

NUCLEAR INSTALLATIONS SAFETY (NISD)

Effects of Long-Term Operation on Electrical Cable Aging, Condition Monitoring, and Performance, Mon. pm
Nuclear Installations Safety: General, Tues. am
Preserving Key Nuclear Safety Data—Panel, Tues. pm
Current Topics in Probabilistic Risk Analysis, Wed. am
Safety Aspects of Accident Tolerant Fuels—Panel, Wed. pm
Licensing of Medical Isotope Production Facility—Panel, Wed. pm

NUCLEAR NONPROLIFERATION POLICY (NNPD)

Export Controls—Panel, Mon. pm
Status and Emerging Developments in the Management of Used Nuclear Fuel—Panel, Mon. pm
(Defense Nuclear Nonproliferation Research and Development University Consortia Work Applied to Radiation Shielding), Tues. am
Nuclear Nonproliferation Policy: General, Tues. pm

OPERATIONS AND POWER (OPD)

Hybrid Energy Systems and Energy Storage, Mon. pm
All Energy Forum—I—Panel, Tues. am
All Energy Forum—II—Panel, Tues. pm
(Expediting the Licensing and Deployment of Advanced Reactors—Panel), Tues. pm
Advanced Gen-IV Reactors, Tues. pm
(Load Following Attributes for Nuclear—Panel), Wed. am
Operations and Power: General, Wed. pm
(Water Technologies and Nuclear Power—Panel), Tues. am

RADIATION PROTECTION AND SHIELDING (RPSD)

Radiation Protection and Shielding: General, Mon. pm
Defense Nuclear Nonproliferation Research and Development, Tues. am
Computational Tools for Radiation Protection and Shielding, Tues. pm

Reactor Physics: General—I, Mon. pm
Reactor Physics: General—II, Tues. pm
Reactor Physics: General—III, Wed. pm
Reactor Analysis Methods—I, Tues. am
Reactor Analysis Methods—II, Wed. am
The Nuclear Energy Advance Modeling and Simulation (NEAMS) Workbench—I, Wed. pm
The Nuclear Energy Advance Modeling and Simulation (NEAMS) Workbench—II, Wed. pm
Advances in Fast Reactor Design and Concepts—Panel, Wed. pm
Reactor Physics Design, Validation and Operational Experience, Thurs. am

THERMAL HYDRAULICS (THD)

Two-Phase and Heat Transfer Fundamentals, Mon. pm
Molten Salt Thermal Hydraulics and Mass Transport, Tues. am
Multiscale Thermal Hydraulics, Tues. pm
Natural Circulation and Reliability of Natural Circulation Phenomena and Associates Systems, Tues. pm
Computational Fluid Dynamics Codes for Nuclear Thermal Hydraulics Applications—Panel, Tues. pm
Experimental Thermal Hydraulics—I, Wed. am
Experimental Thermal Hydraulics—II, Thurs. am
Computational Thermal Hydraulics—I, Wed. am
Computational Thermal Hydraulics—II, Thurs. am
Computational Fluid Dynamics, Wed. pm
Thermal Hydraulic Analysis in Support of Severe Accident Management, Wed. pm
General Thermal Hydraulics, Wed. pm
(The Nuclear Energy Advance Modeling and Simulation (NEAMS) Workbench—I, Wed. pm)
(The Nuclear Energy Advance Modeling and Simulation (NEAMS) Workbench—II, Wed. pm)

YOUNG MEMBERS GROUP (YMG)

Meet with ANS Staff—Panel, Mon. pm
Students for Nuclear—Telling your Nuclear Story—Panel, Mon. pm
(Hybrid Energy Systems and Energy Storage), Mon. pm
(Cybersecurity Guidance and Practices—Papers Workshop), Tues. am
(University Research in Fuel Cycle and Waste Management), Tues. am
(All Energy Forum—I—Panel), Tues. am
(All Energy Forum—II—Panel), Tues. pm
Water Technologies and Nuclear Power—Panel, Tues. am
Expediting the Licensing and Deployment of Advanced Reactors—Panel, Tues. pm
Load Following Attributes for Nuclear—Panel, Wed. am
Nuclear Advocacy—Panel, Wed. pm
(Focus on Communications: It's All About the Plant—Panel), Wed. pm



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MONDAY, JUNE 18

TECHNICAL SESSIONS – 1:00 PM

Radiation Protection and Shielding: General

Sponsored by RPSD

Session Organizer: Irina I. Popova (ORNL) Chair: Jeremy A. Roberts (Kansas State Univ)

Location: Grand Salon I Time: 1:00-3:25 pm

- 1:05 pm:** Shielding Design of the Cold Neutron Source for the KIPT Neutron Source Facility, Zhaopeng Zhong, Yousry Gohar (ANL)
- 1:30 pm:** Integral Experiments to Test the Adequacy of Neutron Cross Sections for Simulation of Well-Logging Tools, John C. Stooksbury, Nolan Hertel (Georgia Tech), invited
- 1:55 pm:** MCNP6.1 Computation of Fluence-to-Ambient Dose Equivalent Conversion Factors for a Steel Cube, S. R. McHale, M. Millett (U.S. Naval Academy), A. W. Decker (U.S. Military Academy)
- 2:20 pm:** External Dose Assessment During Dismantling Biological Shield of Kori-Unit 1, Choong Wie Lee, Hyung Jun Kim, Donghyun Lee, Si Hyeong Sung, Min Ji Kim, Hee Reyoung Kim (UNIST)
- 3:00 pm:** Detailed SCALE Dose Rate Evaluations for a Consolidated Interim Spent Nuclear Fuel Storage Facility, Georgeta Radulescu, Thomas M. Miller, Kaushik Banerjee, Douglas E. Peplow (ORNL)

Challenges of Digital I&C Technology—I-Panel

Sponsored by HFICD

Session Organizer and Chair: Raymond L. Herb (Southern)

Location: Grand Salon J Time: 1:00-2:45 pm

One of the ANS Nuclear Grand Challenges calls to “Rejuvenate nuclear technology infrastructure and facilities.” Modernization of I&C systems is a necessary part of this rejuvenation for the current and near-term fleet of light water reactors. This panel will provide an overview of the NEI and NRC activities that impact modernization of I&C systems, such as the NEI and NRC digital action plans and the newly formed NRC and NEI Regulatory Transformation Teams.

Panelists:

Jason Remer (NEI)

Eric Benner (NRC)

Craig Primer (DOE-INL)

Innovations in Radiation Detectors: New Designs, Improvements and Applications

Sponsored by IRD

Session Organizer: Igor Jovanovic (Univ. Michigan) Chair: Robert Zboray (Penn State)

Location: Grand Salon J Time: 3:00-3:50 pm

- 3:00 pm:** MCNP Detector Simulations with DRiFT’s Digitizer Class, M. T. Andrews (LANL)
- 3:25 pm:** Design Optimization of a Neutron Activation Based Explosives Detection System, Zafar ullah Koreshi, Hamda Khan (Air Univ.)

Technical
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Monday
June
18



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18

MONDAY, JUNE 18
TECHNICAL SESSIONS – 1:00 PM

Reactor Physics: General—I

Sponsored by RPD

Session Organizer: Cristian Rabiti (*INL*) **Chair:** Dimitrios Cokinos (*BNL*)

Location: Grand Salon K **Time:** 1:00-3:50 pm

- 1:05 pm:** Investigation on the Resonance Interference Effect Between Adjacent Fuels, Qian Zhang, Qiang Zhao (*Harbin Univ.*), Liangzhi Cao (*Xi'an Jiaotong Univ.*)
- 1:30 pm:** Accurate Resonance Calculation of the Fuel Rod with Non-Uniform Temperature Profile, Qian Zhang, Rong Jiang, Qiang Zhao (*Harbin Univ.*)
- 1:55 pm:** Exploring Molten-Salt Reactor Source Terms, Alexander M. Wheeler, Vikram Singh, Laurence F. Miller, Ondřej Chvála (*Univ. Tenn.*)
- 2:20 pm:** CMM Perturbation Theory and AI Engineering Design Optimization, Albert Gu (*SJTU*)
- 3:00 pm:** Testing and Verification of Multiphysics Tools for Fast-Spectrum MSRs: The CNRS Benchmark, Manuele Aufiero, Pablo Rubiolo (*Grenoble Inst. Technol.*)
- 3:25 pm:** Whole Core Multiphysics Simulation Enabled Through Pin Resolved Transport, Benjamin Collins (*ORNL*)

Effects of Long-Term Operation on Electrical Cable Aging, Condition Monitoring, and Performance

Sponsored by NISD

Session Organizer and Chair: Leonard S. Fifield (*PNNL*)

Location: Grand Salon L **Time:** 1:00-4:15 pm

- 1:05 pm:** Insight into Thermal Aging of Jacket-Bonded Ethylene-Propylene Rubber Cable Insulation, Leonard S. Fifield (*PNNL, Washington State*), Miguel Correa, Yongsoon Shin, Andy J. Zwoster (*PNNL*)
- 1:30 pm:** Multi-Sectioned Kinetics for the Degradation of Cable Insulation, Yuan-Shang Chang, Ali Mosleh (*UCLA*)
- 1:55 pm:** Avoiding Unnecessary Cable Replacement in Nuclear Power Plants, C. Kiger, C. Sexton, H. Hashemian, T. Toll (*Analysis and Measurement Services Corp.*), L. Dormann, W. Wasfy (*Exelon*)
- 2:20 pm:** Research Gap in Management of Insulation Aging of Medium Voltage Cables in Nuclear Power Plants, C. J. Kiger, H. M. Hashemian, C. D. Sexton, T. A. Toll (*Analysis and Measurement Corp.*)
- 3:00 pm:** Cable Insulation Testing for Mechanistic Degradation FEA Modeling, Brian Hinderliter, Elizabeth Hill, Melissa Maurer-Jones, Alexander Carlberg, Taylor Hebner (*Univ. Minnesota, Duluth*), Robert C. Duckworth (*ORNL*)
- 3:25 pm:** Defect Length and Profile Influence on Frequency Domain Reflectometry, S. W. Glass, L. S. Fifield, A. M. Jones, T. S. Hartman (*PNNL*)
- 3:50 pm:** Electrical Insulation Test on Mock-Up Helium Circulator for HTR-PM, Gang Zhao, Ping Ye, Hong Wang (*Tsinghua Univ.*)

Criticality Accident Alarm System: Issues and Testing

Sponsored by NCSD

Session Organizer and Chair: Catherine M. Percher (*LLNL*)

Location: Franklin 5 **Time:** 1:00-3:50 pm

- 1:05 pm:** Technical Basis for the Uranium Processing Facility Criticality Accident Alarm System, C. E. Gross (*Paschal Solutions, Inc.*), R. S. Brown (*Gem Technologies, Inc.*), K. H. Reynolds (*Y-12 National Security Complex*), R. G. Taylor (*C.S. Engineering Inc.*)
- 1:30 pm:** MCNP 6.1.1 Validation for Shielding Applications, Timothy D. Jackson (*Consolidated Nuclear Services*)
- 1:55 pm:** The Y-12 Legacy Criticality Accident Alarm System, Chris Haught, Chris Woodrow (*Consolidated Nuclear Security*)
- 2:20 pm:** "Swapped Source": A Forward Calculation Technique to Help Establish the Worst-Case Accident Location for CAAS Detectors in Fixed Locations, C. E. Gross (*Paschal Solutions, Inc.*), R. S. Brown (*Gem Technologies, Inc.*), K. H. Reynolds (*Y-12 National Security Complex*), R. G. Taylor (*C. S. Engineering Inc.*)
- 3:00 pm:** Criticality Accident Alarm System Removal Methodologies, Tom Hines (*DOE*), Matthew Wilson (*Paschal Solutions Inc.*)
- 3:25 pm:** Is an ANS-8.3 Compliant CAAS Justifiable: Time to Recognize Reality, Thomas P. McLaughlin (*Retired*)

MONDAY, JUNE 18

TECHNICAL SESSIONS – 1:00 PM

Two-Phase and Heat Transfer Fundamentals

Sponsored by THD

Session Organizer: Igor Bolotnov (*NCSU*) **Cochairs:** Seungjin Kim (*Purdue Univ.*), Fan-Bill Cheung (*Penn State*)

Location: Franklin 6 **Time:** 1:00-4:15 pm

- 1:05 pm:** Measurements of Liquid-Phase Turbulence in Air-Water Two-Phase Flows Using PIV, Yalan Qian (*Univ. Michigan & Shanghai Jiao Tong Univ.*), Shanbin Shi (*Univ. Michigan*), Dewei Wang, Yang Liu (*Virginia Tech.*), Junlian Yin (*Shanghai Jiao Tong Univ.*), Xiaodong Sun (*Univ. Michigan*)
- 1:30 pm:** Drift-Flux Analysis for Horizontal Air-Water Flow, Ran Kong, Qingzi Zhu, Seungjin Kim, Mamoru Ishii (*Purdue*)
- 1:55 pm:** Drift-Flux Analysis for Downward Air-Water Two-Phase Flow, Qingzi Zhu, Ran Kong, Seungjin Kim, Mamoru Ishii (*Purdue*)
- 2:20 pm:** Characteristic Effects of Pipe Size on Horizontal Two-Phase Flow, Ran Kong, Seungjin Kim (*Purdue*), Stephen M. Bajorek, Kirk Tien, Chris L. Hoxie (*NRC*)
- 3:00 pm:** Investigation of Wall Effect on Deformable Bubble Using Interface Tracking Method, Yuqiao Fan (*NCSU*), Jinyong Feng (*MIT*), Igor A. Bolotnov (*NCSU*)
- 3:25 pm:** Development of Evaporation and Condensation Model—Pool Boiling Simulation Using ITM Approach, Mengnan Li, Igor A. Bolotnov (*NCSU*)
- 3:50 pm:** CFD Study of Subcooled Boiling in a Parallel Plate Assembly of a Research Reactor, Mark Ho (*Australian Nuclear Sci. Technol.*), Guan Yeoh, Robert Mardus-Hall (*Univ. New South Wales*), George Braoudakis (*Australian Nuclear Sci. Technol.*)

Export Controls—Panel

Sponsored by NNPd

Session Organizer and Chair: Margaret E. Harding (*4 Factor Consulting, LLC*)

Location: Franklin 7 **Time:** 1:00-2:45 pm

Given the global nature of the nuclear enterprise, export controls represent a first line of defense for preventing the illicit trade in nuclear technology. Yet compliance with export controls affects far more than just commercial industry, touching on numerous activities conducted by both the national laboratories and academia. This panel brings together experts from industry, national laboratories, and academia to offer their perspectives on the challenge in implementing export controls within their respective domains, with the goal of stimulating a lively discussion of current challenges and issues faced beyond just the commercial realm.

Panelists:

James Warden (*Department of State*)

Lauren Mayros (*NRC*)

Steven Claggett (*Department of Commerce*)

Katie Strangis (*DOE NNSA*)

Status and Emerging Developments in the Management of Used Nuclear Fuel—Panel

Sponsored by NNPd **Cosponsored by** FCWMD

Session Organizers: Kelsey Amundson (*DNFSB*), James Behrens (*retired, U.S. Navy*)

Chair: Jeff Brault (*retired*)

Location: Franklin 7 **Time:** 3:00-4:15 pm

The panel will focus on the status and emerging developments in the management of used nuclear fuel such as the development of a consolidated interim storage facility, the USNRC licensing efforts, and recent policy developments.

Panelists:

Carlyn Greene (*Ux Consulting Co.*)

Marc Dapas (*NRC*)

Joy Russell (*Holtec International*)

Rod McCullum (*NEI*)

Technical
Sessions:
Monday
June
18

Technical Sessions: Monday June 18

MONDAY, JUNE 18 TECHNICAL SESSIONS – 1:00 PM

Hybrid Energy Systems and Energy Storage

Sponsored by OPD **Cosponsored by** ANSTD, **Cosponsored by** YMG

Session Organizer and Chair: Piyush Sabharwall (*INL*)

Location: Franklin 9/10 **Time:** 1:00-3:25 pm

1:05 pm: Small Modular Reactor as a Part of a District Heating System, Ville Tulkki, Esa Pursiheimo, Tomi J. Lindroos, Ville Sahlberg (*VTT*)

1:30 pm: The Requirement for Variable Electricity from Base-Load Nuclear Power Plants: Role of Heat Storage, Charles Forsberg (*MIT*)

1:55 pm: Assessment of a Nuclear Reactor-Thermal Energy Storage Coupled System, Saeed A. Alameri, Ahmed K. Alkaabi (*Khalifa Univ.*)

2:20 pm: Economic Assessment of Nuclear Hybrid Energy Systems: A Framework Demonstration Case, Aaron S. Epiney, Andrea Alfonsi, P. Talbot, Cristian Rabiti (*INL*)

3:00 pm: Light Water Reactors with Heat Storage and Auxiliary-Combustion Steam Generation to Maximize Electricity and Capacity Payment Revenue, Charles Forsberg (*MIT*), Robert Varrin (*Dominion*)

Meet with ANS Staff–Panel

Sponsored by YMG

Session Organizer and Chair: Brett D. Rampal (*Clean Air Task Force*)

Location: Rooms 411/412 **Time:** 1:00-2:45 pm

It takes a lot to make the society work, and not all members get a chance to meet the staff that keeps ANS running on a day-to-day basis. In this session, ANS members will learn about many of the ANS departments and their activities. After each spending a few minutes discussing the roles of the ANS departments and staff, the panelists will open the session for questions and discussion on the numerous ways the staff ensure that all ANS activities are effectively run.

Panelists:

Bob Fine (*ANS Executive Director*)

Paula Cappelletti (*Meetings and Exhibits Director*)

Dan Goldberg (*Membership and Marketing Director*)

Tracy Marc (*Communications Manager*)

Rick Michal (*Scientific Publications and Standards Director*)

Craig Piercy (*Washington Office Director*)

Daryl Rizzo (*Director of Development*)

Betsy Tompkins (*Commercial Publications Director*)

Linda Zec (*Online Communications Specialist*)

Students for Nuclear—Telling your Nuclear Story–Panel

Sponsored by YMG **Cosponsored by** ETWDD

Session Organizer and Chair: Emma Redfoot (*Univ of Idaho*)

Location: Rooms 411/412 **Time:** 3:00-4:15 pm

Why did you join the nuclear industry? Why are you studying nuclear engineering? In this workshop, Students for Nuclear and the members of the Young Members Group will help you work on telling your story as well as practice an effective advocacy strategies for nuclear energy.

Workshop Leaders:

Emma Redfoot (*Univ of Idaho*)

Kelley Verner (*Univ of Idaho*)

MONDAY, JUNE 18

TECHNICAL SESSIONS – 1:00 PM

Current Issues in Computational Methods–Roundtable

Sponsored by MCD

Session Organizer and Chair: Dmitriy Y. Anistratov (NCSU)

Location: Rooms 414/415 Time: 1:00-4:15 pm

“Challenges in Numerical Simulation of Real Experiments and Physical Systems”

Mathematical modeling of a complex physical phenomenon involves several major elements. The foundation of everything is a theoretical physical model that describes the phenomenon. This model is formulated by a set of equations of different types (PDEs, ODEs, etc.). The coefficients of the governing equations are parameters of the physical model. They are obtained on the basis of experiments and theoretical analysis. The complicated system of the equations defining the physical model is solved by means of various numerical methods. These numerical methods are building blocks for sophisticated computational tools that are created to perform numerous computer simulations of the physical phenomenon. To improve predictive capability of numerical simulations, it is necessary to enhance every element of mathematical modeling.

The panelists of this roundtable will talk about challenges in simulation of different physical systems. They will discuss simulations of

- Radflow project at Los Alamos National Laboratory
- Transient Reactor Test Facility (TREAT) at Idaho National Laboratory
- Light water reactors at Consortium for Advanced Simulations of LWRs
- Molten salt reactors at Oak Ridge National Laboratory

Panelists:

Benjamin Betzler (ORNL)

Mark DeHart (INL)

David Kropaczek (NCSU, CASL)

Todd Urbatsch (LANL)

Status on Repository Concepts Internationally–Panel

Sponsored by FCWMD

Session Organizer and Chair: Fiona E. Rayment (NNL-UK)

Location: Rooms 408/409 Time: 1:00-4:15 pm

Waste and spent fuel management continue to be key areas of focus for the industry with long-term solutions for ultimate disposal being the ultimate aim. This panel discusses the current status of repository developments internationally together with key challenges that are being addressed and areas of best practice being adopted.

Panelists:

Finland Repository Update, Mika Pohjonen or representative (Posiva Solutions Oy)

France Repository Update and Update on the EU IGD-TP, Patrick Landais (Andra)

A View from the U.S. Nuclear Industry, Mick Apted (Intera)

UK Repository Update, Anthony Banford (UK NNL)

Technical
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Monday
June
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Technical
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June
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TUESDAY, JUNE 19
TECHNICAL SESSIONS – 8:00 AM

Training, Human Performance and Workforce Development

Sponsored by ETWDD

Session Organizer: Lisa Marshall (NCSU) **Chair:** James Kendrick (Univ of California, Berkeley)

Location: Grand Salon I **Time:** 8:00-10:50 am

- 8:05 am:** Early Introduction of Computational Methods in Undergraduate Nuclear Engineering, Kenneth S. Allen, Blake K. Huff (*U.S. Military Academy*)
- 8:30 am:** Human Capital Development, Safeguards by Design, and University Engagement—Lessons Learned,Carolynn P. Scherer, Eric B. Rauch, Christy Ruggiero (*LANL*)
- 8:55 am:** Nuclear Quality Assurance for Universities, James C. Kendrick, Per F. Peterson (*Univ. Calif., Berkeley*)
- 9:35 am:** Role-Focused Training and Education in the UK Defense Nuclear Enterprise, Kirk D. Atkinson, Alice M. Darbyshire, Farkhanda Kauser, Rizgar Mella, Martyn D. Kendrick, James R. Bratt (*Defence Academy U.K*)
- 10:00 am:** A Nuclear Power Plant Re-Shapes Culture to Improve Performance, Lynne Viscio and Tanya Mann (*MGStrategy*)
- 10:25 am:** Manage Moments of Truth to Improve Plant Performance, Tanya Mann, Lynne Viscio (*MGStrategy*)

Cybersecurity Guidance and Practices—Papers/Panel

Sponsored by HFICD **Cosponsored by** YMG

Session Organizer and Chair: Raymond L. Herb (*Southern Nuclear*)

Location: Grand Salon J **Time:** 8:00-11:40 am

- 8:05 am:** Development of Simulation-Based Test-Bed for Nuclear Power Plant Safety-Critical Software, Sang Hun Lee (*RPI*), Seung Jun Lee (*UNIST*), Jinkyun Park (*KAERI*), Eun-chan Lee (*Korea Hydro & Nuclear Power Co.*), Hyun Gook Kang (*RPI*)
- 8:30 am:** Development of a Methodology for Quantifying the Amount of Additional S/W V&V Processes: When Cyber Security Techniques are Applied to NPP I&C Systems, Chanyoung Lee, Poong Hyun Seong (*KAIST*)

Panel Discussion

This panel will provide a discussion of guidance and implementation of cybersecurity for the nuclear power industry. Topics to be covered include: nuclear power cybersecurity standards currently under development by IEC, guidance and cooperative research generated by IAEA, and implementation practices promoted by NEI and EPRI.

Panelists:

Richard T. Wood (*Univ. of Tennessee*)

Raymond L. Herb (*Southern Nuclear*)

Representative from NITSL to be announced

Representative from NEI to be announced

Reactor Analysis Methods—I

Sponsored by RPD

Session Organizer and Chair: Cristian Rabiti (*INL*)

Location: Grand Salon K **Time:** 8:00-11:15 am

- 8:05 am:** A Mixed-Integer Linear Programming Method for Optimal Orificing in Breed-and-Burn Cores, Chris Keckler, Alper Atamtürk, Massimiliano Fratoni, Ehud Greenspan (*Univ. Calif., Berkeley*)
- 8:30 am:** A New Stable Finite Element Method for Solving the First-Order Neutron Transport Equation, Liangzhi Cao, Chao Fang, Hongchun Wu, Yunzhao Li (*Xi'an Jiaotong Univ.*)
- 8:55 am:** Monte Carlo Resonance Calculation for the Method of Characteristics, Hongchun Wu, Qi Zheng, Yunzhao Li, Wei Shen (*Xi'an Jiaotong Univ.*)
- 9:35 am:** Parallelization of the Pin Resolved Variational Nodal Method, Yongping Wang (*Xi'an Jiaotong Univ. & Univ. Michigan*), Tengfei Zhang (*Shanghai Jiao Tong Univ.*), E. E. Lewis (*Northwestern*), W. S. Yang (*Univ. Michigan*), M. A. Smith (*ANL*), Hongchun Wu (*Xi'an Jiaotong Univ.*)
- 10:00 am:** Analysis of Two-Dimensional Full-Core One-Step Calculation with Bamboo-Lattice, Yunzhao Li, Dongyong Wang, Hongchun Wu, Wei Shen (*Xi'an Jiaotong Univ.*)
- 10:25 am:** A New Monte Carlo Alpha-Eigenvalue Estimator with Delayed Neutrons, Colin Josey, Forrest B. Brown (*LANL*)
- 10:50 am:** Generalized Partitioned Matrix Acceleration of Variational Nodal Method, Yongping Wang (*Xi'an Jiaotong Univ. & Univ. Michigan*), Tengfei Zhang (*Shanghai Jiao Tong Univ.*), E. E. Lewis (*Northwestern*), W. S. Yang (*Univ. Michigan*), M. A. Smith (*ANL*), Hongchun Wu (*Xi'an Jiaotong Univ.*)

TUESDAY, JUNE 19

TECHNICAL SESSIONS – 8:00 AM

Nuclear Installations Safety: General

Sponsored by NISD

Session Organizer and Chair: Nicholas Brown (*Penn State*)

Location: Grand Salon L Time: 8:00-11:15 am

- 8:05 am:** Establishing the Criteria for the Evaluation Active vs Passive Safety Systems, Luciano Burgazzi (*ENEA*)
- 8:30 am:** NuScale Power Plant Resilience, Jose N. Reyes, Daniel T. Ingersoll (*NuScale*)
- 8:55 am:** Experimental Nucleate Pool Boiling on a Horizontal Plate in Saturated Water, Yong-Han Chang, Tien-Juei Chuang, Yuh-Ming Ferng (*Tsing Hua Univ.*)
- 9:35 am:** An Explanation of the Damage in the Fukushima 1F3 Explosion, Robert E. Henry (*Fauske & Associates*)
- 10:00 am:** Experience with Severe Accident Management Review Missions at Nuclear Power Plants, George Vayssier (*NSC Netherlands*)
- 10:25 am:** Sensitivity Analyses of a Type A Transportation Package, J. J. Carbajo, P. K. Jain, B. D. Patton, S. M. Robinson (*ORNL*)
- 10:50 am:** Uncertainty Quantifications for the MIT Reactor Thermal-Hydraulic Analysis, Yu-Jou Wang, Kaichao Sun, Lin-Wen Hu (*MIT*)

Data, Analysis, and Operations in Nuclear Criticality Safety—I

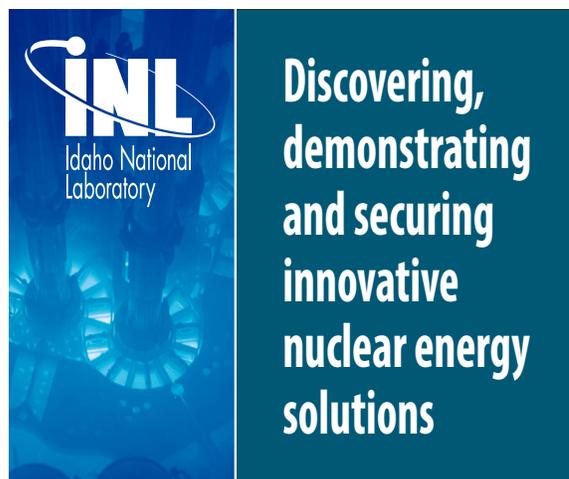
Sponsored by NCSD

Session Organizer: Theresa E. Cutler (*LANL*) Chair: Arielle J. Miller (*DNFSB*)

Location: Franklin 5 Time: 8:00-11:40 am

- 8:05 am:** Enhancing the Criticality Safety Analysis for the Mobile Plutonium Facility, Tracy Stover, Steve Kessler, John Dewes (*SRS*)
- 8:30 am:** Development of Augmented Reality Technology for Nuclear Criticality Safety Applications at Los Alamos National Laboratory, Austin Meredith, Andrew Wysong, Julio Trujillo (*LANL*)
- 8:55 am:** Elimination of Acid Based Criticality Scenarios in the HM-Process, Tracy Stover, John Lint, W. Glynn Dyer (*SRS*)
- 9:35 am:** Preliminary Design of Temperature Dependent Critical Experiments at Atmospheric Pressure with Low Enriched UO₂ Fuel, Mathieu Dupont (*RPI*), Thomas M. Miller (*ORNL*)
- 10:00 am:** Reactivity Simulation for Criticality Safety Training and Future Projects at LANL, Jacob McCallum, Dave Miko, Julio Trujillo, Andrew Wysong (*LANL*)
- 10:25 am:** Criticality Characterization of Plutonium—Iron Systems, Arielle Miller, Jerry McKamy (*DNFSB*)
- 10:50 am:** Nuclear Criticality Safety Strategy for the Downgrade of the 9206 Facility, Austin McGee, Michael Crouse (*Consolidated Nuclear Security*)
- 11:15 am:** The 2018 Edition of the ICSBEP Handbook, John D. Bess (*INL*), Tatiana Ivanova, Ian Hill (*OECD*), Margaret A. Marshall (*INL*)

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TUESDAY, JUNE 19
TECHNICAL SESSIONS – 8:00 AM

Molten Salt Thermal Hydraulics and Mass Transport

Sponsored by THD

Session Organizer: Raluca O. Scarlat (*Univ. Wisconsin, Madison*)

Cochairs: Raluca O. Scarlat (*Univ of Wisconsin, Madison*), Xiaodong Sun (*Univ of Michigan*)

Location: Franklin 6 **Time:** 8:00 am-12:05 pm

- 8:05 am:** Kinetic Precursor Drift Model for Salt-Fueled Molten Salt Reactors, M. Scott Greenwood, Ben. Betzler (*ORNL*)
- 8:30 am:** Development of MSR Transient Safety Analysis Capability in SAM, Guanheng Zhang, Rui Hu (*ANL*)
- 8:55 am:** Modeling the Molten Salt Reactor Experiment with the System Analysis Module (SAM), Adrian M. Leandro (*Penn State*), Rui Hu, Florent Heidet (*ANL*), Nicholas R. Brown (*Penn State*)
- 9:35 am:** Implementation of General Species Transport Capability into VERA-CS for Molten Salt Reactor Analysis, Zachary Taylor (*Univ. Tenn.*), Robert Salko, Benjamin Collins (*ORNL*), G. Ivan Maldonado (*Univ. Tenn.*)
- 10:00 am:** Code Comparison of Thermal-Hydraulic Uncertainty Propagation Licensing Analysis for a Fluoride-Salt-Cooled High-Temperature Test Reactor (TUPLA-FHR) with DAKOTA+RELAP5-3D, R. Romatoski (*St. Ambrose Univ.*), K. Sun, L. Hu (*MIT*)
- 10:25 am:** Thermal-Hydraulics of a FLiBe Natural Circulation Flow Loop, Karl Britsch, Kumar Sridharan, Mark Anderson (*Univ. Wisconsin, Madison*)
- 10:50 am:** Stability Analysis of a Molten FLiBe Natural Circulation Loop Using the Nyquist Criterion, Mohamed Abou Dbai, Raluca O. Scarlat (*Univ. Wisconsin, Madison*)
- 11:15 am:** FLiBe Radiative Heat Transfer, Will Derdeyn, Mohamed Abou Dbai, Raluca O. Scarlat, Mario Trujillo (*Univ. Wisconsin, Madison*)
- 11:40 am:** Experimental Studies on Thermal Hydraulics of FHR Pebble Bed Core, Limin Liu (*Xi'an Jiaotong Univ. & Univ. Calif., Berkeley*), Dalin Zhang (*Xi'an Jiaotong Univ.*), Per F. Peterson (*Univ. Calif., Berkeley*)

University Research in Fuel Cycle and Waste Management

Sponsored by FCWMD **Cosponsored by** YMG

Session Organizer and Chair: Jack D. Law (*INL*)

Location: Franklin 7 **Time:** 8:00-11:15 am

- 8:05 am:** Determination of Mechanisms and Kinetics of Ag⁰Z and Ag⁰-Aerogel Aging in Nuclear Off-Gases, Yue Nan, Seungrag Choi (*Syracuse*), Austin P. Ladshaw Sotira Yiacoumi, Costas Tsouris (*Georgia Tech. & ORNL*), Lawrence L. Tavlarides (*Syracuse*)
- 8:30 am:** Effects of Changing Parameters on Chlorination Process of Rare Earth Metals and Actinides Mixture, Parker Okabe (*Univ. Utah*), Devin Rappleye (*LLNL*), Michael Simpson (*Univ. Utah*)
- 8:55 am:** Electrochemical Methods for Continuous Metal Corrosion Monitoring in Molten Salts, D. Horvath, P. Bagri, M. F. Simpson (*Univ. Utah*)
- 9:35 am:** Effect of Electrodes and Salts Impurity on the Cyclic Voltammetry in Molten Li₂O/LiCl, Meng Shi (*Univ. Idaho*), Shelly Li (*INL*), Haiyan Zhao (*Univ. Idaho*)
- 10:00 am:** Diffusion Model and Artificial Neural Intelligence (ANI) Comparison for Cyclic Voltammetry Prediction of Uranium and Zirconium Chloride in LiCl-KCl Eutectic Salt, Samaneh Rakhshan Pouri, Supathorn Phongikaroon, Zeyun Wu (*Virginia Commonwealth*)
- 10:25 am:** Upgrades on High Reliability Safeguards Model for Material Throughput in Fuel Fabrication, Jieun Lee, R. A. Borrelli (*Univ. Idaho*)
- 10:50 am:** Closing the Nuclear Fuel Cycle: Molten Salt Reactors, Kyra Lawson, Mohammad Modarres (*Univ. Maryland*)

TUESDAY, JUNE 19

TECHNICAL SESSIONS – 8:00 AM

All Energy Forum—I-Panel

Sponsored by OPD **Cosponsored by** YMG

Session Organizers: James V. (Vince) Gilbert (*EXCEL Services Corporation*), Piyush Sabharwall (*INL*)

Chair: Jim Conca (*UFA Ventures*)

Location: Franklin 9/10 **Time:** 8:00-11:40 am

This session will provide a unique opportunity to participate in an apples-to-apples comparison of energy sources. Development of efficient and effective energy applications supported by government energy policy is a complex thing to understand for both technical professionals and members of the public. This forum will provide a “safe and level playing field” for discussion of related energy issues, by a panel of industry experts and consultants representing technologies such as fossil, hydro, natural gas, nuclear, wind, solar and the investment community. Valid comparisons and insights using a broad speaking agenda are desired with comparative metrics for R&D, licensing, construction, operations and maintenance and decommissioning development stages. Appropriate U.S. climate policy and the resulting environmental value will also be part of invited discussions. After initial presentations are made a second discussion will take place for questions and answers regarding governmental challenges to manage climate change policy as well as thoughts from the speakers and audience as to the most appropriate energy mix for the future.

Panelists:

Vince Gilbert (*EXCEL Services Corporation*)

James Conca (*UFA Ventures*)

James Hansen (*Columbia Univ*)

Tom Kiernan (*AWEA*)

Richard Meyer (*AGA*)

David Zayas (*NHA*)

John Kotek (*NEI*)

Stu Bresler (*PJM*)

Josh Rhodes (*UT Austin*)

Chris Gadowski (*Bloomberg*)

Aerospace Nuclear Science and Technology: General

Sponsored by ANSTD

Session Organizer: Robert C. O'Brien (*INL*) **Chair:** Jeffrey C. King (*CMS*)

Location: Rooms 414/415 **Time:** 8:00-8:55 am

8:05 am: Characterization of Spark Plasma Sintered W/UO₂, Dennis Tucker (*NASA*), Yaqiao Wu, Jatuporn Burns (*Boise State*)

8:30 am: Study of Film Cooling in Diverging Section of Nuclear Rocket Nozzle, Xiaokai Sun, Wei Peng, Jie Wang (*Tsinghua Univ.*)

Deterministic Transport Methods

Sponsored by MCD

Session Organizer: Jeffery D. Densmore (*Naval Nuclear Lab*) **Chair:** Jeremy A. Roberts (*Kansas State Univ*)

Location: Rooms 414/415 **Time:** 9:35 am-12:10 pm

9:40 am: An Efficient Sweep-Based Solver for the SN Equations on High-Order Meshes, Terry S. Haut, Peter G. Maginot, Vladimir Z. Tomov, Thomas A. Brunner, Teresa S. Bailey (*LLNL*)

10:05 am: Convergence of Sequential and Parallel One-Node CMFD Accelerations for Neutron Transport Analysis, HyeonTae Kim, Yonghee Kim (*KAIST*)

10:30 am: Improved Performance of the PN Scattering MOC Solvers in MPACT, Shane Stimpson, Benjamin Collins (*ORNL*)

10:55 am: Solution of the Neutron Survival Probability Equation by the Eigenfunction Expansion Technique, Patrick F. O'Rourke, Anil K. Prinja (*Univ. New Mexico*)

11:20 am: A Multilevel Quasidiffusion Method with Hybrid Temporal Discretization for Thermal Radiative Transfer Problems, Pedram Ghassemi, Dmitriy Anistratov (*NCSU*)

11:45 am: Effective Use of the Linear Fine Mesh Rebalance for the DSA of SN Transport Equation with Tetrahedral Meshes, Habib Muhammad, Ser Gi Hong (*Kyung Hee Univ.*)

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TUESDAY, JUNE 19
TECHNICAL SESSIONS – 8:00 AM

Defense Nuclear Nonproliferation Research and Development

Sponsored by RPSD **Cosponsored by** NNPD

Session Organizer and Chair: Jeffrey A. Favorite (*LANL*), All invited.

Location: Rooms 408/409 **Time:** 8:00-11:15 am

- 8:05 am:** Comparing A Posteriori Spatial Error Estimators for the S_N Neutron Transport Equation, Nathan H. Hart, Yousry Y. Azmy (*NCSU*), Jose Ignacio Duo (*IMPISA*)
- 8:30 am:** Data Assimilation of Nuclear Cross Sections Applied to Neutron Multiplicity Counting Experiments, Alexander Clark, John Mattingly (*NCSU*)
- 8:55 am:** Testing the Sensitivity of a Neural Based Identification Algorithm to Shielding Levels, P. L. Lagari, S. Weidenbenner, M. Alamaniotis, C. K. Choi, L. H. Tsoukalas (*Purdue*)
- 9:35 am:** Influence of Detector Orientation on Source Localization Using Bayesian Parameter Estimation, Jason Hite, John Mattingly (*NCSU*)
- 10:00 am:** Accelerator Shielding Design for Active Interrogation Methods Development, Cameron A. Miller, Christopher A. Meert, Alek K. Harvis, Shaun D. Clarke, Sara A. Pozzi (*Univ. Michigan*)
- 10:25 am:** The Radiation Transport Model for Physical Cryptographic Verification of Nuclear Warheads, Jayson R. Vavrek, Brian S. Henderson, Areg Danagoulian (*MIT*)
- 10:50 am:** A Theoretical Model for the Angular Discretization Error in the Uncollided Scalar Flux Solution of the Discrete Ordinates Method, Xiaoyu Hu, Yousry Y. Azmy (*NCSU*)

Water Technologies and Nuclear Power–Panel

Sponsored by YMG **Cosponsored by** OPD

Session Organizer and Chair: Emma Redfoot (*Univ. Idaho*)

Location: Rooms 411/412 **Time:** 9:35-11:40 am

Light water reactors require a lot of clean water. The politics of water rights and accessibility are increasingly heated. There are various approaches to dealing with water accessibility for nuclear power plants. This panel will discuss some of the current and future approaches to meeting nuclear power plant's water needs including the possibilities surrounding coupling nuclear power plants and desalination facilities. With a growing world population requiring increasing amounts of clean water, the potential demand for desalination facilities-and the energy to support them-inflates. This panel will focus on contextualizing the current and future systems for meeting nuclear power plants water demands and the possibilities of desalinated water as an alternative product to sell to the public from nuclear power plants.

Panelists:

- Cristian Rabiti (*INL*)
- Eric Schwarz (*Exelon Generation*)
- Ibrahim Khamis (*IAEA*)
- Steven Scroggs (*FPL*)



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TUESDAY, JUNE 19

TECHNICAL SESSIONS – 3:00 PM

Applications of DOE-NE Infrastructure Support for University Research Reactors

Sponsored by IRD

Session Organizer: Brenden J. Heidrich (*INL*) **Cochairs:** Vaibhav Sinha (*Ohio State*), Brenden Heidrich (*INL*)

Location: Grand Salon I **Time:** 3:00-4:45 pm

- 3:05 pm:** New Core-Moderator Assembly and Neutron Beam Ports Development and Installation at the Radiation Science and Engineering Center, Kenan Ünlü (*Penn State*), invited
- 3:25 pm:** Digital Control and Safety System Modernization for the Penn State TRIGA Reactor, James Turso, Kenan Ünlü (*Penn State*), invited
- 3:45 pm:** Breaking the Digital Ceiling: Research Reactors Driving Innovation, R. Bean, C. Townsend (*Purdue*), R. Ray (*Mirion Technologies*)
- 4:05 pm:** Methodology Development for Cybersecurity Vulnerability Assessment of University Research Reactors, S. A. Lassell, A. I. Hawari (*NCSU*), J. S. Benjamin, K. T. Barnes, V. L. Wright (*INL*)
- 4:25 pm:** Licensing Process for Upgrading I&C Systems at Nonpower Production or Utilization Facilities (NPUFs), D. A. Hardesty (*U.S. NRC*), M. D. Muhlheim (*ORNL*), N. Carte, R. Alvarado, P. G. Boyle, D. Warner, A. Adams (*NRC*)

Advanced Sensor Development and Demonstration

Sponsored by HFICD

Session Organizer: Jamie Baalis Coble (*Univ. Tennessee*) **Chair:** Pradeep Ramuhalli (*PNNL*)

Location: Grand Salon J **Time:** 3:00-4:20 pm

- 3:05 pm:** Development, Fabrication, and Testing of a Prototype High Temperature Fission Chamber, Padhraic L. Mulligan, N. Dianne B. Ezell, Christian Petrie, Lou Qualls (*ORNL*), Neil Taylor (*Ohio State*)
- 3:30 pm:** Development and Testing of a High-Speed Fiber-Based Pyrometer for TREAT, Austin Fleming, Colby Jensen (*INL*)
- 3:55 pm:** In-Core Evaluation of Online Instrumentation in the TREAT Reactor, Kevin Tsai, Colby Jensen, Troy Unruh, Austin Fleming, Cody Race (*INL*)

Computational Tools for Radiation Protection and Shielding

Sponsored by RPSD

Session Organizer: Irina I. Popova (*ORNL*) **Chair:** Michael L. Fensin (*LANL*)

Location: Grand Salon K **Time:** 3:00-5:10 pm

- 3:05 pm:** Neutron Moderation Analysis for a Fusion-Based Neutron Source, Abdullah Weiss, Moiz Butt, Xue Yang (*Texas A&M, Kingsville*)
- 3:30 pm:** Evaluation of Russian Roulette and Particle Splitting Monte Carlo Methods for Space Radiation Transport, Rajarshi Pal Chowdhury, Luke A. Stegeman, Amir A. Bahadori (*Kansas State*)
- 3:55 pm:** Numerical Approach of Designing the Primary Containment Building of a Pressurized Water Reactor, M. Hossain (*Bangladesh Univ. Eng. Technol.*), A. H. Khan (*Jessore Univ.*), M. A. R. Sarkar (*Bangladesh Univ. Eng. Technol.*)
- 4:20 pm:** Application of cosSOURCE Code for PWR Primary Coolant System Source Term Analysis, Wen Song, Yeshuai Sun, Hui Yu, Yixue Chen (*State Nuclear Power Software Development Center*)
- 4:45 pm:** Detector Response Forward Modeling Using Kernel Density Estimator Intermediate Staged Sources, Tanim Islam (*LLNL*)

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TUESDAY, JUNE 19
TECHNICAL SESSIONS – 3:00 PM

Reactor Physics: General—II

Sponsored by RPD

Session Chair: Cristian Rabiti (*INL*) **Chair:** Andrea Alfonsi (*INL*)

Location: Grand Salon L **Time:** 3:00-4:20 pm

3:05 pm: An Improved Kaniadakis Doppler Broadening Function, Guilherme Guedes (*CEFET*), Daniel A. P. Palma (*Comissão Nacional de Energia Nuclear*), Alesandro C. Gonçalves (*Cidade Universitária*)

3:30 pm: Estimation of Subcriticality Using Particle Filter Method, Takuya Ikeda, Toshiaki Kimura, Tomohiro Endo, Akio Yamamoto (*Nagoya Univ.*)

3:55 pm: Design Optimization of Additively Manufactured HFIR Control Elements, J. R. Burns, D. Chandler (*ORNL*), B. Petrovic (*Georgia Tech.*)

Education, Training, and Workforce Development: General

Sponsored by ETWDD

Session Organizer: Lisa Marshall (*NCSU*) **Chair:** Drew Thomas (*INL*)

Location: Franklin 5 **Time:** 3:00-4:45 pm

3:05 pm: Backscatter Surrogate for Highly Enriched Uranium, Nicholas Anthony Costa (*U.S. Naval Academy*)

3:30 pm: Analysis and Comparison of In-Situ Corrosion Rate Measurements with Co-Located Analytical Soil Corrosivity Parameters Along Buried Pipelines at Nuclear Power Facilities, M. E. Darois (*RSCS Inc.*), H. G. Kleinfelder (*CorrTech Inc.*)

3:55 pm: PHR Capacity Analysis of Nuclear Heating Reactor HAPPY 200, Mian Xing, Zhaocan Meng, Yaodong Chen (*State Power Investment Corp. Research Inst.*)

4:20 pm: Particle Image Velocimetry (PIV) Measurements in 1/23 Scaled Water Reactor Cavity Cooling System (WRCCS), N. Quintanar, T. Nguyen, R. Vaghetto, Y. Hassan (*Texas A&M*)

Multiscale Thermal Hydraulics

Sponsored by THD

Session Organizer: Elia Merzari (*ANL*) **Chair:** W. David Pointer (*ORNL*)

Location: Franklin 6 **Time:** 3:00-4:20 pm

3:05 pm: Application of the Dynamical System Scaling Methodology, Stephen Heagy, Cesare Frepoli (*FPoliSolutions*), Jose Reyes (*NuScale*)

3:30 pm: Predictive Capability and Maturity Assessment with Bayesian Network, Linyu Lin, Nam Dinh (*NCSU*)

3:55 pm: Study of Data-Driven Mesh-Model Optimization in System Thermal-Hydraulic Simulation, Han Bao, Nam Dinh (*NCSU*), Jeffrey Lane (*Zachry Nuclear*), Robert Youngblood (*INL*)

Natural Circulation and Reliability of Natural Circulation Phenomena and Associates Systems

Sponsored by THD

Session Organizer: Francesco D'Auria (*Univ. Pisa*) **Chair:** Hisashi Ninokata (*Politecnico di Milano*)

Location: Franklin 7 **Time:** 3:00-4:20 pm

3:05 pm: Experimental Investigation of Plenum-to-Plenum Natural Circulation Heat Transfer in a Prismatic Very-High-Temperature Reactor, Salman Alshehri (*Missouri Univ. Sci. Technol. & King Abdulaziz City Sci. Technol.*), Ibrahim A. Said (*Missouri Univ. Sci. Technol. & Alexandria Univ.*), Muthanna H. Al-Dahhan, Shoaib Usman (*Missouri Univ. Sci. Technol.*)

3:30 pm: Optimal Working Fluid Charge and Degradation Thresholds for a Natural Circulation Heat Transport Loop, Douglas A. Fynan, Jin Hee Park (*KAERI*)

3:55 pm: Experimental Investigation on Heat Transfer Characteristics with Nonuniform Heat Flux Distribution Under Natural Circulation, Salman M. Alshehri (*Missouri Univ. Sci. Technol. & King Abdulaziz Univ. Sci. Technol.*), Ibrahim A. Said (*Missouri Univ. Sci. Technol. & Alexandria Univ.*), Muthanna H. Al-Dahhan, Shoaib Usman (*Missouri Univ. Sci. Technol.*)

TUESDAY, JUNE 19

TECHNICAL SESSIONS – 3:00 PM

All Energy Forum—II—Panel

Sponsored by OPD **Cosponsored by** YMG

Session Organizers: James V. (Vince) Gilbert (*EXCEL Services Corp.*), Piyush Sabharwall (*INL*)

Chair: Jim Conca (*UFA Ventures*)

Location: Franklin 9/10 **Time:** 3:00-4:15 pm

An additional session for discussion and Q&A.

Expediting the Licensing and Deployment of Advanced Reactors—Panel

Sponsored by YMG **Cosponsored by** OPD

Session Organizer and Chair: Daniel Carleton (*Terrestrial Energy USA*)

Location: Rooms 411/412 **Time:** 3:00-4:15 pm

As companies seek to deploy advanced nuclear power plants in the United States, a major hurdle is ensuring the designs meet regulatory requirements. In recent years, the U.S. Nuclear Regulatory Commission has undertaken efforts to improve the licensing process for advanced reactors while private industry has worked to accelerate licensing of advanced reactor designs. This panel will discuss recent efforts to streamline advanced reactor licensing from the perspective of both industry and government and will provide recommendations for a path forward to ensure an efficient licensing process in the future.

Panelists:

Robin Rickman (*Terrestrial Energy USA*)

Brett Rampal (*Clean Air Task Force*)

Jan Mazza (*NRC*)

Monte Carlo Methods—I

Sponsored by MCD

Session Organizer: Jeffery D. Densmore (*Naval Nuclear Lab*) **Chair:** Todd J. Urbatsch (*LANL*)

Location: Rooms 414/415 **Time:** 3:00-4:20 pm

3:05 pm: Emissivity-Limited Implicit Monte Carlo, Ryan T. Wollaeger, Mathew A. Cleveland, HyeongKae Park (*LANL*)

3:30 pm: Time Step Control for Iterative Multifrequency Corrected Implicit Monte Carlo, Mathew Cleveland, Ryan Wollaeger, Andrew Till (*INL*)

3:55 pm: An Optimal-Cost Monte Carlo Approach to Stochastic Media Transport Calculations, Aaron J. Olson, Brian C. Franke (*SNL*)

Advanced Closed Fuel Cycles—The Economic Challenge—Panel

Sponsored by FCWMD

Session Organizer: Fiona Rayment (*National Nuclear Lab. U.K.*) **Chair:** Steve Napier (*NNL*)

Location: Rooms 408/409 **Time:** 3:00-5:30 pm

For closed fuel cycles to be successful commercially a number of challenges need to be addressed to enable sustainable nuclear solutions. However, a key area of prime importance that must be addressed for a successful commercial fuel cycle relates to the economics of such a plant. This panel looks at reprocessing/recycling facilities over the years and evaluates where drivers and criteria have increased the cost burden. It also evaluates what else needs to be done in developing advanced fuel cycles that will drive reductions in cost and enable competitive economics for the industry.

Panelists:

Emmanuel Touron (*CEA*)

~~Sven Bader (*Areva*)~~ **CANCELED**

Paul Murray (*Orano*)

Francesco Ganda (*ANL*)

Andy Worrall (*ORNL*)

Fiona Rayment (*NNL*)

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TUESDAY, JUNE 19
TECHNICAL SESSIONS – 4:30 PM

Isotopes and Radiation: General

Sponsored by IRD **Cosponsored by** BMD

Session Organizer and Chair: Kenan Ünlü (*Penn State*)

Location: Grand Salon I **Time:** 4:50-6:35 pm

- 4:55 pm:** Production of Alpha and Beta Radioisotopes for Nuclear Batteries Using a Superconducting Electron Linac, V. N. Starovoitova, T. L. Grimm, A. K. Grimm, F. Y. Odeh, W. A. Peters (*Niowave, Inc.*), A. Afanasev, N. Guardala (*George Washington Univ.*), J. Carroll, M. Litz (*U.S. Army Research Lab.*), T. Adams (*Naval Surface Warfare Center*), S. Maximenko (*U.S. Naval Research Lab.*)
- 5:15 pm:** A Python-Based ENDF Cross Section Explorer, H. Omar Wooten (*LANL*)
- 5:35 pm:** Quantitative Crack Analysis Using Neutron Radiography with Gadolinium Contrast Enhancement Agents, Russell Jarmer, Jeffrey C. King (*Colorado School of Mines*), Aaron Craft, Robert O'Brien (*INL*)
- 5:55 pm:** Characterizing Neutron Scatter in a Correlated Fission Experiment, Tyler A. Jordan (*Univ. Calif., Berkeley & LANL*), Madison T. Andrews, Krista C. Meierbachtol, Patrick M. Talou (*LANL*)
- 6:15 pm:** Modeling and Simulation of a Ring Geometry CdZnTe Detector for Medical Imaging Applications, O. Dim (*BNL & Univ. Mass.*), Y. Cui (*BNL*), Y. Seo (*Univ. Calif.*), S. K. Aghara (*Univ. Mass.*)

Licensing and Implementation of Digital I&C at Research Reactors–Panel

Sponsored by HFICD

Session Organizer and Chair: Michael D. Muhlheim (*ORNL*)

Location: Grand Salon J **Time:** 4:30-6:40 pm

Non-power reactors used for research and training are going through a period of I&C modernization. Digital I&C systems are fundamentally different from analog I&C systems in that minor errors in design and implementation can cause them to exhibit unexpected behavior. The transition to digital I&C systems introduces unique design and qualification requirements related to calibration and testing, functional independence, access control, and cybersecurity. This panel will provide an overview of NUREG-1537 reviews for digital I&C systems at research reactors. Recent experience applying for digital I&C upgrades at research, test, and training reactors will be presented.

Panelists:

Duane Hardesty (*NRC*)
Clive Townsend (*Purdue*)
Rossnyev Alvarado (*NRC*)
Brenden Heidrich (*INL*)

Preserving Key Nuclear Safety Data–Panel

Sponsored by NISD

Session Organizer: Robert J. Budnitz (*LBNL*) **Cochairs:** Robert J. Budnitz (*LBNL*), Robert Henry (*Fauske & Assoc., retired*)

Location: Grand Salon L **Time:** 4:30-6:40 pm

Over the years, much important experimental data relevant to nuclear power plant safety has become difficult or impossible to obtain. These data sets are an important part of the technical basis for our understanding of nuclear reactor safety. Their loss may eventually call into question the design and licensing of reactors because the physical basis of computer codes and engineering analysis can no longer be assured. This panel session, consisting entirely of four invited experts, is intended to explain the issues and explore various possible initiatives that can allow for the preservation of these very important data sets.

Panelists:

Nuclear Fuel Experiments, Kemal O. Pasamehmetoglu (*INL*)
Severe Accident Experiments, Bal Raj Sehgal (*KTH - Royal Institute of Technology*)
Thermal Hydraulic Experiments, Sanjoy Banerjee (*CUNY*)
Summary, Wrap-up, Frank Rahn (*EPR1*)

TUESDAY, JUNE 19
TECHNICAL SESSIONS – 4:30 PM

Computational Fluid Dynamics Codes for Nuclear Thermal Hydraulics Applications–Panel

Sponsored by THD

Session Organizer: Lane B. Carasik (*Kairos Power*) **Cochairs:** Lane B. Carasik (*Kairos Power LLC*), Dillion R. Shaver (*ANL*)

Location: Franklin 6 **Time:** 4:30-6:40 pm

In this panel several CFD codes commonly used for nuclear applications will be presented. For each code, common use cases as well as strengths and weaknesses will be discussed. The aim of the panel is to present a comprehensive overview of the field while discussing also a path forward in this emerging area.

Panelists:

Emilio Baglietto (*MIT*)
W. D. Pointer (*ORNL*)
Christopher Boyd (*NRC*)
Elia Merzari (*ANL*)
Lane B. Carasik (*Kairos Power LLC*)

ANS 8.10 Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement, Uses and Purpose–Panel

Sponsored by NCSD

Session Organizer and Chair: Andrew W. Prichard (*PNNL*)

Location: Franklin 7 **Time:** 4:30-6:40 pm

The panel will discuss the value of using ANSI/ANS-8.10-2015, “Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement.” The panel will include discussion of the risks, benefits, and concerns of using this standard in different facilities.

Panelists:

Thomas McLaughlin (*LANL, retired*)
Jerry Hicks (*NNSA, retired*)
Dan Thomas (*ORANO*)
Tracy Stover (*SRNS*)

Nuclear Nonproliferation Policy: General

Sponsored by NNPD

Session Organizer and Chair: Kelsey Amundson (*DNFSB*)

Location: Franklin 9/10 **Time:** 4:30-6:15 pm

4:35 pm: Modeling Potential JCPOA Diversion Scenarios with Cyclus, Baptiste Mougnot, Kathryn Mumma, Paul P. H. Wilson (*Univ. Wisconsin, Madison*)

5:00 pm: An Overview of Nonproliferation Workshops at Oak Ridge National Laboratory: 2013-2017, Jessica L. White-Horton, J. Michael Whitaker, S. K. Smith (*ORNL*), K. V. Gilligan (*BNL*)

5:25 pm: Production of Radioxenon for Nuclear Explosion Monitoring, W. A. Peters, A. C. Bakken, A. K. Grimm, T. L. Grimm, N. C. Johnson, M. Mamtimin, F. Y. Odeh, K. A. Shannon, V. N. Starovoitova (*Niowave, inc.*), S. A. Pozzi, C. Sivals (*Univ. Michigan*)

Technical
Sessions:
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Technical Sessions:
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TUESDAY, JUNE 19
TECHNICAL SESSIONS – 4:30 PM

Advanced Gen-IV Reactors

Sponsored by OPD

Session Organizer: Piyush Sabharwall (*INL*) **Chair:** Xiaodong Sun (*Univ of Michigan*)

Location: Rooms 411/412 **Time:** 4:30-7:05 pm

- 4:35 pm:** Viability and Deployment of Small Modular Reactors, Zafar ullah Koreshi (*Air Univ.*)
- 5:00 pm:** Progress in Experimental Development of MSR and FHR Technologies, Jan Uhlíř, Martin Mareček, Evžen Losa (*Research Centre Řež*), Martin Straka (ÚJV Řež), Martina Koukolíková (*COMTES FHT*), Petr Toman (*MICo*), Tomáš Trojan (*ŠKODA JS*)
- 5:25 pm:** A Survey: The Chemical Compatibility of Silicon Carbide with Molten Fluoride Salts, Jo Jo Lee, Yutai Katoh, Takaaki Koyanagi, Lauren Garrison, Wilna Geringer (*ORNL*)
- 5:50 pm:** A Testing Facility for Advanced Reactor Development and Demonstration, F. Y. Odeh, T. L. Grimm, M. Mamtimin (*Niowave, Inc.*), V. P. Chellapandi, P. Deng, W. S. Yang (*Univ. Michigan*), R. Bean, A. J. Jinia (*Purdue*), S. A. Maloy, K. A. Woloshun (*LANL*)
- 6:15 pm:** Experimental Study Progress on Mock-up Helium Circulator with Dry Gas Seal, Ping Ye, Gang Zhao, Jie Wang (*Tsinghua Univ.*)
- 6:40 pm:** Numerical Simulation of Chronic Moisture Graphite Oxidation for MHTGR, Chengqi Wang, Xiaodong Sun (*Univ. Michigan*), Richard N. Christensen (*Ohio State & Univ. Idaho*), Shanbin Shi (*Univ. Michigan*)

Monte Carlo Methods—II

Sponsored by MCD

Session Organizer: Jeffery D. Densmore (*Naval Nuclear Lab*) **Chair:** Todd J. Urbatsch (*LANL*)

Location: Rooms 414/415 **Time:** 4:30-5:50 pm

- 4:35 pm:** MonteRay—A Prototype Software Library for Accelerating Monte Carlo Particle Transport on GPU Hardware, Jeremy E. Sweezy (*LANL*)
- 5:00 pm:** Continuous-Energy Monte Carlo on GPUs in Shift, Steven P. Hamilton, Thomas M. Evans, Stuart R. Slattery (*ORNL*)
- 5:25 pm:** Monte Carlo Tally Convergence: Runtime Comparisons Between Functional Expansion Tallies and Mesh Tallies, Brycen Wendt (*Idaho State*), Leslie Kerby (*Idaho State & INL*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 8:00 AM

Technical Grand Challenges—Closing the Nuclear Fuel Cycle—Panel

Sponsored by FCWMD

Session Organizer: Sven O. Bader (*AREVA*) **Chair:** Jean-Francois Lucchini (*LANL*)

Location: Grand Salon I **Time:** 8:00-11:40 am

In the previous “Grand Challenges of Closing the Fuel Cycle” panel, a brief overview of the evaluation of different fuel cycles, a status of current back-end and front-end DOE activities, an economic case, and some concerns of an external entity were discussed that were related to this Grand Challenge. The objective of this panel is to examine some of the political whims and historical biases that have formed the current “almost” once through fuel cycle (still no repository) and to examine some of the regulatory and economic issues that need to be addressed to make closing the fuel cycle a viable and attractive activity.

Panelists:

Jack Law (*INL*)

Emory Collins (*ORNL*)

Tom Wellock (*NRC*)

Christina Leggett (*NRC*)

Chris Phillips (*Atkins - SNC/Lavalin*)

Steve Napier (*NNL*)

Experience with Revised Human Factors Engineering Training—Papers/Panel

Sponsored by HFICD

Session Organizer and Chair: Eric L. Harvey (*EPRI*)

Location: Grand Salon J **Time:** 8:00-11:40 am

8:05 am: Suggestion of the Eye-Tracking System Based Fitness-for-Duty Evaluation Methodology in Nuclear Power Plants, Moon Kyoung Choi, Poong Hyun Seong (*KAIST*)

8:30 am: Human System Interface Improvements Using Advanced Keyboard-Video-Mouse (KVM) Technology, Richard Turk (*Technology Resources, LLC*), Richard Cooper (*Thinklogical*), Bradley Yeates (*Southern Co.*)

Panel Discussion

This panel session will focus on human factors for nuclear plants, with a look toward advanced designs, and is intended for engineering staff, supervisors, and managers that are working in the area of human factors engineering. The possible topics to be discussed are issues faced by control panel designers, issues related to the improvement of human factors engineering, a discussion on existing control panel design practices and constraints, lessons learned from upgrades to digital systems, and feedback from design review and regulatory evaluations.

Panelists:

Richard (Rick) Villim (*ANL*)

Craig Primer (*INL*)

Reactor Analysis Methods—II

Sponsored by RPD

Session Organizer: Cristian Rabiti (*INL*) **Chair:** Andrea Alfonsi (*INL*)

Location: Grand Salon K **Time:** 8:00-11:40 am

8:05 am: Temperature Feedback Effect Incorporated in HIRE-Theoretic Multigroup Transport Equations, YuGwon Jo, Nam Zin Cho (*KAIST*)

8:30 am: Application of the Ratio Correction Fission Matrix Method to a 2-D Four-Assembly Model, Donghao He, William J. Walters (*Penn State*)

8:55 am: Nuclear Data Sensitivity Analysis in OpenMC Using the GPT-Free Method, Jingang Liang (*MIT*), Zeyun Wu (*Virginia Commonwealth*), Hany S. Abdel-Khalik (*Purdue*)

9:35 am: Application of Multi-Node SPH Factor Generation to PHWR Lattice Homogenization, Thomas A. Ferguson, Eleodor Nichita (*Univ. Ontario Inst. Technol.*)

10:00 am: Acceleration Methods for Whole Core Reactor Simulations Using VERA, Benjamin Collins, Shane Stimpson (*ORNL*)

10:25 am: Application of the APEC Method to MOX Fuel Loaded PWR Cores, Woosong Kim, Yonghee Kim (*KAIST*)

10:50 am: Decay Heat Curve Generation for High Temperature Reactors Using Exponentials, Support Vector Machines and Dynamic Mode Decomposition Within the RAVEN Framework, Andrea Alfonsi, Andrew Hummel, Sonat Sen, Gerhard Strydom, Hans Gougar (*INL*)

11:15 am: Enhanced Embedded Self-Shielding Method, Qian Zhang, Qiang Zhao (*Harbin Univ.*), Hongchun Wu (*Xi'an Jiaotong Univ.*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 8:00 AM

Current Topics in Probabilistic Risk Analysis

Sponsored by NISD

Session Organizer: Nicholas Brown (*Penn State*) **Chair:** Matthew R. Denman (*SNL*)

Location: Grand Salon L **Time:** 8:00-11:40 am

- 8:05 am:** Integration of Fault-Trees and Event-Trees into Dynamic PRA, D. Mandelli, D. Maljovec, A. Alfonsi, C. Wang, Z. Ma, C. Parisi, C. Smith (*INL*)
- 8:30 am:** Development of Domestic Risk Informed Decision Making Framework, Dongju Jang, Namchul Cho, Sok Chul Kim (*Korea Inst. Nucl. Safety*)
- 8:55 am:** A Sensitivity Study on Population Segmentation Effects in the MACCS Code, Wonjong Song, Byeongmun Ahn, Yein Seo, Moosung Jae (*Hanyang Univ.*)
- 9:35 am:** Use of Decision Trees for Evaluating Severe Accident Management Strategies, Sunghyun Park, Hoyoung Shin, Moosung Jae (*Hanyang Univ.*)
- 10:00 am:** Development of Safety Significance Analysis System for Risk-Informed Decision Making, Bo Gyung Kim, Dongju Jang, Namchul Cho, Sok chul Kim (*Korea Inst. Nucl. Safety*), Yongsuk Lee, YoungChul Cho (*FNC Technol. Co., Ltd.*)
- 10:25 am:** Dynamic Fault Tree Analysis for NPP Emergency Diesel Generator System, Daochuan Ge, Shanqi Chen, Zhen Wang, Zhibin Chen (*CAS*)
- 10:50 am:** A Study on the Design Requirement for the Level 3 PSA Code Development, Sunhee Park, Han Seok-Jung, Sung-Yeop Kim (*KAERI*)
- 11:15 am:** Modeling of Aggressive Cool Down in a PSA with a Procedural Change, Wondea Jung, Jaehyun Cho (*KAERI*)

Data, Analysis, and Operations in Nuclear Criticality Safety—II

Sponsored by NCSD

Session Organizer: Theresa E. Cutler (*LANL*) **Chair:** Vladimir Sobes (*ORNL*)

Location: Franklin 5 **Time:** 8:00-11:40 am

- 8:05 am:** Criticality Safety Scenario-Based Training at Los Alamos National Laboratory, Mary Beth Lujan, Julio Trujillo, Andrew R. Wysong (*LANL*)
- 8:30 am:** A First Look at the Thermal Neutron Scattering Law for H-UH³, Michael L. Zerkle (*Naval Nuclear Lab.*)
- 8:55 am:** Sloped Bottom Tanks and Areal Density—Part I: Case Study in H-Canyon Decanter Controls, Tracy Stover, John Lint, Meagan Strachan (*SRS*)
- 9:35 am:** Sloped Bottom Tanks and Areal Density—Part II: Functional Behavior of Projected Areal Density, Tracy Stover (*SRS*)
- 10:00 am:** Benchmark Model Temperatures Incorporated into DICE, Z. J. Clifton (*Univ. Alabama, Huntsville*), W. J. Marshall (*ORNL*), I. Hill (*Nuclear Energy Agency*)
- 10:25 am:** Crediting a Soluble Neutron Absorber at Y-12 Under ANSI/ANS-8.14-2004, V. B. Lollar (*Consolidated Nuclear Security*), A. W. Krass (*C. S. Engineering, Inc.*)
- 10:50 am:** Temperature Measurements of the BeRP Ball During the Subcritical Copper-Reflected α -Phase Plutonium (*SCRaP*) Experiment, T. Cutler, R. Bahran, J. Hutchinson (*LANL*)
- 11:15 am:** The Case for and Against a Gadolinium Bias in SCALE: Opening Arguments, W. J. Marshall (*ORNL*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 8:00 AM

Experimental Thermal Hydraulics—I

Sponsored by THD

Session Organizer: Wade Marcum (*Oregon State*) **Cochairs:** Wade R. Marcum (*Oregon State Univ.*), Rodolfo Vaghetto **CANCELED**, Marilyn Delgado (*Texas A&M*)

Location: Franklin 6 **Time:** 8:00-11:15 am

- 8:05 am:** Development of a Novel Resistive Heater for Performing Simulated Nuclear Fuel Experiments, Daniel P. LaBrier, Wade R. Marcum (*Oregon State*), James Nylander (*Harris Thermal Transfer Products*)
- 8:30 am:** Matched Refractive Index Rod Bundle and Spacer Grid Testing Facility Experiments, A. A. Campagnole dos Santos (*Centro de Desenvolvimento da Tecnológica Nuclear*), M. Childs, T. D. Nguyen, Y. A. Hassan (*Texas A&M*)
- 8:55 am:** Time-Resolved Particle Image Velocimetry Measurements and Proper Orthogonal Decomposition Analysis of Jet Impingement in a HTGR Upper Plenum, Anas Alwafi (*Texas A&M & King Abdulaziz City for Sci. and Technol.*), Thien Nguyen, N. K. Anand, Yassin Hassan (*Texas A&M*)
- 9:35 am:** Time-Resolved Particle Image Velocimetry Measurements in a Low-Aspect Ratio Pebble Bed Reactor, E. Kappes, M. Marciniak, S. King, A. Mills, R. Muyshondt, D.T. Nguyen, Y.A. Hassan, V. Ugaz (*Texas A&M*)
- 10:00 am:** A New High Pressure Pump Testing Loop, Guillaume P. Mignot, Wade R. Marcum, Sean K. O'Brien (*Oregon State*)
- 10:25 am:** On the Performance of the Transient Reactor Test Loop (TRTL), Daniel P. LaBrier, Wade R. Marcum, Aaron W. Weiss, Guillaume P. Mignot, Emory G. Brown, Yikuan Yan, Musa A. Moussaoui, Tsung-Wen Chen (*Oregon State*)
- 10:50 am:** Drift Flux Model Analysis of Vertical Air-Water Downward Two-Phase Flow in Large Diameter Pipes, M. Yousaf, G. Wang, Z. Dang, M. Ishii (*Purdue*)

Computational Thermal Hydraulics—I

Sponsored by THD

Session Organizer: Ling Zou (*INL*) **Cochairs:** Ling Zou (*INL*), Si Young Lee (*SRNL*)

Location: Franklin 7 **Time:** 8:00 am-12:05 pm

- 8:05 am:** Interfacial Area Transport in Horizontal Bubbly Flow, Ran Kong, Seungjin Kim (*Purdue*), Stephen M. Bajorek, Kirk Tien, Chris L. Hoxie (*NRC*)
- 8:30 am:** Implicit Second-Order Scheme for Steady-State Thermal-Hydraulic Simulations, Guojun Hu, Tomasz Kozlowski (*Univ. Illinois, Urbana-Champaign*)
- 8:55 am:** Adjoint Sensitivity Analysis of the Two-Phase Two-Fluid Model, Guojun Hu, Tomasz Kozlowski (*Univ. Illinois, Urbana-Champaign*)
- 9:35 am:** Validation Hierarchy for Waste Vitrification Models, D. P. Guillen, A. W. Abboud (*INL*), R. Pokorny (*Univ. Chemistry Technol. Prague*), W. C. Eaton, D. Dixon (*PNNL*), K. Fox (*SRNL*), A. A. Kruger (*DOE*)
- 10:00 am:** Thermal Evaluations for Tank Cesium Removal System, Si Young Lee (*SRNL*), Amy L. Lloyd (*Mercer Univ.*)
- 10:25 am:** Stabilized Finite Element Formulation for Thermally-Driven Porous Media Flows in Pronghorn, Ling Zou, John W. Peterson (*INL*), April J. Novak (*Univ. Calif., Berkeley*), Richard C. Martineau, Hans D. Gougar (*INL*)
- 10:50 am:** Low Mach Number Acoustics in Nuclear Piping Systems, Alexander Boschitsch, Pavel Danilov, Alan Bilanin (*Continuum Dynamics, Inc.*)
- 11:15 am:** Numerical Study of the Impact of the Fuel Rod Swelling on the Thermal Hydraulics Performance in 2X2 Rod Bundle, Cen Wei, Bao-wen Yang, Bin Han (*Jiaotong Univ.*)
- 11:40 am:** Rod Bundle Mixing Test and Subchannel Analysis with Modified Turbulent Mixing Model, Aiguo Liu, Bao-Wen Yang, Xianlin Zhu (*Xi'an Jiaotong Univ.*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 8:00 AM

Molten Salt Systems for FHRs and MSRs: Chemistry and Mass Transport

Sponsored by FCWMD

Session Organizer and Chair: Raluca O. Scarlat (*Univ. Wisconsin, Madison*)

Location: Rooms 411/412 Time: 8:00-11:15 am

- 8:05 am:** Developing a Molten Salt Reactor Safeguards Model, Benjamin B. Cipiti, Nathan Shoman (*SNL*)
- 8:30 am:** Modeling Molten Salt Performance in MSRs: Using Thermochemical Behavior, Theodore M. Besmann, Johnathan C. Ard (*Univ. South Carolina*), Jacob W. McMurray (*ORNL*)
- 8:55 am:** Chemistry of Molten Salt Reactor Fuel Salt Candidates, Pavel Souček, Ondřej Beneš (*European Commission*), Alberto Tosolin (*European Commission & Politecnico di Milano*), Rudy Konings (*European Commission*)
- 9:35 am:** On the Possibility of Quantitative Electrochemical Separation of Uranium from Gadolinium in Fluoride Melts, Martin Straka, Lorant Szatmáry (*ÚJV Řež*), Martin Mareček, Jan Uhlíř (*Research Centre Řež*)
- 10:00 am:** Galvanic Reduction for Actinide Recycling in a Molten Chloride Fast Reactor, Prashant Bagri, Michael Simpson (*Univ. Utah*)
- 10:25 am:** Wetting of Graphite by Molten Fluoride Salts: Initial Experiments, Alexandra R. Delmore, Will Derdeyn, Ruchi Gakhar, Raluca O. Scarlat (*Univ. Wisconsin, Madison*)
- 10:50 am:** Design and Fabrication of Molten Salt Loop for Material Corrosion and Salt Chemistry Control, Brendan Dsouza, Jinsuo Zhang, Shaoqiang Guo (*Virginia Tech*)

Uncertainty Quantification and Sensitivity Analysis

Sponsored by MCD

Session Organizer: Jeffery D. Densmore (*Naval Nuclear Lab*) Chair: Gabriel Kooreman (*NNL*)

Location: Rooms 414/415 Time: 8:00-11:40 am

- 8:05 am:** On the Connection Between Sensitivity and Identifiability for Inverse Uncertainty Quantification, Xu Wu, Koroush Shirvan (*MIT*), Tomasz Kozlowski (*Univ. Illinois, Champaign-Urbana*)
- 8:30 am:** Global Sensitivity Analyses on Coupled VERA-CS/BISON and VERA-CS/FRAPCON Simulations, Hongbin Zhang (*INL*)
- 8:55 am:** Bayesian Calibration and Uncertainty Quantification for TRACE Based on PSBT Benchmark, Chen Wang (*Univ. Illinois, Urbana-Champaign*), Xu Wu (*MIT*), Katarzyna Borowiec, Tomasz Kozlowski (*Univ. Illinois, Urbana-Champaign*)
- 9:35 am:** Validating TRACE Void Fraction Predictive Capability Using the Quantitative Area Validation Metric, Xu Wu, Koroush Shirvan (*MIT*), Tomasz Kozlowski (*Univ. Illinois, Urbana-Champaign*)
- 10:00 am:** Automatic Selection of High-Fidelity Models and Surrogates for Uncertainty Analysis, Congjian Wang, Andrea Alfonsi, Diego Mandelli, Paul W. Talbot, Cristian Rabiti (*INL*)
- 10:25 am:** First-Order Perturbation for Uncertainty Quantification in the Deterministic Truncation of Monte Carlo Method, Hyeontae Kim, Inhyung Kim, Yonghee Kim (*KAIST*)
- 10:50 am:** A New Uncertainty Evaluation Method for SFP Criticality Calculation, Kazuya Yamaji, Tetsuya Sugimura, Yasuhiro Harada, Daisuke Sato, Shinya Kosaka (*Mitsubishi Heavy Industries, Ltd.*)
- 11:15 am:** Inverse Uncertainty Quantification of TRACE Physical Model Parameters Using BFBT Benchmark with Investigation of Measurement Bias, Katarzyna Borowiec, Tomasz Kozlowski (*Univ. Illinois, Urbana-Champaign*)

Load Following Attributes for Nuclear–Panel

Sponsored by YMG

Session Organizer: Nicolas E. Stauff (*ANL*) Chair: Emma Redfoot (*Univ of Idaho*)

Location: Rooms 408/409 Time: 9:35-11:40 am

As renewables penetrate the grid at increasing quantities, there is greater demand for a flexible grid system. Nuclear power plants with the ability to fluctuate how much electricity they send to the grid will be more capable of meeting the flexible grid demand. This panel will focus on various strategies of nuclear power plants fluctuating their electricity output to the grid including ramping power levels, load following with an industrial process, and the options for advanced reactors as compared to the current nuclear power plant fleet.

Panelists:

John Siphers (*Duke Energy*)

Andrew Sowder (*EPRI*)

Sonny Kim (*PNNL*)

Jose Reyes (*NuScale*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 1:00 PM

Reactor Physics: General—III

Sponsored by RPD

Session Organizer and Chair: Cristian Rabiti (*INL*)

Location: Grand Salon I Time: 1:00-3:50 pm

- 1:05 pm:** Further Development of Efficient Uncertainty Quantification Techniques for Core Simulation, Dongli Huang, Hany S. Abdel-Khalik (*Purdue*), Ondrej Chvala, G. Ivan Maldonado (*Univ. Tenn.*)
- 1:30 pm:** Preliminary Simulation Results of VERA Problems 6 and 7 Using NECP-X/SUBSC, Jun Chen, Liangzhi Cao, Xingjian Wen, Zhouyu Liu, Hongchun Wu (*Xi'an Jiaotong Univ.*)
- 1:55 pm:** A Hybrid Subcritical Testbed for Fast Neutron Irradiation of Novel Fuels and Claddings in Fast Reactors, P. Deng, W. S. Yang, V. P. Chellapandi (*Univ. Michigan*), F. Y. Odeh, M. Mamtimin, T. L. Grimm (*Niowave, Inc.*)
- 2:20 pm:** Development of a Limited Angle Gamma Ray Emission Tomography System for In-Situ Spatially-Resolved Measurement of Fuel Burn Up and Pre-Shutdown Power, Kirk D. Atkinson, Luciano Grana (*Defence Academy U.K.*)
- 3:00 pm:** Quantification of Modeling Approximation Error of Pin-Cell Calculation Using Kriging and Principal Component Analysis, Tomomi Hanai, Akio Yamamoto, Tomohiro Endo (*Nagoya Univ.*), Kento Yamamoto, Yasunori Ohoka, Hiroaki Nagano (*Nuclear Fuel Industries, Ltd.*)
- 3:25 pm:** Calculation of the Cross Power Spectral Density for Pulse Mode Detectors, Alberto Talamo, Y. Gohar (*ANL*), T. Yamamoto, M. Yamanaka, C. H. Pyeon (*Kyoto Univ.*)

On-Line Monitoring-Prognostic and Health Management for Nuclear Power Plants

Sponsored by HFICD

Session Organizer and Chair: Jamie Baalis Coble (*Univ. Tennessee*)

Location: Grand Salon J Time: 1:00-3:50 pm

- 1:05 pm:** Evolving Nuclear Power Generation Through Optimized Asset Performance Management, Levon Keusseyan (*GE Hitachi*)
- 1:30 pm:** Robust Online Monitoring Technologies for Nuclear Power Plant Sensors, P. Ramuhalli (*PNNL*), J. Coble (*Univ. Tenn.*), B. Shumaker (*AMS Corp.*)
- 1:55 pm:** A DTW Based Automatic Transient Identification Method in Nuclear Power Plants, Xiaoming Bai, Honglei Ai, Xinjun Wang (*Nuclear Power Inst of China*)
- 2:20 pm:** Management of Aging of Reactor Internal Components, B. D. Shumaker, H. M. Hashemian, C. J. Kiger, A. H. Hashemian (*AMS*)
- 3:00 pm:** Model Learning with the CIET Facility Heater, Christopher Poresky, Per F. Peterson (*Univ. Calif., Berkeley*)
- 3:25 pm:** Neural Network-Based Predictive Control for the Thermal Power of a MHTGR-Based NSSS, Zhe Dong, Miao Liu, Zuoyi Zhang, Yujie Dong, Xiaojin Huang (*Tsinghua Univ.*)

The Nuclear Energy Advance Modeling and Simulation (NEAMS) Workbench—I

Sponsored by RPD; Cosponsored by THD

Session Organizer and Chair: Nicolas E. Stauff (*ANL*)

Location: Grand Salon K Time: 1:00-4:15 pm

- 1:05 pm:** Objectives of the NEAMS Workbench, B. T. Rearden, R. A. Lefebvre (*ORNL*)
- 1:30 pm:** NEAMS Workbench 1.0 Beta Status, Robert A. Lefebvre, Adam B. Thompson, Brandon R. Langley, Bradley T. Rearden (*ORNL*)
- 1:55 pm:** MOOSE Integration in the NEAMS Workbench, Robert A. Lefebvre (*ORNL*), Cody J. Permann (*INL*), Brandon R. Langley, Bradley T. Rearden (*ORNL*), Richard C. Martineau (*INL*)
- 2:20 pm:** Integration of the Argonne Reactor Computation Codes into the NEAMS Workbench, Nicolas E. Stauff (*ANL*), Robert A. Lefebvre, Brandon R. Langley (*ORNL*), Taek K. Kim (*ANL*), Bradley T. Rearden (*ORNL*)
- 3:00 pm:** Preliminary Integration of MCNP6 and PROTEUS into the NEAMS Workbench, Kurt A. Dominesey, Matthew D. Eklund, Peter J. Kowal, Wei Ji (*RPI*)
- 3:25 pm:** Integration of the Nek5000 Computational Fluid Dynamics Code to the NEAMS Workbench, Marc-Olivier G. Delchini, Robert A. Lefebvre, W. David Pointer, Bradley T. Rearden (*ORNL*)
- 3:50 pm:** Warthog: At the Intersection of MOOSE and SHARP, Kevin J. Dugan, Shane W. D. Hart (*ORNL*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 1:00 PM

Safety Aspects of Accident Tolerant Fuels–Panel

Sponsored by NISD

Session Organizer and Chair: Martin B. Sattison (*Retired*)

Location: Grand Salon L **Time:** 1:00-4:15 pm

The research and development of accident tolerant fuel systems for the light water reactor fleet has reached a point where a number of potential candidates have progressed through initial testing and preliminary evaluation. The nuclear industry is seriously considering taking some of these technologies to the next step of demonstration in commercial reactor lead rods or assemblies. Deployment of these technologies requires the consideration of a broad spectrum of issues and impacts on the operational and regulatory aspects of light water reactors. This panel will provide an overview of the leading candidates, explore the operational and regulatory hurdles for use, and provide discussion of near term activities in the area of accident tolerant fuel technologies.

Panelists:

Al Csontos (*EPRI*)

Jeff Whitt (*Framatome*)

Kurt Terrani (*ORNL*)

Mirela Gavrilas (*NRC*)

John Williams (*Southern Nuclear*)

Edward J. Lahoda (*Westinghouse*)

Sharing of Good Industry Practices and/or Lessons Learned in Nuclear Criticality Safety–Panel

Sponsored by NCS D

Session Organizer: Deborah Ann Hill (*NNL-UK*) **Cochairs:** Deborah Ann Hill (*NNL*), James C. Bunsen (*LANL*)

Location: Franklin 5 **Time:** 1:00-4:15 pm

Fundamental to the successful operation of any nuclear site is a first-class safety culture that strives to continually improve in response to good industry practices and operating experience feedback. Speakers will provide examples of either specific good practices and/or lessons learned at their site, following which an audience discussion will be initiated on alternative good practices and experiences in these areas.

Panelists:

Brandon O'Donnell (*BWX Technologies*)

Kevin Reynolds (*Consolidated Nuclear Security, LLC*)

Bob Wilson (*DOE*)

Dominic Winstanley (*Sellafield Ltd.*)

Computational Fluid Dynamics

Sponsored by THD

Session Organizer: Elia Merzari (*ANL*) **Cochairs:** Igor A. Bolotnov (*NCSU*), Jonathan K. Lai (*Texas A&M*)

Location: Franklin 6 **Time:** 1:00-4:15 pm

- 1:05 pm:** An Uncertainty Quantification of the Computational Fluid Dynamics Solution to the Modeling of the Contact Point in a Wire-Wrapped Fuel Assembly, Marc-Olivier G. Delchini (*ORNL*), Laura P. Swiler (*SNL*), Emilian P. Popov, William D. Pointer (*ORNL*)
- 1:30 pm:** Towards Low Prandtl Number Investigations with Direct Numerical Simulation in Fuel Bundles, Jonathan K. Lai (*Texas A&M*), Elia Merzari (*ANL*), Yassin A. Hassan (*Texas A&M*)
- 1:55 pm:** Large Eddy Simulations on Turbulent Flow of Twin Parallel Jets, Han Li, N. K. Anand, Yassin A. Hassan (*Texas A&M*)
- 2:20 pm:** Simulation of Flow Across a Spacer Grid with RANS and LES Turbulence Models, Giacomo Busco, Yassin A. Hassan (*Texas A&M*)
- 3:00 pm:** Flow Development with LES for Cold Leg Mixing Benchmark, Jonathan K. Lai (*Texas A&M*), Elia Merzari (*ANL*), Yassin A. Hassan (*Texas A&M*)
- 3:25 pm:** CFD-DEM Analysis of Heated Pebble Bed Geometry, Robert Mardus-Hall (*Univ. New South Wales*), Mark Ho (*ANSTO*), Guan Yeoh (*Univ. New South Wales, ANSTO*)
- 3:50 pm:** Lagrangian CFD Analyses for Use in DOE M 441.1-1 Calculations, S. M. McGuffie (*Porter McGuffie, Inc.*), M. Alsharif, Y. He (*Consolidated Nuclear Security, LLC.*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 1:00 PM

Operations and Power: General

Sponsored by OPD

Session Organizer: Brycen Wendt (*Idaho State*) Chair: James V. (Vince) Gilbert (*EXCEL Services*)

Location: Franklin 7 Time: 1:00-4:15 pm

- 1:05 pm:** A Novel Approach to Advanced Nanostructured Materials Manufacturing, J. J. Graham (*Univ. Calif., Berkeley*), K. Sridharan, B. R. Maier, H. Yeom (*Univ. Wisconsin, Madison*), Peter Hosemann (*Univ. Calif., Berkeley*)
- 1:30 pm:** Thermal Conductivity of Thorium Dioxide with Defects, Jungkyu Park, Eduardo B. Farfán, Katherine Mitchell, Alex Resnick, Christian Enriquez, Tien Yee (*Kennesaw State*)
- 1:55 pm:** Blade Fracture Accident Analysis of Helium Turbine for HTR-10GT, Xiaoyong Yang (*Tsinghua Univ.*), Haoran Hao (*Shanghai Nucl. Eng. Research Des. Inst.*), Jie Wang (*Tsinghua Univ.*)
- 2:20 pm:** Comparative Study of Spent Fuel Storage Design Aspects for HTR-PM and Other Pebble-Bed HTGRs, Bin Wu, Jin-hua Wang, Yan Zhang, Yue Li (*Inst. Nucl. and New Energy Technol.*)
- 3:00 pm:** The Influence of Al Content in Steels and Oxygen Concentration in Liquid LBE on the Corrosion Protection of Structural Steel Candidates for Generation IV FBRs, Miroslav P. Popovic, Yun Yang, Peter Hosemann (*Univ. Calif., Berkeley*)
- 3:25 pm:** Effects of Inventory Control on the Performance of HTR-10GT, Xiaoyong Yang (*Tsinghua Univ.*), Xiao Lin (*China United Gas Turbine Co.*), Jie Wang, Youjie Zhang (*Tsinghua Univ.*)
- 3:50 pm:** Essential Elements of a Nuclear Construction Performance Assessment, Kathryn Biegel (*Univ. Wisconsin, Madison*), Daniel Curtis (*MIT*), Todd Allen (*Univ. Wisconsin, Madison*)

Focus on Communications: It's All About the Plant–Panel

Sponsored by ETWDD Cosponsored by YMG

Session Organizer and Chair: Mimi Limbach (*Potomac Communication Group*)

Location: Rooms 411/412 Time: 1:00-2:45 pm

It's no accident that communities around nuclear power plants tend to have higher levels of support for nuclear energy than among people who don't live nearby. Communicators at nuclear plants in the United States make a positive difference to our industry day-by-day, week-by-week, and year-by-year. And while their facilities may have substantial support, they also are the subject of criticism and even protest. This session will feature a panel discussion of experienced nuclear plant communicators. They'll examine what techniques have worked best, how they've overcome challenges, and what they'd like to do over. They also will discuss how they have channeled support into positive action.

Panelists:

Maureen Brown (*SCE*)

Lacey Dean (*Exelon Generation*)

Rick Zuercher (*Dominion Energy*)

~~David Tillman (*Exelon Generation*)~~ **CANCELED**

Nuclear Advocacy–Panel

Sponsored by YMG Cosponsored by ETWDD

Session Organizer: Kelsey Amundsen (*DNFSB*) Chair: Jitesh Kuntawala (*Duke Energy*)

Location: Rooms 411/412 Time: 3:00-4:15 pm

Successfully advancing a pro-nuclear agenda today requires a diverse advocacy and communication tool set. Experts will discuss their personal involvement in nuclear advocacy, how to engage with the public on nuclear issues, and what they see for the future of nuclear advocacy. This panel will also discuss the impact of the internet and social media on science reporting, explore the rise of multimedia storytelling, and discover successful avenues to advance support for nuclear science and technology nationwide.

Panelists:

Eric Meyer (*Generation Atomic*)

Todd Allen (*Univ of Wisconsin, Madison*)

Brett Rampal (*Clean Air Task Force*)

Aries Loumis (*UIUC*)

Meredith Angwin (*Author/Nuclear Advocate*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 1:00 PM

Computational Methods and Mathematical Modeling

Sponsored by MCD

Session Organizer: Jeffery D. Densmore (*Naval Nuclear Lab*) Chair: Mathew A. Cleveland (*LANL*)

Location: Rooms 414/415 Time: 1:00-4:15 pm

- 1:05 pm: A Reduced-Order Model for the Solution of Diffusion Equations, Jaron P. Senecal, Wei Ji (*RPI*)
- 1:30 pm: An Eigenvalue Extension to the Candlestick Analytic Space- Time Depletion Benchmark and Its Application to Monte Carlo Simulation, Gabriel Kooreman, David P. Griesheimer (*Naval Nuclear Lab.*)
- 1:55 pm: An Analytical Model that Shows Possible Bias in Opacity Measurements, Todd Urbatsch (*LANL*)
- 2:20 pm: Solution of One-Speed Homogeneous Slab Transport Problems via Orthogonal Expansion of Emission Density, Kyle Remley (*Naval Nuclear Lab.*)
- 3:00 pm: Metaheuristic Optimization Method for Neutron Spectra Shaping, Sandra Bogetic (*Univ. Calif., Berkeley*), James E. Bevins (*Air Force Inst. Technol.*), Lee A. Bernstein (*Univ. Calif., Berkeley & LLNL*), Rachel Slaybaugh, Jasmina Vujic (*Univ. Calif., Berkeley*)
- 3:25 pm: Comparison Between Gaussian Processes and DMD Surrogates for Isotopic Composition Prediction, Rabab Elzohery, Mohammad Abdo, Jeremy Roberts (*Kansas State*)
- 3:50 pm: Model Verification via Principal Component Analysis, Bassam A. Khuwailah (*Univ. Sharjah*)

Recycle and Reuse of Used Nuclear Fuel Resources

Sponsored by FCWMD

Session Organizer and Chair: Guillermo Daniel Del Cul (*ORNL*)

Location: Rooms 408/409 Time: 1:00-4:15 pm

- 1:05 pm: Investigations into the Gas Phase Reactions of Zirconium Tetrachloride ($ZrCl_4$) from UNF Cladding, Craig Barnes, Austin Albert (*Univ. Tenn.*), Guillermo Daniel DelCul (*ORNL*), David F. McLaughlin (*Westinghouse*)
- 1:30 pm: Computational Studies of Gas Phase Reactions of Zirconium Tetrachloride ($ZrCl_4$) and Metal Chloride Impurities, Michael Orick, Craig Barnes (*Univ. Tenn.*), Guillermo Daniel DelCul (*ORNL*), David F. McLaughlin (*Westinghouse*)
- 1:55 pm: Ab Initio Study of Zirconium(IV) Chloride, Eunja Kim (*Univ. Nevada, Las Vegas*), Philippe F. Weck (*SNL*), Rosendo Borjas, Eswari Balasekaran, Frederic Poineau (*Univ. Nevada, Las Vegas*)
- 2:20 pm: Burning LWR SNF On-Site with Mu*STAR Accelerator-Driven Molten-Salt Systems, Robert Abrams, Mary Anne Cummings, Rolland P. Johnson, Thomas J. Roberts (*Muons, Inc.*)
- 3:00 pm: Evaluation of Various Methods for Converting Spent Nuclear Fuel into Fluoride Salts, P. A. Taylor, A. D. Braatz, G. D. Del Cul, B. B. Spencer (*ORNL*)
- 3:25 pm: Fuel Cycle Analysis of an Innovative Lead-Cooled Subcritical System, Xuewei Fu, Minghuang Wang, Yunqing Bai (*CAS*)
- 3:50 pm: Physics Evaluation of Thorium-Based Internally-Cooled Annular Fuel Bundles for Use in Pressure-Tube Heavy Water Reactors, B. P. Bromley, K. Groves, A. Colton, S. Golesorkhi (*CNL*)

Accelerator Applications in Science and Engineering

Sponsored by AAD

Session Organizer and Chair: Peter Hosemann (*Univ of California, Berkeley*)

Location: Franklin 9/10 Time: 3:00-4:25 pm

- 3:05 pm: Novel Ion Accelerator for Nuclear Physics Research, Yong Jiang, Jay Hirshfield (*Yale*)
- 3:25 pm: Niowave Neutron Interrogation System, W. A. Peters, M. Mamtimin, C. H. Boulware, T. L. Grimm, F. Y. Odeh, V. N. Starovoitova (*Niowave, Inc.*), S. A. Pozzi (*Univ. Michigan*), A. Inglis (*Silverside Detectors*)
- 3:45 pm: Improved Transmission and Capture Data for Tantalum-181, J. M. Brown (*RPI*), G. Leinweber, D. P. Barry, B. Epping, M. Rapp (*Naval Nuclear Lab.*), Y. Danon (*RPI*)
- 4:05 pm: Comparison of Incident and Modulated Neutron Flux Inside a High Flux Neutron Generator in the Presence of a Polyethylene Shield, Nnaemeka Nnamani (*Univ. Calif., Berkeley*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 4:30 PM

Challenges of Digital I&C Technology—II

Sponsored by HFICD

Session Organizer: Jamie Baalis Coble (*Univ. Tennessee*) **Chair:** Richard T. Wood (*Univ of Tennessee*)

Location: Grand Salon I **Time:** 4:30-6:40 pm

- 4:35 pm:** Research on the Methodology of Verification of Vital Digital Assets, Yeeun Byun, Siwon Kim, Kookheui Kwon (*Korea Inst of Nuclear Nonproliferation and Control*)
- 5:00 pm:** Simultaneous Test of Graphic Recorders (KR-2000 and KR-3000) with I/O Stimulator, Jang-Yeol Kim, Chang-Hwoi Kim (*KAERI*)
- 5:25 pm:** The Development of Safety DCS Platform—NicSys®8000N Based on FPGA, Liu Zhikai, Hu Yiwu (*China Nucl. Control System Eng. Co.*)
- 5:50 pm:** How EMI/RFI Site Surveys Can Improve the Digital Upgrade Process, Chad Kiger, Zachary Crane (*AMS Corp.*), Mark Campbell (*Talen Energy*)
- 6:15 pm:** Assessing the EMI/RFI Risks of Wireless Devices Using a Cognitive Radio System, Chad J. Kiger (*AMS Corp.*), William Ansley, Andrew Watters (*Exelon*), Chris Lowe (*AMS Corp.*)

Advances in Fast Reactor Design and Concepts—Panel

Sponsored by RPD

Session Organizer and Chair: Florent Heidet (*ANL*)

Location: Grand Salon J **Time:** 4:30-6:40 pm

This special panel will discuss recent progresses and development in the world of fast reactors. Various aspect of fast reactors will be discussed such as technology development, reactor concepts, reactor physics... The panelists have been selected from both the industry and the R&D community such as to provide complementary perspectives. The discussion will cover several types of fast reactor systems.

Panelists:

Robert Hill (*ANL*)

Greg Vetterick (*TerraPower*)

Paolo Ferroni (*Westinghouse*)

Russell Stachowski (*General Electric*)

~~Kevan Weaver (*TerraPower*)~~ **CANCELED**

~~Fausto Franceschini (*Westinghouse*)~~ **CANCELED**

The Nuclear Energy Advance Modeling and Simulation (NEAMS) Workbench—II

Sponsored by RPD; Cosponsored by THD

Session Organizer and Chair: Bradley T. Rearden (*ORNL*)

Location: Grand Salon K **Time:** 4:30-6:40 pm

- 4:35 pm:** The NEAMS Workbench and Dakota: Providing an Environment for Uncertainty Analyses, Laura Swiler (*SNL*), Robert Lefebvre, Brandon Langley, Adam Thompson (*ORNL*)
- 5:00 pm:** Application of the Interface Between Dakota and the Argonne Reactor Computation Codes in the NEAMS Workbench, Nicolas E. Stauff (*ANL*), Robert A. Lefebvre (*ORNL*), Laura Swiler (*SNL*), Taek K. Kim (*ANL*), Bradley T. Rearden (*ORNL*)
- 5:25 pm:** Providing a Graphical Tool for Modeling Reactor Cores, Patrick O'Leary, Jacob Becker, Robert O'Bara, David Thompson (*Kitware, Inc.*), Rajeev Jain, Vijay Mahadevan (*ANL*)
- 5:50 pm:** Enhanced Engineering Analyses with Visualization of Geometry and Mesh-Based Data in Fulcrum, W. J. Marshall, E. M. Saylor (*ORNL*)
- 6:15 pm:** High Power Density Annular Fuel in a Fast Test Reactor, Bo Feng, Nicolas Stauff (*ANL*)

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WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 4:30 PM

Licensing of Medical Isotope Production Facility—Panel

Sponsored by NISD

Session Organizer and Chair: Girija S. Shukla (*NRC*)

Location: Grand Salon L Time: 4:30-6:40 pm

Molybdenum-99 (Moly-99) is an important isotope that decays to technetium-99, which is administered for diagnosing a multitude of diseases, including heart disease and cancer. The world-wide supply of Moly-99 is very limited. Only 5 research reactors in the world produce Moly-99 and none is in the U.S. The Energy Policy Act of 2005 called for a reliable supply of medical isotopes and the National Nuclear Security Administration pledged financial support to establish an adequate domestic supply of Moly-99. SHINE Medical Technologies, Inc. was created in 2010 to pursue the production of medical isotopes. In 2013, SHINE submitted applications to the Nuclear Regulatory Commission (NRC) to construct and operate a unique medical isotope production facility. The NRC issued a construction permit to SHINE in February 2016. Additionally, another company Northwest Medical Isotopes (NwMI) has proposed to produce molybdenum-99, and in 2015, NwMI submitted to the NRC a construction permit application for a medical radioisotope production facility. This is the second application received by the NRC to construct a medical isotope production facility. Licensing of a medical isotope production facility present unique challenges to both the industry and the NRC.

Panelists:

Steven Lynch (*NRC*)

Jeff Chamberlin (*NNSA*)

Carolyn Haass (*NwMI*)

Leslie Foyto (*Univ of Missouri-Columbia*)

Gregory Piefer (*SHINE Medical Technologies, Inc.*)

Data, Analysis, and Operations in Nuclear Criticality Safety—III

Sponsored by NCSD

Session Organizer: Theresa E. Cutler (*LANL*) Chair: Margaret Marshall (*INL*)

Location: Franklin 5 Time: 4:30-6:15 pm

4:35 pm: Estimating Computational Biases for Criticality Safety Applications with Few Neutronically Similar Benchmarks, C. M. Perfetti, B. T. Rearden, W. J. Marshall (*ORNL*)

5:00 pm: Effect of Corner Reflection on the Critical Mass of Plutonium, Quinton Beaulieu, Natasha Glazener (*LANL*)

5:25 pm: Ensuring the Fidelity of Data Assimilation Methodology Bias Estimates, C. M. Perfetti, B. T. Rearden (*ORNL*)

5:50 pm: Validation of KENO V.a and KENO-VI in SCALE 6.2.2 Using ENDF/B-VII.0 and ENDF/BVII.1 Libraries, E. M. Saylor, W. J. Marshall (*ORNL*), Z. J. Clifton (*Univ. Alabama, Huntsville*), J. B. Clarity, B. T. Rearden (*ORNL*)

Thermal Hydraulic Analysis in Support of Severe Accident Management

Sponsored by THD

Session Organizer and Chair: John C. Luxat (*McMaster Univ.*)

Location: Franklin 6 Time: 4:30-6:40 pm

4:35 pm: Advanced Computational Accident Scenario Modeling for Safety Margin Economic Analysis, Thomas Riley, Andrew Klein (*Oregon State*)

5:00 pm: Accident Tolerant Fuels (ATF) Coating and Cladding Thermal Hydraulic Properties Evaluation by MELCOR YU 1.8.6: Benchmark for SURRY Short Term Station Black Out, Jun Wang, Michael L. Corradini, Hangjin Jo (*Univ. Wisconsin, Madison*)

5:25 pm: CFD-Assisted Analytical Work of Pressure Vessel Rupture Size Enlargement During Severe Accidents, Mun Won Song, Hee Cheon No (*KAIST*)

5:50 pm: A Model for Growth and Fracture of Crust Before Water Ingression, Dong Yeol Yeo, Hee Cheon No (*KAIST*)

6:15 pm: Investigations on the Hydrogen Risk in the Filtered Containment Venting System Using MELCOR, Hoe-Yeol Kim, Dong-Wook Jerng, Eun-Hye Lee (*Chung-Ang Univ.*)

Technical Sessions: Wednesday June 20

WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 4:30 PM

General Thermal Hydraulics

Sponsored by THD

Session Organizer and Chair: Donna P. Guillen (*INL*)

Location: Franklin 7 Time: 4:30-6:40 pm

- 4:35 pm:** Comparative Analysis of Conventional and Compact Heat Exchangers for Next Generation Nuclear Reactors, Amey Shigrekar (*Univ. Idaho*), Piyush Sabharwall (*INL*), Richard Christensen (*Univ. Idaho*)
- 5:00 pm:** Influence of Dissolved Impurities on the Coolability of Nuclear Fuel Rods, Zayed Ahmed, Daniel Franken, Seth Eckels, Steven Eckels, Hitesh Bindra (*Kansas State*)
- 5:25 pm:** A Dryout Model of CRUD, Dong Yeol Yeo, Hee Cheon No (*KAIST*)
- 5:50 pm:** Multiple Branches Coupling Property and Design of PRHRs, Zhang Zhuohua, Ran Xu, Li Feng, Xian Lin, Zhou Ke (*Nuclear Power Inst. China*)
- 6:15 pm:** Buoyancy and Thermal Expansion Acceleration Effects of Supercritical CO₂ Flowing in a Helically Coiled Tube, Xiao-Rui Huang, Zhen Zhang, Xing-Tuan Yang (*Tsinghua Univ.*)

Fuel Cycle and Waste Management: General—I

Sponsored by FCWMD

Session Organizer and Chair: Jared A. Johnson (*ORNL*)

Location: Franklin 9/10 Time: 4:30-7:55 pm

- 4:35 pm:** Small Scale Recycling of Irradiated Nuclear Fuel for Isotope Production and Nuclear Energy R&D, K. A. Shannon, T. L. Grimm, A. K. Grimm, N. C. Johnson, F. Y. Odeh, V. N. Starovoitova (*Niowave Inc.*), P. Kozak, A. V. Gelis (*ANL*)
- 5:00 pm:** Extraction of Actinides from Nitric Acid Solutions by Using N,N-di(2-ethylhexyl)-diglycolamic Acid, Guoxin Tian (*China Inst. Atomic Energy & Harbin Eng. Univ.*), Yan Zhang, Suliang Yang (*China Inst. Atomic Energy*)
- 5:25 pm:** Micro Scale Monitoring and Analysis of Phase Transfer Kinetics During Solvent Extraction, Susan Howett, Amanda Casella, Amanda Lines, Danny Bottenus, Forrest Heller, Sue Clark (*PNNL*), Calvin Delegard (*TradeWind Services*), Gilbert Nelson (*College of Idaho*), Sam Bryan (*PNNL*)
- 5:50 pm:** Verifying Contents of Dry Fuel Casks with Multiple Coulomb Scattering of Cosmic Ray Muons, Daniel Poulson (*LANL*)
- 6:15 pm:** Design of a Borated Aluminum Cask for Onsite Used Fuel Storage, J. Seth Dustin (*Univ. Idaho*), Samuel Pedersen, Brian J. Jaques (*Boise State*), R. A. Borrelli (*Univ. Idaho*)
- 6:40 pm:** Regulatory Licensing Pathway for a Borated Aluminum Cask Design for Onsite Used Fuel Storage, R. A. Borrelli (*Univ. Idaho*), Mark S. Delligatti (*Table Rock, LLC.*)
- 7:05 pm:** A Criticality Analysis of a Dry Storage Cask with Advanced Nuclear Fuel Cask Additive, J. Bae, R. Bean (*Purdue*), R. Abboud (*RGA Labs, Inc.*)
- 7:30 pm:** Development of a Greedy Method for Used Fuel Selection in Dry Cask Storage, Kristina Yancey Spencer, Pavel V. Tsvetkov, Joshua J. Jarrell (*Texas A&M*)

Challenges Associated with the Back End of the Molten Salt Reactor Fuel Cycle—Panel

Sponsored by FCWMD

Session Organizer and Chair: Christina Leggett (*NRC*)

Location: Rooms 414/415 Time: 4:30-6:40 pm

Over the past few years, molten salt reactors (MSRs) have gained increasing attention among non-LWR technologies. Although the current emphasis is on licensing and potential deployment of MSRs, there are some efforts to address the challenges associated with the back end of the MSR fuel cycle. This panel provides a much-needed discussion of those challenges and will cover the following topics: interim and long-term storage of MSR wastes, transportation, MSR waste forms (including tritium and off-gas waste forms), and the potential impact of online recycling of MSR UNF/SNF.

Panelists:

David Holcomb (*ORNL*)

Ed Hoffman (*ANL*)

Lou Qualls (*ORNL*)

Eric Loewen (*GE Hitachi Nuclear Energy*)

Panel moderator: Christina Leggett (*NRC*)

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THURSDAY, JUNE 21

TECHNICAL SESSIONS – 8:00 AM

Fuel Cycle and Waste Management: General—II

Sponsored by FCWMD

Session Organizer and Chair: Jared A. Johnson (ORNL)

Location: Grand Salon I Time: 8:00-11:40 am

- 8:05 am:** Comprehensive Evaluation System for ¹³⁷Cs Migration and Radiation Levels in Eastern Fukushima Prefecture, Akihiro Kitamura, Kazuki Iijima (JAEA)
- 8:30 am:** Preliminary Radioactive Contamination Assessment for Decommissioning on Kori-Unit 1 Bioshield, Donghyun Lee, Hee Reyoung Kim (UNIST)
- 8:55 am:** Design and Fabrication of a Heat Treatment Oven for Full-Length Spent Nuclear Fuel Rods, Rose Montgomery, Nesrin Cetiner (ORNL), Charles Blue, Randall Blue (*Infrared Heating Technol.*), Bruce Bevard (ORNL)
- 9:35 am:** Fuel Cycle for a Uranium-Plutonium Thermal Breeder Reactor, Neal L. Mann (Consultant)
- 10:00 am:** Mechanical Integrity of Spent Nuclear Fuel Rods, Efsthios Vlassopoulos (EPFL), Stefano Caruso (NAGRA), Konrad Linnemnn (BAM), Ramil Nasyrow, Ralf Gretter, Lorenzo Fongaro, Dimitrios Papaioannou (European Commission)
- 10:25 am:** Correlation Between Strain and Buckling of Spacer Grid by Side Impact, Kyungho Yoon, Jaeyong Kim, Hongyeol Oh, Donghak Kook (KAERI)
- 10:50 am:** Experimental Methods for Determining Li₂O Entrainment in Electrolytic Uranium Oxide Reduction, A. J. Burak, M. F. Simpson (Univ. Utah)
- 11:15 am:** Visually Determining the Thermal Expansion of a Triple Bubbler System in Pyroprocessing Molten Salt, Amey Shigrekar (Univ. Idaho), Ammon Williams, Greg Galbreth (INL)

Waste Repositories

Sponsored by FCWMD

Session Organizer: Jean-Francois Lucchini (LANL) Chair: Punam Thakur (New Mexico State Univ)

Location: Grand Salon J Time: 8:00-10:25 am

- 8:05 am:** Testing the Relative Oxidizing Hazard of Organic Wipes, J. F. Lucchini, C. J. Chancellor, B. A. Crawford, B. E. Ams, C. Poulos, D. Weaver (LANL)
- 8:30 am:** The Value of Independent Environmental Monitoring in Nuclear Waste Disposal: A WIPP Case Study, P. Thakur (Carlsbad Environmental Monitoring & Research Center)
- 8:55 am:** Thermo-Hydro-Mechanical Evaluation of Critical Mass in Repository Far-Field, Alex Salazar, Massimiliano Fratoni (Univ. Calif., Berkeley)
- 9:35 am:** Water Migration in Engineered Barrier Materials for Radioactive Waste Disposal, J. McFarlane, R. E. Hale (ORNL), V. H. DiStefano (ORNL & Univ. Tenn.), L. M. Anovitz, H. Z. Bilheux, M. C. Cheshire, L. L. Daemen, R. L. Howard (ORNL), E. Perfect, D. S. Hussey, D. L. Jacobson, J. M. LaManna (NIST)
- 10:00 am:** WIPP Safety Significant Confinement Ventilation Pre-Treatment Design, Richard Berry, Jack Clemmens (APTIM Federal Services), Rodney Whisenhunt (Nuclear Waste Partnership)

Reactor Physics Design, Validation, and Operational Experience

Sponsored by RPD

Session Organizer: Cristian Rabiti (INL) Chair: Russell E. Stachowski (GE Hitachi)

Location: Grand Salon K Time: 8:00-10:25 am

- 8:05 am:** Core Power Flattening Studies Supporting Narrowing Transient Pulse Widths in TREAT, John D. Bess (INL), Louis M. Dusanter (Ecole Polytechnique), Nicolas E. Woolstenhulme, James R. Parry, Connie M. Hill, Cliff B. Davis (INL)
- 8:30 am:** The Combinational Use of Burnable Poison Pins for 24 months Cycle PWR, Minjae Lee, Aiman Dandi, Myung Hyun Kim (Kyung Hee Univ.), Soon Ki Kim, Sang Rin Shon (KEPCO)
- 8:55 am:** Online Adversarial Estimation of Reactor Kinetics Parameters, Yeni Li, Elisa Bertino, Hany S. Abdel-Khalik (Purdue)
- 9:35 am:** Neutronic and Fuel Performance Evaluation of Accident Tolerant Fuel Concepts in APR1400 Reactor, Zainab Alnoamani, Saeed A. Alameri (Khalifa Univ.), Mohamed ElSawi (TerraPower)
- 10:00 am:** Application of Fission Matrix Correction Method to TRIGA Reactor Core, Adam Rau, Donghao He, William J. Walters (Penn State)

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THURSDAY, JUNE 21

TECHNICAL SESSIONS – 8:00 AM

ANS-8 Standards Forum

Sponsored by NCSD

Session Organizer and Chair: Douglas Bowen (ORNL)

Location: Franklin 5 Time: 8:00-11:40 am

Panelists to be announced.

Experimental Thermal Hydraulics—II

Sponsored by THD

Session Organizer and Chair: Bao-Wen Yang (Xi'an Jiaotong Univ.)

Location: Franklin 6 Time: 8:00-11:15 am

- 8:05 am:** Experimental Validation of Condensation Heat Transfer in PCCS (Passive Containment Cooling System) Heat Exchanger, Byoung-Uhn Bae, Seok Kim, Yu-Sun Park, Hyung-Gil Jun, Kyoung-Ho Kang (KAERI)
- 8:30 am:** Scaling of ADS-4 Depressurization and Long-Term Gravity Injection, Yuquan Li (State Power Investment Corp.), Huajian Chang (Tsinghua Univ.)
- 8:55 am:** Full Scale Experimental Study of Entrainment at ADS-4 Branch of CAP1400, P. Zhang, Y. Q. Li, P. P. Chen, H. J. Chang (State Power Investment Corp. & Tsinghua Univ.)
- 9:35 am:** Oxidation Effect on Flow Boiling CHF of SA508 under ERVC, Xiang Zhang, Yanfang Xue, Yuquan Li, Huajian Chang (State Nuclear Power Technol. Resaerch Center & Tsinghua Univ.)
- 10:00 am:** Experiment and Numerical Study of Water Film/Air Counter-Current Flow Heat Transfer on a Vertical Plate for Passive Containment Cooling System, Po Hu, Kashuai Du, Xiaojie Yang (Shanghai Jiao Tong Univ.)
- 10:25 am:** Direct Temperature Measurement Method of Nuclear Reactor Graphite Core, Cheng Ren, Zhen Zhang, Xingtuan Yang (Tsinghua Univ.)
- 10:50 am:** Experiment Study on the Molten Pool Oxide-Layer Characteristics, Daogui Tian, Lian Chen, Kun Han, Tao Li, Jie Pei, Bin Jiang, Huajian Chang (State Nuclear Power Technol. Center)

Computational Thermal Hydraulics—II

Sponsored by THD

Session Organizer: Kurshad Muftuoglu (GNF) Cochairs: Elia Merzari (ANL), Kurshad Muftuoglu (GNF)

Location: Franklin 7 Time: 8:00-10:50 am

- 8:05 am:** One-Dimensional Thermal Hydraulic Analysis of a Light Water Reactor Fuel Channel, Jerald C. Daniel, Kurshad Muftuoglu (Univ. Pitt.)
- 8:30 am:** Effect of Twisted Tapes on the Natural Circulation, Heat Transfer, and Pressure Drop Enhancements, Salman Alzahrani (King Abdulaziz City Sci. Technol., & Missouri Univ. Sci. Technol.), Shoaib Usman (Missouri Univ. Sci. Technol.)
- 8:55 am:** Severe Accident Mitigation Strategy of IVR-ERVC for Small Integral Reactor, Rae-Joon Park, Dong Gun Song (KAERI)
- ~~**9:35 am:** A Computer Code for Thermal-Hydraulic Analysis of Steam Generator with Axial Preheater/Economizer, Ge Wu, Gening He, Haisong Wang (Nucl. Power Inst. China) CANCELED~~
- 9:35 am:** Preliminary Assessment of CHF Model Based on Dry Patch and Heat Dissipation Concepts Using Vertical Heaters, Dong Hoon Kam, Yong Hoon Jeong (KAIST)
- 10:00 am:** Prediction of Condensation Heat Transfer for Steam with a Non-Condensable Gas of TASS/SMR Code at High-Pressure Conditions, Y. J. Chung, H. J. Kim, H. S. Kim, S. H. Kim, K. H. Bae (KAERI)
- 10:25 am:** Study on Rod Bundles CHF Prediction by Liquid Sublayer Dryout Model, Dawei Zhao (Nuclear Power Inst. China), Juliana Pacheco. Duarte, Michael L. Corradini (Univ. Wisconsin, Madison)

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Embedded Topical Meeting

Nuclear Fuels and Structural Materials for Next Generation Nuclear Reactors (NFSM)
Sponsored by the Materials Science and Technology Division



GENERAL COCHAIR
 Kurt Terrani
Oak Ridge National Laboratory



GENERAL COCHAIR
 Heather Chichester
Idaho National Laboratory



PROGRAM COCHAIR
 Giovanni Pastore
Idaho National Laboratory



PROGRAM COCHAIR
 Kevin Field
Oak Ridge National Laboratory

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NFSM: Sessions by Day

MONDAY, JUNE 18

1:00-2:45 pm	Opening Plenary	Franklin 8
3:00-5:10 pm	Development of Advanced Nuclear Fuel Concepts	Franklin 8

TUESDAY, JUNE 19

8:00-9:20 am	Advanced Modeling and Simulation of Nuclear Materials—I	Franklin 8
9:35-11:45 am	Advanced Modeling and Simulation of Nuclear Materials— II	Franklin 8
1:00-2:45 pm	21st Century Entrepreneurial Nuclear Energy	Franklin 8
3:00-4:15 pm	Enhanced Accident Tolerant Fuels	Franklin 8
4:30-5:25 pm	Fast Reactor Fuels	Franklin 8
5:30-7:30 pm	NFSM 2018 Poster Session and Reception	Franklin Foyer

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WEDNESDAY, JUNE 20

8:00-9:20 am	Materials and Research Reactor Fuel Tests	Franklin 8
9:35-11:45 am	Advanced Materials and Manufacturing	Franklin 8
1:00-2:45 pm	Radiation Effects and Post-Irradiation Examinations	Franklin 8
3:00 -4:20 pm	Used Fuel and Life Management for LWRs	Franklin 8
4:30-6:40 pm	Advanced Characterization of Nuclear Materials	Franklin 8

THURSDAY, JUNE 21

8:00-9:20 am	NSUF Special Session—I	Franklin 8
9:35 am-12:10 pm	NSUF Special Session—II	Franklin 8

EMBEDDED TOPICAL: NFSM | MONDAY, JUNE 18

TECHNICAL SESSION – 3:00 PM

Development of Advanced Nuclear Fuel Concepts

Session Organizer: Kevin G. Field (*ORNL*) **Cochairs:** Kevin Field (*ORNL*), Giovanni Pastore (*INL*)

Location: Franklin 8 **Time:** 3:00-5:10 pm

- 3:05 pm:** SiC-SiC Composite Cladding Development for Accident Tolerant Fuel, C. P. Deck, H. E. Khalifa, K. S. Shapovalov, S. Gonderman, G. M. Jacobsen, J. Sheeder, G. Vasudevamurthy, C. Shih, E. Song, S. Oswald, R. Haefelfinger, C. Bacalski, J. Zhang (*General Atomics*), R. J. Jacko (*Westinghouse*), J. Gazza, C. A. Back (*General Atomics*)
- 3:30 pm:** Sensitization Resistance of FeCrAl Alloys for Welded Fuel Cladding, Vipul K. Gupta, R. J. Blair, Raul B. Rebak (*GE*)
- 3:55 pm:** Update on Westinghouse EnCore® Accident Tolerant Fuel Program, R. Oelrich, P. Xu, E. Lahoda (*Westinghouse*), C. Deck (*General Atomics*), invited
- 4:20 pm:** Development of Novel Nuclear Fuel Materials for Light Water Reactors, A. T. Nelson (*LANL*)
- 4:45 pm:** Uranium Silicide and Uranium Silicide-Nitride Fuels: Assessing Phase Behavior for Fabrication and In-Reactor Behavior, Tashiema L. Wilson, Denise L. Adorno, Vancho Kocevski, Emily E. Moore (*Univ. South Carolina*), Joshua T. White (*LANL*), Elizabeth Sooby Wood (*Univ. Texas, San Antonio*), Andrew T. Nelson (*LANL*), Peng Xu (*Westinghouse*), Simon C. Middleburgh (*Bangor Univ.*), Jacob W. McMurray (*ORNL*), Theodore M. Besmann (*Univ. South Carolina*)

EMBEDDED TOPICAL: NFSM | TUESDAY, JUNE 19

TECHNICAL SESSIONS – 8:00 AM

Advanced Modeling and Simulation of Nuclear Materials—I

Session Organizer and Chair: Giovanni Pastore (*INL*), All invited

Location: Franklin 8 **Time:** 8:00-9:20 am

- 8:05 am:** Developments in Fuel Modeling within the NEAMS Program, Christopher R. Stanek (*LANL*)
- 8:30 am:** Multiscale Modeling of Fission Gas Bubble Evolution in UO_2 Under Nominal Operating Conditions, B. D. Wirth (*Univ. Tenn. & ORNL*), A. D. Andersson (*LANL*), S. Blondel (*Univ. Tenn.*), G. Pastore (*INL*), R. J. Kurtz, W. Setyawan (*PNNL*)
- 8:55 am:** Atomistic Simulations of Point Defect Behavior in Nuclear Fuels, David Andersson, Michael Cooper, Tophir Matthews, Romain Perriot, Xiang-Yang Liu, Chris Stanek (*LANL*)

Advanced Modeling and Simulation of Nuclear Materials—II

Session Organizer: Giovanni Pastore (*INL*) **Cochairs:** Chris Stanek (*LANL*), Brian Wirth (*Univ of Tennessee, Knoxville*)

Location: Franklin 8 **Time:** 9:35-11:45 am

- 9:40 am:** BISON: A Multidimensional Fuel Performance Code, Giovanni Pastore, Benjamin Spencer, Richard Williamson, Jason Hales (*INL*), invited
- 10:05 am:** Extending the Capability of Nuclear Plant Systems Analysis with Advanced Tightly-Coupled Nuclear Fuels Performance, Richard Martineau, David Andrs, Joshua Hansel, Cody Permann, Derek Gaston, Steve Novascone (*INL*), Matthew Bernard (*NRC*), Russel Johns (*LANL*), Rui Hu, Elia Merzari (*ANL*), James Wolf, Hongbin Zhang, Ronaldo Szilard (*INL*), invited
- 10:30 am:** Introduction of the Meso-Scale Fuel Performance Modeling Code MARMOT, Yongfeng Zhang, Daniel Schwen (*INL*), David Andersson (*LANL*), Michael Tonks (*Univ. Florida*), Stephen Novascone (*INL*), Karim Ahmed (*Texas A&M*), invited
- 10:55 am:** Calibration of Zr Redistribution Models for Metallic Fuel in BISON, Christopher Matthews, Garrison Stevens, Cetin Unal (*LANL*)
- 11:20 am:** Machine Learning Applications and Opportunities in Nuclear Materials, Dane Morgan, Wei Li, Tam Mayeshiba, Henry Wu, Benjamin Afflerbach (*Univ. Wisconsin, Madison*), Peter Wells, G. Robert Odette (*Univ. Calif. Santa Barbara*), Kevin Field (*ORNL*), invited

Embedded
Topical:
Nuclear
Fuels &
Structural
Materials
for Next
Generation
Nuclear
Reactors

EMBEDDED TOPICAL: NFSM | TUESDAY, JUNE 19

TECHNICAL SESSIONS – 1:00 PM

21st Century Entrepreneurial Nuclear Energy

Session Organizer: Kevin G. Field (*ORNL*) **Co-chairs:** Christian Deck (*General Atomics*), Todd Allen (*Univ of Wisconsin, Madison*)

Location: Franklin 8 **Time:** 1:00-2:45 pm

1:05 pm: Entrepreneurial Nuclear and the Associated Challenges for Materials Development, T. R. Allen (*Univ. Wisconsin, Madison*), invited

1:30 pm: Modeling of Structural Graphite for Pebble Bed HTGR Cores, Paul Kirchman, Pete Pappano (*X-Energy*)

1:55 pm: HT9 Material Development for the TWR Core, Greg Vetterick, Cheng Xu (*TerraPower*)

2:20 pm: Technology Development in Fuels and Materials for the Fluoride-Salt Cooled High Temperature Reactor, Micah Hackett, Alan Kruizenga, Michael Hanson (*Kairos Power*), Sam Sham (*ANL*), George Young (*Dominion*), invited

Enhanced Accident Tolerant Fuels

Session Organizer: Kurt A. Terrani (*ORNL*) **Co-chairs:** Andrew Nelson (*LANL*), Raul Rebak (*GE Global Research*)

Location: Franklin 8 **Time:** 3:00-4:15 pm

3:05 pm: Designing for Radiation Tolerance in FeCrAl Alloys, Kevin G. Field (*ORNL*), Samuel A. Briggs (*SNL*), Dalong Zhang, Kenneth C. Littrell, Yukinori Yamamoto (*ORNL*)

3:30 pm: Mechanical Response of SiC-SiC Composite Cladding at Accident Relevant Temperatures, Kirill Shapovalov, George M. Jacobsen, Christian P. Deck (*General Atomics*)

3:55 pm: Hydrothermal Corrosion of Candidate Coatings on Silicon Carbide, Stephen S. Raiman, Peter Doyle (*ORNL*)

Fast Reactor Fuels

Session Organizer: Giovanni Pastore (*INL*) **Chair:** Stuart Maloy (*MIT*)

Location: Franklin 8 **Time:** 4:30-5:25 pm

4:35 pm: Nitrogen Effects on Irradiated Ferritic/Martensitic Steel, Ben Eftink, Matthew Chancey, Di Chen, Yongqiang Wang, Stuart Maloy (*LANL*)

5:00 pm: Investigating S_n as a Potential Fuel Additive to Control FCCI, Michael T. Benson, James A. King, Robert D. Mariani (*INL*)

NFSM 2018 Poster Session and Reception

Session Organizer: Giovanni Pastore (*INL*)

Location: Franklin Foyer **Time:** 5:30-7:30 pm

1. Fabrication of Graphite—LEU Fuel for TREAT Reactor Conversion, Dustin R. Cummins, Erik P. Luther (*LANL*), Ben D. Coryell (*INL*), Timothy Baker (*LANL*), Douglas E. Burns (*INL*)
2. Fabrication and Characterization of U-Zr Foils for the DISECT Project, Walter J. Williams (*Purdue & INL*), Maria A. Okuniewski (*Purdue*), Laura Sudderth, Daniel Wachs (*INL*), Sven Van den Berghe (*SCK-CEN*)
3. ~~First-Principles Study of the Fracture Toughness of Transition Metal Nitride Thin Films for U-Mo/Al-Dispersion Fuel, Zhi-Gang Mei, Abdellatif M. Yacout (*ANL*)~~ **CANCELED**
4. Effect of a Raw Material Powder on Sintered CeO₂ Pellets by 28 GHz Microwave Irradiation, Masatoshi Akashi, Taku Matsumoto, Masato Kato (*JAEA*)
5. Characterization of U-Zr Alloy System Fuel Slugs Prepared with Recycled Metallic Fuel Scraps, Ki-Hwan Kim (*KAERI*), Seong-Jun Ha (*Chungnam Univ.*), Jeong-Yong Park, Seok-Jin Oh, Sung-Ho Kim (*KAERI*)
6. Thermophysical Properties of Uranium-Palladium Metallic Fuel Alloys, Scott Middlemas, Cynthia Papesch, Craig Marshall (*INL*)
7. Processing of Enhanced UO₂ Fuel Starting from a Sol-Gel Feedstock, Sarah Finkeldei, James Kiggans, Rodney Hunt, Kurt Terrani (*ORNL*)

EMBEDDED TOPICAL: NFSM | TUESDAY, JUNE 19

TECHNICAL SESSIONS – 5:30 PM

NFSM 2018 Poster Session and Reception Continued

Session Organizer: Giovanni Pastore (*INL*)

Location: Franklin Foyer **Time:** 5:30-7:30 pm

8. Microstructural Degradation of U_3Si_2 and Fission Product Silicides Exposed to H_2O Containing Atmospheres, Elizabeth Sooby Wood, Geronimo Robles (*Univ Texas at San Antonio*), Joshua T. White, Christopher J. Grote, Andrew T. Nelson (*LANL*)
9. Thermophysical Properties Evaluation of U-x wt%Pu-20 wt%Zr Metallic Fuel, Where x = 30, 36.5, and 55, Cynthia A. Adkins, Scott Middlemas (*INL*)
10. Assessment of Radiation Damage and Microstructural Changes in Neutron Irradiated U-10Zr Fuels with High Energy X-Rays, Jonova Thomas, Sri Tapaswi Nori, Alejandro Figueroa, Ran Ren, Maria A. Okuniewski (*Purdue*), Peter Kenesei, Jun Sang-Park, Jon Almer (*ANL*), Jason M. Harp (*INL*)
11. Synthesis, Sintering, and Thermophysical Properties of Thorium Mononitride, Stephen S. Parker (*Univ. Calif., Berkeley & ORNL*), Joshua T. White (*ORNL*), Peter Hosemann (*Univ. Calif., Berkeley*), Andrew T. Nelson (*ORNL*)
12. Axial and Hoop Creep Mechanisms of ZIRLO, Micah G. Tillman, N. Kumar, K. L. Murty (*NCSU*)
13. Microstructural Characterization of ECAP Processed Grade 91 During In-Situ Annealing, Ryan Carnahan, Malwina Wilding, Cheng Sun, Mary Lou Dunzik-Gougar, Thomas M. Lillo (*INL*)
14. Hydrogen Precipitation Kinetics Measurement in Zircaloy-4 Using Synchrotron Irradiation X-Ray Diffraction, Evrard Lacroix, Arthur T. Motta (*Penn State*)
15. Electronic Structure Characterization of Oxide Films on Zirconium Alloy in High Temperature Water, Taeho Kim, Seunghyun Kim, Yunju Lee, Junhyuk Ham, Ji Hyun Kim (*UNIST*)
16. Simulating Hydrogen Solvus in Zirconium by Hyrax: A Mesoscale Phase-Field Code, Jun-Li Lin, Brent Heuser (*Univ. Illinois, Urbana-Champaign*)
17. Enhanced High-Temperature Performance of a Zirconium Alloy Cladding by High-Temperature Preformed Oxide, Cheol Min Lee (*UNIST*), Yong-Kyoon Mok (*KEPCO*), Dong-Seong Sohn (*UNIST*)
18. Solid Mechanics Behavior of UO_2 -36.4vol % BeO Fuel Pellets with Zircaloy, SiC, FeCrAl and Surface-Coated Claddings, Wei Zhou, Wenzhong Zhou (*Univ. Hong Kong*)
19. OFRAC: An Advanced Nanostructured Ferritic Alloy Fuel Cladding for Fast Reactors, Caleb P. Massey (*Univ. Tenn.*), David T. Hoelzer, Philip D. Edmondson (*ORNL*), Rachel L. Seibert (*Illinois Inst. Technol.*), Anoop Kini, Baptiste Gault (*Max-Planck*), Kurt A. Terrani (*ORNL*), Steven J. Zinkle (*ORNL & Univ. Tenn.*)
20. Molecular Dynamics Simulations of Gap Thermal Conductance, Lin Zhang, Heng Ban (*Univ. Pitt.*)
21. Multiphysics Simulation of Thermal Striping for Determining Creep-Fatigue Life, M. C. Messner, Y. Yu (*ANL*)
22. Nickel-Based Structural Material MONICR for Molten Salt Reactors Applications, Martina Koukolikova, Peter Slama, Pavel Podany, Jan Cerny (*COMTES FHT*)
23. Recrystallization Behaviour of Nickel-Based Superalloys for Molten Salt Reactors, Pavel Podany, Martina Koukolikova, Peter Slama, Petr Motycka (*COMTES FHT*)
- ~~24. High Temperature Creep Properties of Alloy 709, A. S. Alomari, N. Kumar, K. L. Murty (*NCSU*) CANCELED~~
25. Characterization of Nuclear Materials with Neutron Diffraction and Neutron Imaging, Sven C. Vogel, Donald W. Brown, Adrian S. Losko, Tarik A. Saleh (*LANL*)
26. Influence of Heat Treatment on the Microstructure and Mechanical Properties of Alloy 825 at Cryogenic Temperatures, Jan Sas, Klaus-Peter Weiss (*KIT*), Pavel Podany (*COMTES FHT*)
27. An Overview of NSUF Facilities at Los Alamos National Laboratory, Tarik A. Saleh, Thomas J. Venhaus, Donald W. Brown, Sven C. Vogel (*LANL*)
28. Mitigating Stress Corrosion Cracking and Irradiation Defects in ODS Austenitic Alloys by Laser Shock Peening, Xueliang Yan, Yongfeng Lu, Michael Nastasi, Bai Cui (*Univ. Nebraska*)
29. Corrosion Resistant Materials Testing and Compatibility Studies in High Temperature Lead Bismuth Eutectic, Stuart Maloy, Keith Woloshun (*LANL*), Mayir Mamtimin, John Diemer, Terry Grimm, Faisal Odeh, Tim Shade (*Niowave*)

Embedded Topical: Nuclear Fuels & Structural Materials for Next Generation Nuclear Reactors

EMBEDDED TOPICAL: NFSM | TUESDAY, JUNE 19

TECHNICAL SESSIONS – 5:30 PM

NFSM 2018 Poster Session and Reception Continued

Session Organizer: Giovanni Pastore (*INL*)

Location: Franklin Foyer **Time:** 5:30-7:30 pm

Embedded Topical: Nuclear Fuels & Structural Materials for Next Generation Nuclear Reactors

30. Tribological Behavior of Structural Materials at Elevated Temperatures and in Impure Helium Environments for High-Temperature Gas-Cooled Reactor Applications, Valentin Pauly, Carter Tesch, Joseph Kern, David Grierson, Dileep Singh, Oyelayo Ajayi, Kumar Sridharan (*Univ. Wisconsin, Madison*)
31. Electrochemistry of FeCrAl Fuel Cladding in High Temperature Water, Timothy B. Jurewicz, Raul B. Rebak (*GE*)
32. Investigation of Materials Corrosion in Molten Fluoride Salts, C. Falconer, W. H. Doniger (*Univ. Wisconsin, Madison*), G. Zheng (*Univ. Wisconsin, Madison & MIT*), R. Scarlat, K. Sridharan, A. Couet (*Univ. Wisconsin, Madison*)
33. Design and Development of CANDU Ex-Service Garter Spring Irradiation Experiments in the HFIR, Richard H. Howard, Ryan C. Gallagher (*ORNL*), Andrew Buyer (*CNL*)
34. Enhanced Plasticity in 33 dpa Neutron Irradiated 304SS with 2-3.7% Swelling, H. Vo (*Univ. Calif., Berkeley*), S. Teysseyre (*INL*), P. Hosemann (*Univ. Calif., Berkeley*)
35. Accelerated Irradiation Testing of Miniature Fuel Specimens, Christian M. Petrie, Joseph Burns, Robert Morris, Kurt Terrani (*ORNL*)
36. Radiation-Induced Microstructure Evolution and Hardening of Austenitic Alloy 709, Xiang Liu (*Univ. Illinois, Urbana-Champaign*), Jonathan Gigax, Lin Shao, Frank A. Garner (*Texas A&M*), James F. Stubbins (*Univ. Illinois, Urbana-Champaign & Kyushu Univ.*)
37. Evaluation of Irradiation-Induced Strain in SiC Tubes by a Combination of Experiment and Simulation, Takaaki Koyanagi, Yutai Katoh, Gyanender Singh, Xunxiang Hu, Christian M. Petrie, Kurt Terrani (*ORNL*)
38. Diffusion of Fissile Inventory in AGR-1 TRISO Fuel Particles as a Function of Temperature and Silver Retention, Rachel L. Seibert (*Illinois Inst. Technol.*), Tyler J. Gerczak, Kurt A. Terrani, John D. Hunn, Fred Montgomery, Charles Baldwin (*ORNL*), Jeff Terry (*Illinois Inst. Technol.*)
39. Nano-Crystallization in UO₂ Irradiated by High-Energy Heavy Ions, Yinbin Miao (*ANL*), Tiankai Yao, Jie Lian (*RPI*), Shaofei Zhu, Sumit Bhattacharya, Aaron Oaks, Abdellatif M. Yacout, Kun Mo (*ANL*)
40. Simulated Effective Thermal Conductivity of U₃Si₂ Fuels with Irradiated Gas Bubbles, Linyun Liang, Zhi-Gang Mei, Yinbin Miao (*ANL*), Larry K. Aagesen (*INL*), Abdellatif M. Yacout (*ANL*)
41. Modelling of Uranium Dioxide Oxidation in Air Condition, Hyounggyu Park, Kwangheon Park (*Kyunghee Univ.*)
42. Phase Field Simulation of Sintering of UO₂ Nuclear Fuel, Ian Greenquist (*Penn State*), Michael Tonks (*Univ. Florida*), Yongfeng Zhang (*INL*)
43. Neutronic Analysis of Fuel Out Zone Effects for USHPRR Program U-10Mo, Mini-Plate-1 Irradiation at the Advanced Test Reactor, Margaret A. Marshall (*INL*)
- ~~44. Role of Compression Metallization in UO₂ Fission Product Energy Cascade Track: Multiscale Electron-Phonon Analyses, Woong-Kee Kim (*Seoul Univ. & Univ. Michigan*), Corey Melnick (*Univ. Michigan*), Ji Hoon Shim, Massoud Kaviani (*Univ. Michigan & Pohang Univ.*). **CANCELED**~~
45. Investigation of Interfaces in Gamma U-Mo, Benjamin Beeler, Yongfeng Zhang, Yipeng Gao (*INL*)
46. As-Run Neutronics Analysis for AFIP-6 Mk II Irradiations in ATR for the USHPRR Program, Margaret Marshall (*INL*)
47. Progress in Coupling of Thermodynamics, Fluid Dynamics, and Isotopics in Molten Salt Reactor Multi-Physics Simulations, B. W. N. Fitzpatrick, M. H. A. Piro (*Univ. Ontario Inst. Technol.*), B. Collins (*ORNL*)
- ~~48. Microstructure-Level Modeling of Triple Junction Fission Gas Bubble Percolation, Larry Aagesen, Daniel Schwen, Yongfeng Zhang (*INL*). **CANCELED**~~
49. Evaluation of Precipitation Thermodynamics in MAMBA-3D, Jason T. Rizk, Brian D. Wirth (*Univ. Tenn.*)
50. Fuel Analysis of Iron-Chrome-Aluminum Cladding Under Simulated Loss-of-Coolant Conditions, R. T. Sweet (*Univ. Tenn.*), K. A. Terrani (*ORNL*), Brian D. Wirth (*Univ. Tenn. & ORNL*)

EMBEDDED TOPICAL: NFSM | TUESDAY, JUNE 19

TECHNICAL SESSIONS – 5:30 PM

NFSM 2018 Poster Session and Reception Continued

Session Organizer: Giovanni Pastore (INL)

Location: Franklin Foyer **Time:** 5:30-7:30 pm

51. Radionuclide Release Modeling from TRISO Based FCM Fuel, Daniel Schappel (*Univ. Tenn.*), Kurt A. Terrani, Jeffery Powers, Lance Snead (*ORNL*), Brian D. Wirth (*Univ. Tenn. & ORNL*)
52. Design of a Fission Gas Release Measurement System at the PULSTAR Reactor, M. Liu, A. I. Hawari (*NCSU*)
53. Physics-Based Computational Modeling of α -U Thermal Conductivity, Shuxiang Zhou, Ryan Jacob (*Univ. Wisconsin, Madison*), Eric Tea, Celine Hin (*Virginia Tech*), Dane Morgan (*Univ. Wisconsin, Madison*)
54. Reactivity-Initiated Accident Experimental Benchmarks for the BISON Fuel Performance Code, C. Folsom (*Utah State*), R. Williamson, G. Pastore (INL), H. Ban (*Univ. Pitt*)
55. Using BISON to Design a PCMI Validation Experiment, A. Casagrande, B. W. Spencer, G. Pastore, S. R. Novascone, J. D. Hales, R. L. Williamson, R. C. Martineau (INL)
56. Engineering Analysis of Reactor Pressure Vessels with Grizzly, Benjamin W. Spencer, William M. Hoffman, Wen Jiang (INL)
57. Microstructural Evolution of 3C-SiC Exposed to Simultaneous Neutron Irradiation and Helium Implantation, Xunxiang Hu, Takaaki Koyanagi (*ORNL*), Jiangtao Zhao (*Lanzhou Univ.*), Takuya Yamamoto (*Univ. Calif., Santa Barbara*), Yutai Katoh (*ORNL*)
58. Characterization of Dislocation Loops and α' Participates in Neutron-Irradiated FeCrAl Weldments, D. Zhang (*ORNL*), S. A. Briggs (*SNL*), Y. Yamamoto, R. H. Howard, M. N. Gussev, K. G. Field (*ORNL*)
59. Point Defects in Uranium Mono-Nitride: First-Principles Calculations, Behieh M. Elahi, Iyad I. Al-Qasir (*Univ. Sharjah*)
60. Microstructural Modifications in U_3Si_2 Implanted by High-Energy Xe Ions at LWR Temperatures, Yinbin Miao (*ANL*), Jason Harp (INL), Kun Mo, Shaofei Zhu, Abdellatif M. Yacout (INL)
61. Fully Ceramic Microencapsulated Fuel in Prismatic High Temperature Gas-Cooled Reactors—Impact on Control Rod Worth and Temperature Distribution in the Core, Cihang Lu, Nicholas R. Brown (*Penn State*)
62. Evaluating Accident Tolerant Fuel Concepts in Light Water Reactors Using CASL CTF, Jacob P. Gorton, Nicholas R. Brown (*Penn State*), Kurt A. Terrani (*ORNL*), Amir F. Ali, Youho Lee (*Univ. New Mexico*)
63. Thermal Neutron Scattering Cross Sections of Molybdenum Isotopes, Andrea Saltos, Nickie J. Peters, Karl Hammond (*Univ. Missouri*)
64. Irradiation Creep Behavior of Iron Base Alloy at High Temperature Condition, Sang Il Choi (*UNIST*), Mosab Jaser Baniselman (*Seoul National Univ*), Gyeong-Geun Lee, Junhyun Kwon (*KAERI*), Ji Hyun Kim (*UNIST*)

EMBEDDED TOPICAL: NFSM | WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 8:00 AM

Materials and Research Reactor Fuel Tests

Session Organizer: Giovanni Pastore (INL) **Chair:** Elizabeth Sooby Wood (*Univ of Texas at San Antonio*)

Location: Franklin 8 **Time:** 8:00-9:20 am

- 8:05 am:** A Proposed Start-Up Fuel for the Versatile Test Reactor, Douglas C. Crawford, Steven L. Hayes (INL), Jeffery J. Powers (ORNL), invited
- 8:30 am:** New Capabilities for In-Pile Separate Effects Tests in TREAT, N. Woolstenhulme, C. Baker, J. Bess, D. Chapman, D. Dempsey, C. Hill, C. Jensen, S. Snow (INL)
- 8:55 am:** New Generation of Transient Testing for SFR Fuels in TREAT, Colby Jensen, Daniel Wachs, Nicolas Woolstenhulme (INL)

Embedded Topical: Nuclear Fuels & Structural Materials for Next Generation Nuclear Reactors

EMBEDDED TOPICAL: NFSM | WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 9:35 AM

Advanced Materials and Manufacturing

Session Organizer and Chair: Kevin G. Field (*ORNL*)

Location: Franklin 8 **Time:** 9:35-11:45 am

9:40 am: Advanced Manufacturing and Materials to Enable Advanced Nuclear Energy, Kurt A. Terrani (*ORNL*)

10:05 am: Cold Spray Coatings for Accident Tolerant Zr-Alloy Cladding in Light Water Reactors, Hwasung Yeom, Benjamin Maier, Greg Johnson, Tyler Dabney, Mia Lenling, Payton Scallon (*Univ. Wisconsin, Madison*), Javier Romero, Jorie Walters, Peng Xu, Hemant Shah (*Westinghouse*), Kumar Sridharan (*Univ. Wisconsin, Madison*)

10:30 am: Recent Development in SiC Composite Technologies for Nuclear Energy Applications, Yutai Katoh (*ORNL*), invited

10:55 am: Investigation of High-Entropy Alloys Compositions for Radiation Damage Applications, Calvin Parkin, Michael Moorehead, Zefeng Yu, Kumar Sridharan, Adrien Couet (*Univ. Wisconsin, Madison*), Alfred Ludwig, Alan Savan (*Ruhr Univ., Bochum*), Chuan Zhang (*Computherm*)

11:20 am: History and Outlook of ODS/NFA Ferritic Alloys for Nuclear Applications, D. T. Hoelzer (*ORNL*)

TECHNICAL SESSIONS – 1:00 PM

Radiation Effects and Post-Irradiation Examinations

Session Organizer: Heather J. M. Chichester (*INL*) **Cochairs:** Lance Snead (*MIT*), Heather J. M. Chichester (*INL*)

Location: Franklin 8 **Time:** 1:00-2:45 pm

1:05 pm: Fundamental Aspects of Radiation Effects in Materials, S. J. Zinkle (*Univ. Tenn. & ORNL*), invited

1:30 pm: Current Status of Postirradiation Examination of the AFC Metallic Fuel, Jason M. Harp, Luca Capriotti, Fabiola Cappia, Steven L. Hayes (*INL*)

1:55 pm: Multi-Scale Analysis of Failed Safety-Tested UO₂ Particles from the AGR-2 Fuel Irradiation Experiment, Tyler J. Gerzack, John D. Hunn, Grant Helmreich, Fred Montgomery, Robert N. Morris (*ORNL*), Rachel L. Seibert (*Illinois Inst. Technol.*), John A. Dyer, Brian D. Eckhart, Darren J. Skitt (*ORNL*)

2:20 pm: Accident Tolerant Fuels (ATF-1) Irradiation Tests: Overview of the Ongoing Post-Irradiation Examinations, Jason M. Harp, Fabiola Cappia (*INL*)

Used Fuel and Life Management for LWRs

Session Organizer: Kevin G. Field (*ORNL*) **Chair:** Nick Brown (*Penn State*)

Location: Franklin 8 **Time:** 3:00-4:20 pm

3:05 pm: Studies on Used Nuclear Fuel Management and Extended Storage at JRC, V. V. Rondinella, T. A. G. Wiss, D. Papaioannou, R. Nasyrow, D. Wegen, S. Bremier (*European Commission*), F. Cappia (*INL*), E. Vlassopoulos (*EPFL*)

3:30 pm: Assessing the Effects of Irradiation on Reactor Cavity Concrete, Thomas M. Rosseeel, Alain B. Giorla, Maxim N. Gushev, Gerald E. Jellison, Jr., Yann Le Pape, Igor Remec, Chinthatka Silva, Elena Tajuelo Rodriguez, Stephanie M. Curlin, Luis F. Mora (*ORNL*)

3:55 pm: State of Electrical Cable Aging in U.S. Nuclear Power Plants, Leonard S. Fifield (*PNNL & Washington State*), invited

EMBEDDED TOPICAL: NFSM | WEDNESDAY, JUNE 20

TECHNICAL SESSIONS – 4:30 PM

Advanced Characterization of Nuclear Materials

Session Organizer: Kevin G. Field (*ORNL*) **Cochairs:** Michael Benson (*INL*), Kurt Terrani (*ORNL*)

Location: Franklin 8 **Time:** 4:30-6:15 pm

- 4:35 pm:** Advantages of SEM-EBSD In-Situ Mechanical Testing for Investigating Radiation Effects on Materials, M. N. Gussev, K. G. Field, K. J. Leonard (*ORNL*)
- 5:00 pm:** Mechanical Properties of Irradiated Miniature Nuclear Fuel Related Materials, Mehdi Balooch (*Univ. Calif., Berkeley & ORNL*), Kurt A. Terrani (*ORNL*), invited
- 5:25 pm:** High-Resolution Neutron Imaging: Investigating Anisotropic Hydride Structure in Zircaloy-4 Nuclear Fuel Cladding, Jun-Li Lin, Weicheng Zhong (*Univ. Illinois, Urbana-Champaign*), Hassina Z. Bilheux (*ORNL*), Brent J. Heuser (*Univ. Illinois, Urbana-Champaign*)
- 5:50 pm:** Modeling and Simulation of Redistribution of Oxygen-to-Metal Ratio in MOX, Shun Hirooka, Masato Kato, Masashi Watanabe (*JAEA*)
- ~~**6:15 pm:** Analysis Techniques for Large Datasets from the National Synchrotron Light Source-II, Lynne E. Ecker, David J. Sprouster (*BNL*), John Rodman (*Syracuse*), Shinjae Yoo (*BNL*) **CANCELED**~~

EMBEDDED TOPICAL: NFSM | THURSDAY, JUNE 21

TECHNICAL SESSIONS – 8:00 AM

NSUF Special Session—I

Session Organizer: Peter Hosemann (*Univ. Calif., Berkeley*) **Cochairs:** Rory Kennedy (*INL*), Peter Hosemann (*Univ of California, Berkeley*)

Location: Franklin 8 **Time:** 8:00-9:20 am

- 8:05 am:** Overview of the U.S. Nuclear Science User Facilities, J. Rory Kennedy (*INL*)
- 8:30 am:** In Situ Dual-Beam Ion Irradiation with Transmission Electron Microscopy, Meimei Li, Peter M. Baldo, Marquis A. Kirk, Edward A. Ryan, Jing Hu (*ANL*)
- 8:55 am:** Understanding Complex Environmental Effects in Nuclear Reactor Relevant Materials Through In-Situ Transmission Electron Microscopy Ion Irradiation, C. M. Barr (*SNL*), A. Aitkaliyeva (*Univ. Florida*), K. Hattar (*SNL*)

NSUF Special Session—II

Session Organizer: Peter Hosemann (*Univ. Calif., Berkeley*) **Cochairs:** Rory Kennedy (*INL*), Peter Hosemann (*Univ of California, Berkeley*)

Location: Franklin 8 **Time:** 9:35 am-12:10 pm

- 9:40 am:** The BR2 Reactor as NSUF Affiliate Infrastructure, Steven Van Dyck, Sven Van den Berghe (*SCK CEN*)
- 10:05 am:** In Situ TEM Clamped Beam Fracture in Fe-9Cr ODS, K. H. Yano, J. P. Wharry (*Purdue*)
- 10:30 am:** Wigner Energy in SiC and Implications to LWR Design, Lance L. Snead, Koroush Shirvan (*MIT*)
- 10:55 am:** Micro-Cantilever Testing of Environmental Barrier Coatings on CVD SiC, Joseph Kabel, Peter Hosemann (*Univ. Calif., Berkeley*), Takaaki Koyonagi, Yutai Katoh (*ORNL*)
- 11:20 am:** Assessing the Effects of Gamma Irradiation in Concrete, Elena Tajuelo Rodriguez (*ORNL*), William A. Hunnicutt (*Univ. Illinois, Urbana-Champaign*), Paramita Mondal (*Univ. Illinois, Urbana-Champaign & Univ. Delaware*), Yann Le Pape (*ORNL*), invited
- 11:45 am:** In-Situ Synchrotron X-Ray Scattering Study on the Tensile Properties of Neutron Irradiated Ferritic/Martensitic Alloys, Hoon Lee, Xiang Liu, Kuan-Che Lan, Huan Yan (*Univ. Illinois, Urbana-Champaign*), Meimei Li, Xuan Zhang, Chi Xu, Jun-Sang Park, Jonathan Almer (*ANL*), James F. Stubbins (*Univ. Illinois, Urbana-Champaign & Kyushu Univ.*)

Embedded
Topical:
Nuclear
Fuels &
Structural
Materials
for Next
Generation
Nuclear
Reactors

Committee Meetings

NATIONAL COMMITTEES

Accreditation, Polices & Procedures

SUNDAY, 11 AM - 12 PM | SALON K

ANS Annual Business Meeting

WEDNESDAY, 5:45 PM - 7 PM | MEETING ROOM 305/306

Board of Directors

Professional Division Reports

WEDNESDAY, 4 PM - 5:30 PM | SALON G

ANS Board of Directors

THURSDAY, 7:30 AM - 4:30 PM | SALON G

Bylaws & Rules

SUNDAY, 4 PM - 5:30 PM | MEETING ROOM 411/412

Communications

SUNDAY, 5 PM - 6 PM | SALON L

Finance Meeting

TUESDAY, 2 PM - 6 PM | MEETING ROOM 305/306

Honors & Awards

MONDAY, 4 PM - 6 PM | MEETING ROOM 304

International

SUNDAY, 11:30 AM - 1:30 PM | MEETING ROOM 305/306

Local Sections Committee Workshop

SUNDAY, 9:30 AM - 12 PM | MEETING ROOM 310

Membership

SUNDAY, 10:30 AM - 11:30 AM | SALON L

Membership, Communications, and Professional

Development Coordination Committees

SUNDAY, 4 PM - 5 PM | SALON L

National Program

NPC Screening

SUNDAY, 10 AM - 12 PM | MEETING ROOM 411/412

NPC National Meeting Subcommittee

WEDNESDAY, 11:30 AM - 1 PM | MEETING ROOM 302/303

NPC Program

WEDNESDAY, 4 PM - 6 PM | MEETING ROOM 302/303

NEED

SUNDAY, 7:30 PM - 9:30 PM | MEETING ROOM 309

President's Meeting w/Committee Chairs & Division Chairs

SUNDAY, 8 AM - 9:30 AM | SALON I/J

Professional Development Coordination

TUESDAY, 4 PM - 5 PM | 308

Professional Divisions

Training Workshop

SATURDAY, 5 PM - 6:30 PM | FRANKLIN 9

Committee Meeting

TUESDAY, 4 PM - 5:30 PM | MEETING ROOM 304

Professional Engineering Exam

PEEC Item Writers Group

SATURDAY, 5 PM - 10 PM | FRANKLIN 7

PEEC Committee

54 SUNDAY, 4 PM - 6 PM | MEETING ROOM 307

NATIONAL COMMITTEES

Professional Engineering Exam Continued

PEEC Education & Training

SATURDAY, 9 PM - 10 PM | FRANKLIN 6

Professional Women/Diversity in ANS

MONDAY, 4 PM - 6 PM | MEETING ROOM 305/306

Public Policy

WEDNESDAY, 12:30 PM - 2:30 PM | MEETING ROOM 305/306

Publications Steering

Meetings, Proceedings & Transactions

SUNDAY, 9 AM - 10 AM | MEETING ROOM 308

Book Publishing

SUNDAY, 11 AM - 12:30 PM | MEETING ROOM 410

Nuclear News Editorial Advisory

SUNDAY, 4 PM - 5:30 PM | MEETING ROOM 410

Technical Journals

SUNDAY, 1 PM - 4 PM | MEETING ROOM 410

Nuclear Technology Editorial Advisory

SUNDAY, 4:30 PM - 5:30 PM | MEETING ROOM 304

Publications Steering Committee

MONDAY, 4:30 PM - 6:30 PM | MEETING ROOM 308

FS&T Editorial Advisory Board Meeting

TUESDAY, 2 PM - 6 PM | MEETING ROOM 410

Scholarship Policy & Coordination

MONDAY, 12 PM - 1 PM | MEETING ROOM 304

Student Sections

Executive

MONDAY, 6 PM - 8 PM | FRANKLIN 7

SPECIAL COMMITTEES

Special Committee on the Congressional Fellow Program

TUESDAY, 3:30 PM - 4:30 PM | MEETING ROOM 307

OTHER COMMITTEES

Christian Nuclear Fellowship

MONDAY, 7 PM - 8:30 PM | MEETING ROOM 308

Christian Nuclear Fellowship Breakfast

WEDNESDAY, 7 AM - 8:30 AM | MEETING ROOM 307

Korea Nuclear Society

MONDAY, 4:30 PM - 6:30 PM | MEETING ROOM 408/409

NEDHO

SUNDAY, 4PM - 6 PM | FRANKLIN 6

Nuclear Pride LGBT Organization

TUESDAY, 12 PM - 1:30 PM | MEETING ROOM 407

NURETH

TUESDAY, 7 PM - 9 PM | MEETING ROOM 308

2019 PSA Meeting

MONDAY, 5 PM - 6 PM | MEETING ROOM 302/303

UWC Planning Committee

SUNDAY, 12 PM - 1 PM | MEETING ROOM 302/303

Committee Meetings

DIVISION COMMITTEES

Accelerator Applications

Executive

MONDAY, 11:30 AM - 1:30 PM | MEETING ROOM 305/306

Aerospace Nuclear Science & Technology

SUNDAY, 12 PM - 1 PM | MEETING ROOM 407

Biology & Medicine

Executive

SUNDAY, 4 PM - 5:30 PM | MEETING ROOM 309

Decommissioning and Environmental Sciences

Program

SUNDAY, 3:30 PM - 4:30 PM | MEETING ROOM 408/409

Executive

SUNDAY, 4:30 PM - 5:30 PM | MEETING ROOM 408/409

Education, Training & Workforce Development

Program

SUNDAY, 10:30 AM - 12 PM | FRANKLIN 5

University/Industry/Government Relations

SUNDAY, 1:30 PM - 2 PM | FRANKLIN 5

Executive

SUNDAY, 2 PM - 4 PM | FRANKLIN 5

Fuel Cycle & Waste Management

Program

SUNDAY, 12 PM - 1 PM | MEETING ROOM 408/409

Executive

SUNDAY, 1 PM - 2:30 PM | MEETING ROOM 408/409

Fusion Energy

Executive

TUESDAY, 6 PM - 8 PM | MEETING ROOM 307

Human Factors, Instrumentation, and Controls

Program

SUNDAY, 11 AM - 12 PM | FRANKLIN 6

Executive

SUNDAY, 12 PM - 2:30 PM | FRANKLIN 6

Isotopes and Radiation

Joint Program Committee-I&R/BM

SUNDAY, 1:30 PM - 2:30 PM | MEETING ROOM 308

Executive

SUNDAY, 2:30 PM - 4:30 PM | MEETING ROOM 308

Materials Science & Technology

Executive

MONDAY, 6 PM - 8 PM | MEETING ROOM 305/306

Mathematics & Computation

Program

SUNDAY, 1 PM - 2 PM | MEETING ROOM 310

Executive

SUNDAY, 2 PM - 4 PM | MEETING ROOM 310

DIVISION COMMITTEES

Nuclear Criticality Safety

Education Meeting

SUNDAY, 1 PM - 2 PM | FRANKLIN 9/10

Program

SUNDAY, 2 PM - 3 PM | FRANKLIN 9/10

Executive

SUNDAY, 3 PM - 4:30 PM | FRANKLIN 9/10

Nuclear Installations Safety

Program

SUNDAY, 4 PM - 6 PM | FRANKLIN 5

Executive

MONDAY, 6 PM - 8 PM | MEETING ROOM 302/303

Nuclear Nonproliferation Policy

Program

SUNDAY, 2:30 PM - 3:30 PM | SALON K

Executive

SUNDAY, 3:30 PM - 4:30 PM | SALON K

Operations & Power

Program

SUNDAY, 1:30 PM - 3 PM | MEETING ROOM 302/303

Executive

SUNDAY, 3:30 PM - 6 PM | MEETING ROOM 302/303

Radiation Protection & Shielding

Program

SUNDAY, 1 PM - 2 PM | MEETING ROOM 411/412

Executive

SUNDAY, 2 PM - 4 PM | MEETING ROOM 411/412

Reactor Physics

Strategic Planning

SUNDAY, 10 AM - 12 PM | FRANKLIN 8

Program

SUNDAY, 2 PM - 4 PM | FRANKLIN 8

Executive

SUNDAY, 4 PM - 6 PM | FRANKLIN 8

Robotics & Remote Systems

Executive

SUNDAY, 12 PM - 4 PM | MEETING ROOM 304

Thermal Hydraulics

Program

SUNDAY, 2:30 PM - 4:30 PM | MEETING ROOM 305/306

Executive

SUNDAY, 4:30 PM - 6 PM | MEETING ROOM 305/306

Young Members Group (TG)

Program

MONDAY, 10 AM - 11 AM | MEETING ROOM 302/303

Executive

MONDAY, 12:30 PM - 1:30 PM | MEETING ROOM 302/303

Committee Meetings

STANDARDS COMMITTEES

ANS-3.15 Cybersecurity Standard

SUNDAY, 2 PM - 5 PM | MEETING ROOM 407

ANS-8 Fissionable Materials Outside Reactors Subcommittee

SUNDAY, 12 PM - 2 PM | MEETING ROOM 309

ANS-8.1 Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors

MONDAY, 3 PM - 5 PM | MEETING ROOM 302/303

ANS-8.7 Nuclear Criticality Safety in the Storage of Fissile Materials

TUESDAY, 7 AM - 9 AM | MEETING ROOM 407

ANS-8.12 Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors

WEDNESDAY, 4 PM - 6 PM | MEETING ROOM 308

ANS-8.20 Nuclear Criticality Safety Training

SUNDAY, 10 AM - 12 PM | MEETING ROOM 407

ANS-8.23 Nuclear Criticality Accident Emergency Planning and Response

SUNDAY, 8 AM - 12 PM | MEETING ROOM 309

ANS-8.26 Criticality Safety Engineer Training and Qualification Program

MONDAY, 8 AM - 9 AM | MEETING ROOM 308

ANS-8.28 Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety

TUESDAY, 3 PM - 5 PM | MEETING ROOM 407

ANS-10.4 Verification and Validation of Non-Safety-Related Scientific and Engineering Computer Programs for the Nuclear Industry

MONDAY, 4 PM - 6 PM | MEETING ROOM 307

ANS-19 Reactor Physics Subcommittee

MONDAY, 9 AM - 10:30 AM | MEETING ROOM 307

ANS-19.1 Nuclear Data Sets for Reactor Design Calculations

MONDAY, 11:30 AM - 12:30 PM | MEETING ROOM 307

ANS-19.3 Steady-State Neutronics Methods for Power Reactor Analysis

MONDAY, 8 AM - 9 AM | MEETING ROOM 307

ANS-19.10 Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals

MONDAY, 10:30 AM - 11:30 AM | MEETING ROOM 307

ANS-57.2/57.3 Design Requirements for LWR New and Spent Fuel Storage Facilities

TUESDAY, 8 AM - 12 PM | MEETING ROOM 308

Fuel, Waste, and Decommissioning Consensus Committee (FWDCC)

MONDAY, 10 AM - 12 PM | MEETING ROOM 410

Risk-informed, Performance-based Principles and Policy Committee (RP3C)

MONDAY, 2:30 PM - 6 PM | MEETING ROOM 410

Standards Board

TUESDAY, 8:30 AM - 5 PM | MEETING ROOM 302/303

Committee/Division/Other Meetings Daily

Saturday, June 16

5:00 pm - 10:00 pm	Professional Engineering Exam Committee-Item Writers Group	Franklin 7
5:00 pm - 6:30 pm	Professional Divisions Committee-Training Workshop	Franklin 9
9:00 pm - 10:00 pm	Professional Engineering Exam Committee Education & Training Subcommittee	Franklin 6

Sunday, June 17

8:00 am - 9:30 am	President's Meeting with Committee & Division Chairs	Grand Salon I/J
8:00 am - 12:00 pm	ANS-8.23 Nuclear Criticality Accident Emergency Planning and Response	Meeting Room 309
9:00 am - 10:00 am	Publications Steering-Meetings, Proceedings & Transactions Committee	Meeting Room 308
9:30 am - 12:00 pm	Local Sections Committee Workshop	Meeting Room 310
10:00 am - 12:00 pm	Reactor Physics Division-Strategic Planning Committee	Franklin 8
10:00 am - 12:00 pm	ANS-8.20 Nuclear Criticality Safety Training	Meeting Room 407
10:00 am - 12:00 pm	National Program Committee-NPC Screening	Meeting Room 411/412
10:30 am - 11:30 am	Membership Committee	Grand Salon L
10:30 am - 12:00 pm	Education, Training & Workforce Development Division-Program Committee	Franklin 5
11:00 am - 12:00 pm	Accreditation, Policies & Procedures Committee	Grand Salon K
11:00 am - 12:30 pm	Publications Steering Committee-Book Publishing	Meeting Room 410
11:00 am - 12:00 pm	Human Factors, Instrumentation & Controls Division-Program Committee	Franklin 6
11:30 am - 1:30 pm	International Committee	Meeting Room 305/306
12:00 pm - 1:00 pm	Fuel Cycle & Waste Management Division-Program Committee	Meeting Room 408/409
12:00 pm - 1:00 pm	UWC Planning Committee	Meeting Room 302/303
12:00 pm - 1:00 pm	Aerospace Nuclear Science & Technology Division	Meeting Room 407
12:00 pm - 2:00 pm	ANS-8 Fissionable Materials Outside Reactors Subcommittee	Meeting Room 309
12:00 pm - 2:30 pm	Human Factors, Instrumentation & Controls Division-Executive Committee	Franklin 6
12:00 pm - 4:00 pm	Robotics & Remote Systems Division-Executive Committee	Meeting Room 304
1:00 pm - 2:00 pm	Education, Training & Workforce Development Division-Alpha Nu Sigma National Honor Society	Meeting Room 307
1:00 pm - 2:00 pm	Mathematics & Computation Division-Program Committee	Meeting Room 310
1:00 pm - 2:00 pm	Nuclear Criticality Safety Division-Education Meeting	Franklin 9/10
1:00 pm - 2:00 pm	Radiation Protection & Shielding Division-Program Committee	Meeting Room 411/412
1:00 pm - 2:30 pm	Fuel Cycle & Waste Management Division-Executive Committee	Meeting Room 408/409
1:00 pm - 4:00 pm	Publications Steering Committee-Technical Journals	Meeting Room 410
1:30 pm - 2:30 pm	Isotopes & Radiation Division-Joint Program Committee-I&R/BM	Meeting Room 308
1:30 pm - 2:00 pm	Education, Training & Workforce Development Division-University/Industry/ Government Relations Committee	Franklin 5
1:30 pm - 3:00 pm	Operations & Power Division-Program Committee	Meeting Room 302/303
2:00 pm - 3:00 pm	Nuclear Criticality Safety Division-Program Committee	Franklin 9/10
2:00 pm - 4:00 pm	Education Training & Workforce Development Division-Executive Committee	Franklin 5
2:00 pm - 4:00 pm	Mathematics & Computation Division-Executive Committee	Meeting Room 310
2:00 pm - 4:00 pm	Radiation Protection & Shielding Division-Executive Committee	Meeting Room 411/412
2:00 pm - 4:00 pm	Reactor Physics-Program Committee	Franklin 8
2:00 pm - 5:00 pm	ANS-3.15 Cybersecurity Standard	Meeting Room 407
2:30 pm - 3:30 pm	Nuclear Nonproliferation Policy Division-Program Committee	Grand Salon K
2:30 pm - 4:30 pm	Thermal Hydraulics Division-Program Committee	Meeting Room 305/306
2:30 pm - 4:30 pm	Isotopes & Radiation Division-Executive Committee	Meeting Room 308
3:00 pm - 4:30 pm	Nuclear Criticality Safety Division-Executive Committee	Franklin 9/10
3:30 pm - 4:30 pm	Decommissioning and Environmental Sciences Division-Program Committee	Meeting Room 408/409
3:30 pm - 4:30 pm	Nuclear Nonproliferation Policy Division-Executive Committee	Grand Salon K
3:30 pm - 6:00 pm	Operations & Power Division-Executive Committee	Meeting Room 302/303
4:00 pm - 5:00 pm	Membership, Communications, and Professional Development Coordination Committees	Grand Salon L
4:00 pm - 5:30 pm	Biology & Medicine Division-Executive Committee	Meeting Room 309
4:00 pm - 5:30 pm	Bylaws & Rules Committee	Meeting Room 411/412
4:00 pm - 6:00 pm	NEDHO	Franklin 6
4:00 pm - 6:00 pm	Nuclear Installations Safety Division- Program Committee	Franklin 5
4:00 pm - 5:30 pm	Publications Steering Committee-Nuclear News Editorial Advisory	Meeting Room 410
4:00 pm - 6:00 pm	Professional Engineering Exam Committee-Committee Meeting	Meeting Room 307
4:00 pm - 6:00 pm	Reactor Physics Division-Executive Committee	Franklin 8
4:30 pm - 5:30 pm	Decommissioning and Environmental Sciences Division-Executive Committee	Meeting Room 408/409
4:30 pm - 5:30 pm	Publications Steering-Nuclear Technology Editorial Advisory Committee	Meeting Room 304

Committee/Division/Other Meetings Daily

Sunday, June 17 Continued

4:30 pm - 6:00 pm	Thermal Hydraulics Division-Executive Committee	Meeting Room 305/306
5:00 pm - 6:00 pm	Communications Committee	Grand Salon L
7:30 pm - 9:30 pm	NEED Committee	Meeting Room 309

Monday, June 18

8:00 am - 9:00 am	ANS-8.26 Criticality Safety Engineer Training and Qualification Program	Meeting Room 308
8:00 am - 9:00 am	ANS-19.3 Steady-State Neutronics Method, for Power Reactor Analysis	Meeting Room 307
9:00 am - 10:30 am	ANS-19 Reactor Physics Subcommittee	Meeting Room 307
10:00 am - 12:00 pm	Fuel, Waste, and Decommissioning Consensus Committee (FWGCC)	Meeting Room 410
10:00 am - 11:00 am	Young Member Group-Program	Meeting Room 302/303
10:30 am - 11:30 am	ANS-19.10 Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals	Meeting Room 307
11:30 am - 12:30 pm	ANS-19.1 Nuclear Data Sets for Reactor Design Calculations	Meeting Room 307
11:30 am - 1:30 pm	Accelerator Applications Division-Executive Committee	Meeting Room 305/306
12:00 pm - 1:00 pm	Scholarship Policy & Coordination Committee	Meeting Room 304
12:30 pm - 1:30 pm	Young Member Group-Executive	Meeting Room 302/303
2:30 pm - 6:00 pm	Risk-informed, Performance-based Principles and Policy Committee (RP3C)	Meeting Room 410
3:00 pm - 5:00 pm	ANS-8.1 Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors	Meeting Room 302/303
4:00 pm - 6:00 pm	ANS-10.4 Verification and Validation of Non-Safety-Related Scientific and Engineering Computer Programs for the Nuclear Industry	Meeting Room 307
4:00 pm - 6:00 pm	Honors & Awards Committee	Meeting Room 304
4:00 pm - 6:00 pm	Professional Women/Diversity in ANS	Meeting Room 305/306
4:30 pm - 6:30 pm	Korea Nuclear Society	Meeting Room 408/409
4:30 pm - 6:30 pm	Publications Steering Committee	Meeting Room 308
5:00 pm - 6:00 pm	2019 PSA meeting	Meeting Room 302/303
6:00 pm - 8:00 pm	Nuclear Installations Safety Division-Executive Committee	Meeting Room 302/303
6:00 pm - 8:00 pm	Materials Science & Technology Division-Executive Committee	Meeting Room 305/306
6:00 pm - 8:00 pm	Student Sections Committee- Executive Committee	Franklin 7
7:00 pm - 8:30 pm	Christian Nuclear Fellowship	Meeting Room 308

Tuesday, June 19

7:00 am - 9:00 am	ANS-8.7 Nuclear Criticality Safety in the Storage of Fissile Materials	Meeting Room 407
8:00 am - 12:00 pm	ANS-57.2/57.3 Design Requirements for LWR New and Spent Fuel Storage Facilities	Meeting Room 308
8:30 am - 5:00 pm	Standards Board	Meeting Room 302/303
12:00 pm - 1:30 pm	Nuclear Pride LGBT Organization	Meeting Room 407
2:00 pm - 6:00 pm	Finance Committee	Meeting Room 305/306
2:00 pm - 6:00 pm	FS&T Editorial Advisory Board Meeting	Meeting Room 410
3:00 pm - 5:00 pm	ANS-8.28 Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety	Meeting Room 407
3:30 pm - 4:30 pm	Special Committee on the Congressional Fellow Program	Meeting Room 307
4:00 pm - 5:00 pm	Professional Development Coordination Committee	Meeting Room 308
4:00 pm - 5:30 pm	Professional Divisions Committee-Committee Meeting	Meeting Room 304
6:00 pm - 8:00 pm	Fusion Energy Division-Executive Committee	Meeting Room 307
7:00 pm - 9:00 pm	NURETH	Meeting Room 308

Wednesday, June 20

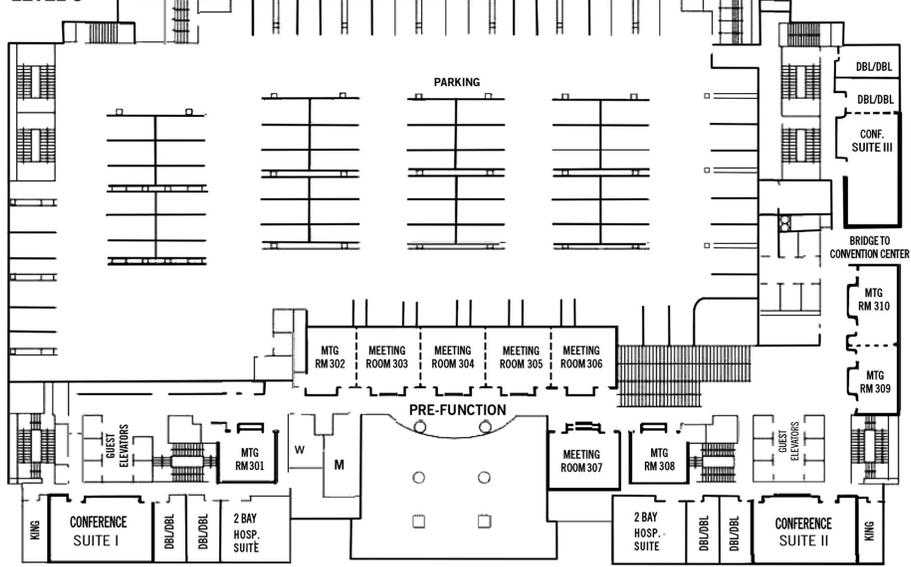
7:00 am - 8:30 am	Christian Nuclear Fellowship Breakfast	Meeting Room 307
11:30 am - 1:00 pm	National Program Committee-NPC National Meeting Subcommittee	Meeting Room 302/303
12:30 pm - 2:30 pm	Public Policy Committee	Meeting Room 305/306
4:00 pm - 6:00 pm	ANS 8.12 Nuclear Criticality Control and Safety of Plutonium- Uranium Fuel Mixtures Outside Reactors	Meeting Room 308
4:00 pm - 5:30 pm	Board of Directors-Professional Division Reports	Grand Salon G
4:00 pm - 6:00 pm	National Program Committee - NPC Program	Meeting Room 302/303
5:45 pm - 7:00 pm	ANS Annual Business Meeting	Meeting Room 305/306

Thursday, June 21

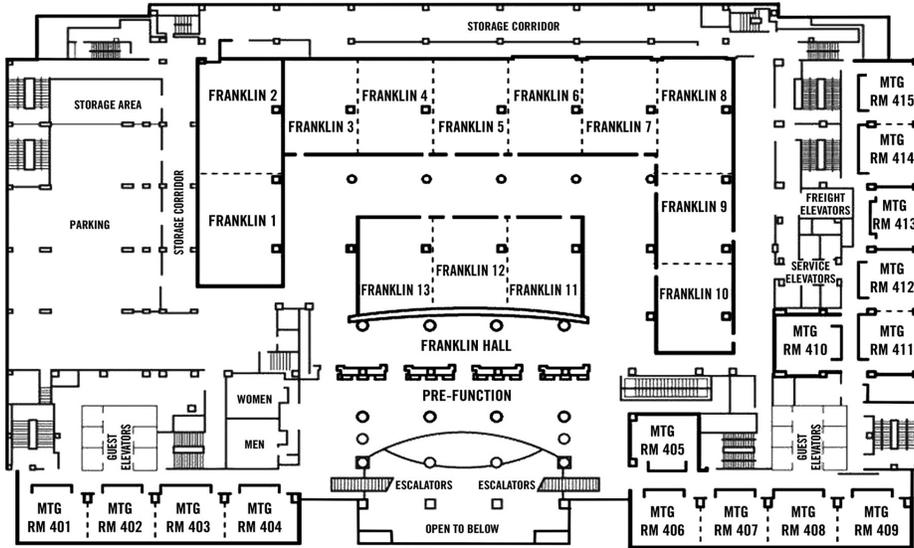
7:30 am - 4:30 pm	ANS Board of Directors Meeting	Grand Salon G
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Hotel Floorplans

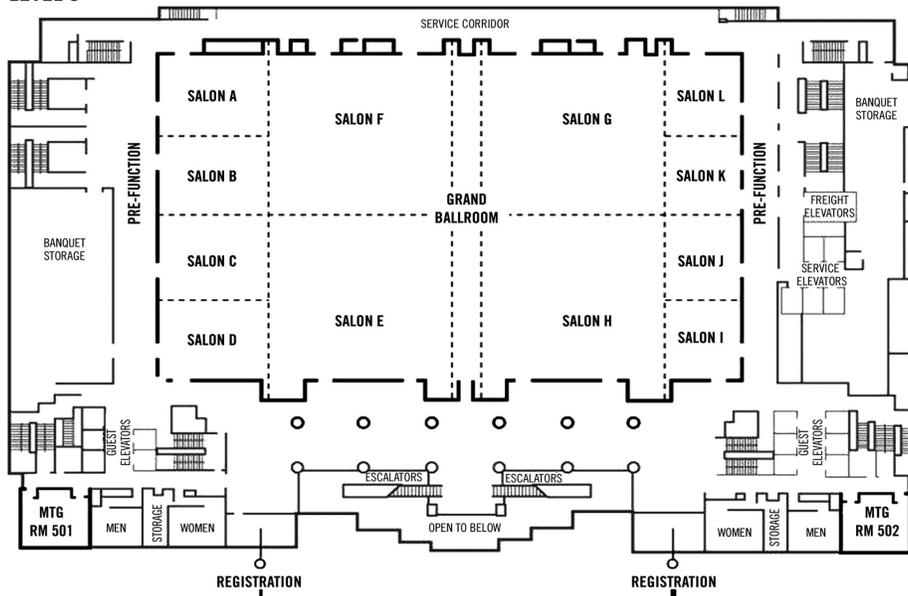
LEVEL 3



LEVEL 4



LEVEL 5





ANS Organization Membership

The American Nuclear Society salutes our Organization Members as sharing in our mission to promote nuclear science and technology to benefit humanity.*

AEGIS dba Electro Static Technology, An ITW Company	Energy Steel	OTEK Corporation
AGT Global Logistics	Engineered Solutions, Inc.	Pacific Gas and Electric Company
Alphasource Inc.	EXCEL Services Corporation	Phoenix
Ameren Missouri-Callaway Energy Center	Exelon Generation Company	Power System Sentinel Technologies, LLC
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APTIM	Framatome	Reef Industries, Inc.
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Devbridge Group	Nebraska Public Power District	Thoreact, LLC
Dominion Generation	NGNP Industry Alliance	TradeTech
Duke Energy Corporation	Nuclear Electric Insurance Limited	Tri Tool, Inc.
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Electrical Builders, Inc. (EBI)	Nuclear-21.Net	ValvTechnologies
Energy Future Holdings (Luminant)	NuScale Power	Varex Imaging
Energy Northwest	Nutherm International, Inc.	Virginia Commonwealth University
	Ontario Power Generation	Western Services Corporation

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*Post-print roster updates at ans.org/orgmembers/memberlist.



ANS Meetings

UTILITY WORKING CONFERENCE AND VENDOR TECHNOLOGY EXPO

AUG 5-8, 2018 | Amelia Island, FL | Omni Amelia Island Plantation

20TH TOPICAL MEETING OF THE RADIATION PROTECTION AND SHIELDING DIVISION OF THE AMERICAN NUCLEAR SOCIETY

AUG 26-31, 2018 | Santa Fe, NM | Drury Plaza Hotel

PLUTONIUM FUTURES—THE SCIENCE 2018

SEP 9-14, 2018 | San Diego, CA | Wyndham San Diego Bayside

ADVANCES IN NUCLEAR NONPROLIFERATION TECHNOLOGY AND POLICY CONFERENCE 2018

SEP 23-27, 2018 | Wilmington, NC | Hilton Wilmington Riverside

APPLICABILITY OF RADIATION-RESPONSE MODELS TO LOW DOSE PROTECTION STANDARDS

SEP 30-OCT 3, 2018 | Pasco, WA | Red Lion Hotel Pasco

2018 PACIFIC BASIN NUCLEAR CONFERENCE (PBNAC 2018)

SEP 30-OCT 5, 2018 | San Francisco, CA | Hyatt Regency

2018 ANS WINTER MEETING AND NUCLEAR TECHNOLOGY EXPO

NOV 11-15, 2018 | Orlando, FL | Hilton Orlando Bonnet Creek

EMBEDDED TOPICAL: 23RD TOPICAL MEETING ON THE TECHNOLOGY OF FUSION ENERGY (TOFE)

EMBEDDED TOPICAL: INTERNATIONAL TOPICAL MEETING ON ADVANCES IN THERMAL HYDRAULICS

CONTE 2019: CONFERENCE ON NUCLEAR TRAINING AND EDUCATION: A BIENNIAL INTERNATIONAL FORUM

FEB 5-7, 2019 | St. Augustine, FL | World Golf Village Renaissance St. Augustine Resort

11TH NUCLEAR PLANT INSTRUMENTATION, CONTROL AND HUMAN-MACHINE INTERFACE TECHNOLOGIES (NPIC&HMIT) 2019

FEB 9-14, 2019 | Orlando, FL | Renaissance Orlando at Sea World

NUCLEAR AND EMERGING TECHNOLOGIES FOR SPACE (NETS) 2019

FEB 25-27, 2019 | Richland, WA

2019 STUDENT CONFERENCE

APR 4-6, 2019 | Virginia Commonwealth University

INTERNATIONAL HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT 2019 (IHLRWM 2019)

APR 14-18, 2019 | Knoxville, TN | Knoxville Convention Center

2019 ANS ANNUAL MEETING

JUN 9-13, 2019 | Minneapolis, MN | Hyatt Regency Minneapolis



See you at future



ANS Annual Meetings



2019 ANNUAL MEETING: JUNE 9-13
Hyatt Regency Minneapolis, Minneapolis, MN

2020 ANNUAL MEETING: JUNE 7-11
Arizona Grand Resort & Spa, Phoenix, AZ

2021 ANNUAL MEETING: JUNE 13-17
Omni / Convention Center, Providence, RI

