



# ANS Winter Meeting & Expo

## 2016

## Official Program

### Nuclear Science + Technology

Imperatives for a Sustainable World



November 6-10, 2016

Caesars Palace

Las Vegas, NV



# ANS

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**Nuclear Science & Technology: Imperatives for a Sustainable World**

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# Meeting Officials

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Nuclear Science + Technology  
Imperatives for a Sustainable World  
2016 ANS Winter Meeting & Expo



**GENERAL CHAIR**  
Dr. Raymond J. Juzaitis  
*Retired, National Security Technologies, LLC*



**ASSISTANT GENERAL CHAIR**  
Steven Curtis  
*Readiness Resource Group*



**TECHNICAL PROGRAM CHAIR**  
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*National Security Technologies, LLC*



**ASSISTANT TECHNICAL PROGRAM CHAIR**  
Dr. Elia Merzari  
*Argonne National Laboratory*



**ASSISTANT TECHNICAL PROGRAM CHAIR**  
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*Idaho National Laboratory*



**STUDENT CO-CHAIR**  
Jessica Hartman  
*University of Nevada Las Vegas*



**STUDENT CO-CHAIR**  
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**MEDIA CHAIR**  
Robert E. Frank  
*USAF*



**TECHNICAL TOUR CHAIR**  
Dennis Kelly  
*University of Nevada Las Vegas*



**SPOUSE PROGRAM CHAIR**  
Ron Fraass  
*Retired, EPA*

# Daily Schedule

## Saturday, November 5

7:30 am-5:00 pm	Detecting Radiation in Our Radioactive World Workshop for Science Teachers	Octavius 2 & 3
11:00 am-4:00 pm	Workshop: High Temperature Reactor Technology (HTR 2016)	Octavius 1
2:00-5:00 pm	Registration	Office 4/Milano Foyer

## Sunday, November 6

7:00 am-7:00 pm	Registration	Office 4/Milano Foyer
1:00-1:30 pm	First-Time Attendee Orientation	Octavius 4
4:00-5:00 pm	Student Program Q&A Meeting	Octavius 12 & 13
5:00-6:00 pm	Mentoring Program	Octavius 17 & 18
6:00-8:00 pm	ANS President's Reception in Technology Expo	Expo Hall

## Monday, November 7

7:00 am-5:00 pm	Registration	Office 4/Milano Foyer
7:00-8:00 am	Morning Coffee Service	Octavius Foyer
8:00-11:30 am	Opening Plenary Session: <i>Building Sustainability in the Nuclear Enterprise</i> <i>Sponsored by:</i> 	Milano Ballroom
10:00 am-5:00 pm	ANS Nuclear Technology Expo	Expo Hall
11:30 am-1:00 pm	Lunch in Technology Expo	Expo Hall
1:00-4:00 pm	Embedded Topical HTR 2016 Opening Plenary	Neopolitan 1
1:00-4:00 pm	ANS Technical Sessions	
1:00-2:40 pm	• Advanced Gen IV Reactors	Octavius 1
1:00-3:00 pm	• Student Design Competition	Octavius 2 & 3
1:00-4:00 pm	• Overview and Purpose of the 52 Reactors that were Built at INL–Panel	Octavius 6
1:00-4:00 pm	• Current Issues in Computational Methods–Roundtable	Octavius 7 & 8
1:00-3:30 pm	• Nuclear Safety R&D at the Department of Energy–I	Octavius 9
1:00-4:00 pm	• Nuclear Science User Facility: University Capabilities–Panel	Octavius 10
1:00-3:55 pm	• Reactor Physics: General–I	Octavius 12
1:00-4:20 pm	• Reactor Analysis Methods–I	Octavius 13
1:00-4:20 pm	• Computational Thermal Hydraulics	Octavius 14
1:00-3:30 pm	• In Memory of Salomon Levy on his Technical Contributions to the Advancements of Thermal-Hydraulics–Panel	Octavius 15 & 16
1:00-4:00 pm	• Roles of Regulatory Organizations–Panel	Neopolitan 2
1:00-4:00 pm	• Yucca Mountain–Is There a Pulse?–Panel	Neopolitan 3
1:00-4:00 pm	• Used Fuel: Once Through or Recycle–Who is Right?–Panel	Neopolitan 4
3:35-4:35 pm	• Technical Achievement Award Lecture	Octavius 15 & 16

# Daily Schedule

## Monday, November 7 *continued*

4:00-4:30 pm	PM Break in Technology Expo	Expo Hall
4:30-6:30 pm	ANS President's Special Session	Milano Ballroom
7:30-9:30 pm	Operations & Power Division Dinner	Carmines/Forum Shops

## Tuesday, November 8

7:00 am-5:00 pm	Registration	Office 4/Milano Foyer
7:00-8:00 am	Morning Coffee Service	Octavius Foyer
8:00-11:30 am	ANS Technical Sessions	
8:00-9:40 am	<ul style="list-style-type: none"> <li>• Intersection of Policy Development and Technical Innovation for Nuclear Nonproliferation and Security</li> </ul>	Octavius 1
8:00-11:30 am	<ul style="list-style-type: none"> <li>• Building a Nuclear Energy and Science Education Program: Successes and Challenges of Developing a Vision for Nuclear Energy Education—Panel</li> </ul>	Octavius 2 & 3
8:00-9:15 am	<ul style="list-style-type: none"> <li>• Novel Detection Methods</li> </ul>	Octavius 6
8:00-11:20 am	<ul style="list-style-type: none"> <li>• Deterministic Transport Methods</li> </ul>	Octavius 7 & 8
8:00-10:05 am	<ul style="list-style-type: none"> <li>• Nuclear Safety R&amp;D at the Department of Energy—II</li> </ul>	Octavius 9
8:00-10:05 am	<ul style="list-style-type: none"> <li>• Advanced Manufacturing, Joining and Measurement Techniques</li> </ul>	Octavius 10
8:00-11:20 am	<ul style="list-style-type: none"> <li>• Reactor Physics: General—II</li> </ul>	Octavius 12
8:00-10:30 am	<ul style="list-style-type: none"> <li>• Reactor Analysis Methods—II</li> </ul>	Octavius 13
8:00-10:55 am	<ul style="list-style-type: none"> <li>• Toward a Longer-Life Core: Thermal-Hydraulic Simulations and Experiments of Deformed Fuels Assemblies</li> </ul>	Octavius 14
8:00-11:30 am	<ul style="list-style-type: none"> <li>• Challenges in Computational Tools for Reactor Thermal Hydraulics—Panel</li> </ul>	Octavius 15 & 16
8:00-10:05 am	<ul style="list-style-type: none"> <li>• Human Factors, Instrumentation and Controls: Instrumentation</li> </ul>	Neopolitan 2
8:00-11:30 am	<ul style="list-style-type: none"> <li>• International Activities on Used Nuclear Fuel Reprocessing Regulatory Framework—Panel</li> </ul>	Neopolitan 3
8:00-9:40 am	<ul style="list-style-type: none"> <li>• Used Nuclear Fuel Dry Storage Canister Inspection—I</li> </ul>	Neopolitan 4
8:00-9:45 am	<ul style="list-style-type: none"> <li>• Your Role in ANS National Committees—Panel</li> </ul>	Messina
8:00-9:40 am	Embedded Topical HTR 2016 Technical Sessions	
8:00-9:45 am	<ul style="list-style-type: none"> <li>• Fuel Design and Fabrication</li> </ul>	Neopolitan 1
8:00-9:40 am	<ul style="list-style-type: none"> <li>• Materials—I</li> </ul>	Octavius 17
8:00-9:15 am	<ul style="list-style-type: none"> <li>• Fluid Dynamics Methods and Codes—I</li> </ul>	Octavius 18
8:00-9:15 am	<ul style="list-style-type: none"> <li>• Nuclear Data and Uncertainty</li> </ul>	Octavius 19
8:00-9:15 am	<ul style="list-style-type: none"> <li>• National Research Programs and Industrial Projects—I</li> </ul>	Octavius 21
8:55-9:45 am	<ul style="list-style-type: none"> <li>• Safety and Licensing—I</li> </ul>	Neopolitan 1
8:55-9:45 am	ANS Technical Sessions	
9:20-10:10 am	<ul style="list-style-type: none"> <li>• Accelerator Applications: General</li> </ul>	Octavius 6
9:45-11:00 am	<ul style="list-style-type: none"> <li>• Chemistry R&amp;D in Radioactive Waste Management</li> </ul>	Neopolitan 4
9:50-11:05 am	ANS Congressional Fellowship—Panel	Messina

# Daily Schedule

## Tuesday, November 8 *continued*

9:50-11:30 am	Embedded Topical HTR 2016 Technical Sessions <ul style="list-style-type: none"> <li>• Materials—II</li> <li>• Fluid Dynamics Methods and Codes—II</li> <li>• Pebble Dynamics</li> <li>• National Research Programs and Industrial Projects—II</li> </ul>	Octavius 17	
9:50-11:30 am		Octavius 18	
9:50-11:05 am		Octavius 19	
9:50-11:05 am		Octavius 21	
9:50-11:05 am			
10:00 am-5:00 pm	ANS Nuclear Technology Expo	Expo Hall	
10:00 am-12:00 pm	Fukushima Session	Milano 1	
10:10-11:00 am	ANS Technical Sessions <ul style="list-style-type: none"> <li>• Education, Training and Workforce Development</li> <li>• Nuclear Fuels and Materials: Modeling</li> </ul>	Octavius 9	
10:10-11:50 am		Octavius 10	
11:00 am-1:00 pm	Student Poster Session in Technology Expo	Expo Hall	
11:30-1:00 pm	Lunch in Technology Expo	Expo Hall	
1:00-4:00 pm	ANS Technical Sessions <ul style="list-style-type: none"> <li>• Computational Tools for Radiation Protection and Shielding</li> <li>• Operations and Power: General—I</li> <li>• U.S. Reactor Fleet Viability in a Challenging Financial Market</li> <li>• The Nuclear Energy Advanced Modeling and Simulation Program-Panel</li> <li>• Current Topics in Probabilistic Risk Analysis—I</li> <li>• Focus on Communications: Talking About Nuclear Waste—What Works and What Doesn't—I—Panel</li> <li>• Reactor Physics: General—III</li> <li>• Data, Analysis and Operations in Nuclear Criticality Safety—I</li> <li>• Two-Phase Flows—I</li> <li>• General Thermal Hydraulics—I</li> <li>• Severe Accident Modeling and Experiments for Advanced Reactor Safety</li> <li>• Progress in DOE's Fuel Cycle Technologies Program-Panel</li> <li>• Used Nuclear Fuel Dry Storage Canister Inspection—II</li> <li>• Updates from Ongoing Nuclear Decommissioning Projects in U.S. and Canada: An Executive Leadership—Panel</li> </ul>	Octavius 1	
1:00-3:55 pm		Octavius 2 & 3	
1:00-3:05 pm		Octavius 6	
1:00-4:00 pm		Octavius 7 & 8	
1:00-4:00 pm		Octavius 9	
1:00-3:55 pm		Octavius 10	
1:00-2:30 pm		Octavius 12	
1:00-3:05 pm		Octavius 13	
1:00-3:55 pm		Octavius 14	
1:00-3:55 pm		Octavius 15 & 16	
1:00-3:30 pm		Neopolitan 2	
1:00-4:00 pm		Neopolitan 3	
1:00-2:40 pm		Neopolitan 4	
1:00-4:00 pm		Milano 1	
1:00-2:40 pm		Embedded Topical HTR 2016 Technical Sessions <ul style="list-style-type: none"> <li>• Fuel Irradiation</li> <li>• Materials—III</li> <li>• Heat Transfer Methods and Codes</li> <li>• Safety and Licensing—II</li> </ul>	Neopolitan 1
			Octavius 17
			Octavius 18
			Octavius 19
2:00-4:00 pm		ANS Technical Sessions <ul style="list-style-type: none"> <li>• Potent Policies: Understanding ANS Position Papers—Panel</li> </ul>	Messina

# Daily Schedule

## Tuesday, November 8 *continued*

2:35-4:05 pm	<p>ANS Technical Sessions</p> <ul style="list-style-type: none"> <li>• Focus on Communications: A Picture is Worth a Thousand Words—And People Pay Attention to Them—II-Panel</li> </ul>	Octavius 10
2:50-4:30 pm	<p>Embedded Topical HTR 2016 Technical Sessions</p> <ul style="list-style-type: none"> <li>• Fuel Postirradiation Examination</li> <li>• Materials—IV</li> <li>• Safety and Licensing—III</li> </ul>	Neopolitan 1 Octavius 17 Octavius 19
2:50-4:05 pm	<ul style="list-style-type: none"> <li>• Hydrogen Production—I</li> </ul> <p>ANS Technical Session</p> <ul style="list-style-type: none"> <li>• Reactor Analysis Methods—III</li> </ul>	Octavius 21 Octavius 12
3:10-4:50 pm	<p>PM Break in Technology Expo &amp; Exhibitor Raffle</p> <p><i>Sponsored by:</i>  <b>USA</b> UTILITIES SERVICE ALLIANCE "SIMPLE, COST-EFFECTIVE EXCELLENCE"</p>	Expo Hall
4:30-6:30 pm	General Chair's Special Session	Milano 3,4,7,8
7:30-9:30 pm	National Atomic Testing Museum Dinner (offsite event)	Offsite

## Wednesday, November 9

7:00 am-5:00 pm	Registration	Office 4/Milano Foyer
7:00-8:00 am	Morning Coffee Service	Octavius Foyer
7:15-7:45 am	Special Session on Change in ANS Incorporation	Octavius 5
8:00-11:30 am	ANS Technical Sessions	
8:00-9:45 am	<ul style="list-style-type: none"> <li>• Advanced Reactors—Panel</li> </ul>	Octavius 1
8:00-9:45 am	<ul style="list-style-type: none"> <li>• Nuclear Politics: Advocacy—Panel</li> </ul>	Octavius 2 & 3
8:00-11:30 am	<ul style="list-style-type: none"> <li>• Emerging Issues in Supply Chain—Panel</li> </ul>	Octavius 6
8:00-10:30 am	<ul style="list-style-type: none"> <li>• Current Topics in Probabilistic Risk Analysis—II</li> </ul>	Octavius 9
8:00-11:20 am	<ul style="list-style-type: none"> <li>• Data, Analysis and Operations in Nuclear Criticality Safety—II</li> </ul>	Octavius 10
8:00-10:55 am	<ul style="list-style-type: none"> <li>• Computational Methods</li> </ul>	Octavius 7 & 8
8:00-10:55 am	<ul style="list-style-type: none"> <li>• Reactor Physics: General—IV</li> </ul>	Octavius 12
8:00-11:20 am	<ul style="list-style-type: none"> <li>• Fast Reactors</li> </ul>	Octavius 13
8:00-11:20 am	<ul style="list-style-type: none"> <li>• Subchannel Thermal-Hydraulic Analysis—I</li> </ul>	Octavius 14
8:00-10:30 am	<ul style="list-style-type: none"> <li>• Large Eddy Simulation and Direct Numerical Simulation</li> </ul>	Octavius 15 & 16
8:00-11:45 am	<ul style="list-style-type: none"> <li>• Experimental Thermal Hydraulics—I</li> </ul>	Neopolitan 2
8:00-11:30 am	<ul style="list-style-type: none"> <li>• Advanced Aqueous Fuel Cycles—International Perspectives—Panel</li> </ul>	Neopolitan 3
8:00-10:55 am	<ul style="list-style-type: none"> <li>• Transition to a New Fuel Cycle—Needs and Challenges</li> </ul>	Neopolitan 4
8:00-11:30 am	<ul style="list-style-type: none"> <li>• Proposal Writing 101—Panel</li> </ul>	Messina

# Daily Schedule

## Wednesday, November 9 *continued*

8:00-11:30 am	Embedded Topical HTR 2016 Technical Sessions <ul style="list-style-type: none"> <li>• Fuel PIE and Safety Testing</li> <li>• Materials—V</li> <li>• Natural and Mixed Convection—I</li> <li>• Progress in New Generation Reactor Designs</li> </ul>	Neopolitan 1	
8:00-9:40 am		Octavius 19	
8:00-9:40 am		Octavius 18	
8:00-9:40 am		Octavius 18	
8:00-9:15 am		Octavius 21	
9:50-11:05 am	ANS Technical Sessions <ul style="list-style-type: none"> <li>• New Nuclear Constructions Around the World—Status Report—Panel</li> <li>• Knowledge Transfer and Retention</li> </ul>	Octavius 1 Octavius 2 & 3	
9:50-11:30 am	Embedded Topical HTR 2016 Technical Sessions <ul style="list-style-type: none"> <li>• Irradiation TRISO Microanalysis and Silver Retention</li> <li>• Natural and Mixed Convection—II</li> <li>• Fuel/Core Design—I</li> <li>• Plant Dynamics and Control</li> </ul>	Neopolitan 1	
9:50-11:30 am		Octavius 18	
9:50-11:05 am		Octavius 19	
9:50-11:30 am		Octavius 19	
9:50-11:05 am		Octavius 21	
11:30 am-1:00 pm	Lunch On Own		
1:00-4:00 pm	ANS Technical Sessions <ul style="list-style-type: none"> <li>• Radiation Protection and Shielding: General</li> <li>• Research by U.S. DOE NEUP-Sponsored Students—I</li> <li>• Monte Carlo Methods</li> <li>• Nuclear Installations Safety: General—I</li> <li>• Recent Nuclear Criticality Safety Program Technical Accomplishments</li> <li>• Reactor Physics: General—V</li> <li>• Reactor Analysis Methods—IV</li> <li>• Uncertainty, Scaling and Global Sensitivity Methods in Thermal Hydraulics</li> <li>• Young Professional Thermal-Hydraulics Research Competition—I</li> <li>• Human Factors, Instrumentation, and Controls: Human Factors, Safety, and Safety Systems</li> <li>• Fuel Cycle and Waste Management: General—I</li> <li>• Advances in Technical Nuclear Forensics: Methods and Analysis—I</li> <li>• ANS Standard and You—Panel</li> </ul>	Octavius 1	
1:00-3:30 pm		Octavius 2 & 3	
1:00-4:20 pm		Octavius 7 & 8	
1:00-3:30 pm		Octavius 9	
1:00-3:30 pm		Octavius 10	
1:00-3:55 pm		Octavius 12	
1:00-3:55 pm		Octavius 13	
1:00-2:40 pm		Octavius 14	
1:00-3:55 pm		Octavius 15 & 16	
1:00-3:55 pm		Neopolitan 2	
1:00-3:55 pm		Neopolitan 3	
1:00-2:40 pm		Neopolitan 4	
1:00-2:30 pm		Messina	
1:00-2:40 pm		Embedded Topical HTR 2016 Technical Sessions <ul style="list-style-type: none"> <li>• Irradiation and PIE</li> <li>• Structural Methods and Codes</li> <li>• Fuel/Core Design—II</li> <li>• System and Facility Design—I</li> </ul>	Neopolitan 1
1:00-2:15 pm			Octavius 18
1:00-2:15 pm	Octavius 19		
1:00-2:15 pm	Octavius 19		
1:00-2:15 pm	Octavius 21		
2:35-3:50 pm	ANS Technical Sessions <ul style="list-style-type: none"> <li>• Cutting Edge Techniques in Education, Training and Distance Education</li> <li>• Robotics and Remote Systems Topics</li> </ul>	Messina	
2:45-4:25 pm		Neopolitan 4	

# Daily Schedule

## Wednesday, November 9 *continued*

2:50-4:05 pm 2:50-4:30 pm 2:50-4:05 pm	<p>Embedded Topical HTR 2016 Technical Sessions</p> <ul style="list-style-type: none"> <li>• Fuel Modeling and Simulation</li> <li>• Transient and Accident Analysis Methods and Codes</li> <li>• System and Facility Design—II</li> </ul>	Neopolitan 1 Octavius 18 Octavius 21
4:30-6:30 pm 4:30-6:10 pm 4:30-7:50 pm 4:30-7:00 pm 4:30-6:35 pm 4:30-6:10 pm 4:30-7:25 pm 4:30-5:45 pm 4:30-7:00 pm 4:30-5:45 pm 4:30-5:20 pm 4:30-6:35 pm	<p>ANS Technical Sessions</p> <ul style="list-style-type: none"> <li>• Operations and Power: General—II</li> <li>• Research by U.S. DOE NEUP-Sponsored Students—II</li> <li>• Decommissioning and Environmental Sciences: General</li> <li>• Mathematical Modeling</li> <li>• Nuclear Installations Safety: General—II</li> <li>• Critical and Subcritical Experiments</li> <li>• Reactor Physics: General—VI</li> <li>• Nuclear Fuels and Materials: Fast Reactors and Accident Tolerant Fuel</li> <li>• Two-Phase Flows—II</li> <li>• Young Professional Thermal-Hydraulics Research Competition—II</li> <li>• Biology and Medicine: General</li> <li>• Recent Development in Material Accountancy Techniques for Pyroprocessing Facilities</li> <li>• Advances in Technical Nuclear Forensics: Methods and Analysis—II</li> <li>• Student Conference Proposal Writing—Panel</li> </ul>	<p>Octavius 1 Octavius 2 &amp; 3 Octavius 6 Octavius 7 &amp; 8 Octavius 9 Octavius 10 Octavius 12 Octavius 13 Octavius 14 Octavius 15 &amp; 16 Neopolitan 2</p>
4:30-6:10 pm 4:30-6:10 pm 4:30-6:30 pm		<p>Neopolitan 3 Neopolitan 4 Messina</p>

## Thursday, November 10

6:00 am-6:30 pm	Technical Tour Nevada National Security Site	Offsite Event
7:00 am-2:00 pm	Registration	Office 4/Milano Foyer
7:00-8:00 am	Morning Coffee Service	Octavius Foyer
7:30 am-7:30 pm	Critical Experiments Workshop	Offsite Event
8:00-11:45 am 8:00-11:30 am	<p>ANS Technical Sessions</p> <ul style="list-style-type: none"> <li>• The Innovations in Fuel Cycle Research Awards Programs</li> <li>• NRC Decommissioning Rulemaking: An Update on the Progress and Issues Coming Out of the Rulemaking Process—Panel</li> </ul>	<p>Octavius 2 &amp; 3</p>
8:00-9:40 am 8:00-10:05 am 8:00-10:00 am 8:00-10:05 am 8:00-11:20 am 8:00-9:15 am 8:00-10:05 am 8:00-9:40 am 8:00-10:30 am	<ul style="list-style-type: none"> <li>• Uncertainty Quantification and Sensitivity Analysis</li> <li>• Nuclear Installations Safety: General—III</li> <li>• ANS-8 Standards Forum</li> <li>• Reactor Physics Design, Validation and Operational Experience—I</li> <li>• TREAT</li> <li>• Subchannel Thermal-Hydraulic Analysis—II</li> <li>• General Thermal Hydraulics—II</li> <li>• Experimental Thermal Hydraulics—II</li> <li>• Human Factors, Instrumentation, and Controls: Instrumentation and Control Systems</li> </ul>	<p>Octavius 6 Octavius 7 &amp; 8 Octavius 9 Octavius 10 Octavius 12 Octavius 13 Octavius 14 Octavius 15 &amp; 16 Neopolitan 2</p>
8:00-9:40 am	<ul style="list-style-type: none"> <li>• Fuel Cycle and Waste Management: General—II</li> </ul>	<p>Neopolitan 3 Neopolitan 4</p>

*continued on next page >*

# Daily Schedule

## Thursday, November 10 *continued*

8:00-11:30 am	Embedded Topical HTR 2016 Technical Sessions	
8:00-9:15 am	• Thermal Hydraulics of Key Components—I	Neopolitan 1
8:00-9:15 am	• Industrial Process Heat	Octavius 17
8:00-8:50 am	• Multiphysics Methods and Codes—I	Octavius 19
8:00-9:15 am	• System and Facility Design—III	Octavius 21
	ANS Technical Sessions	
9:20-10:35 am	• Thermal-Hydraulics of Severe Accidents	Octavius 14
10:05 am-12:25 pm	• The Impact of Chemistry in Nuclear Criticality Safety Evaluations—Tutorial	Octavius 10
	Embedded Topical HTR 2016 Technical Sessions	
9:50-10:40 am	• Thermal Hydraulics of Key Components—II	Neopolitan 1
9:50-11:30 am	• Fission and Activation Product Transport	Octavius 17
9:50-11:05 am	• Multiphysics Methods and Codes—II	Octavius 19
10:45-11:35 am	• Hydrogen Production—II	Octavius 21
	ANS Technical Sessions	
1:00-3:05 pm	• Data, Analysis and Operations in Nuclear Criticality Safety—III	Octavius 10
1:00-3:30pm	• Reactor Physics Design, Validation and Operational Experience—II	Octavius 12

# General Information

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## MEETING INFORMATION

The 2016 ANS Winter Meeting & Expo includes five days of technical programming and events, one Embedded Topical Meeting; HTR 2016, and two workshops, High Temperature Reactor Technology and Critical Experiments.

## REGISTRATION

Name badges must be worn during all technical sessions, in technology expo and events. Certain events require a ticket, and may entail an additional cost. Pickup your materials in the Milano Foyer. See page 117 for a map.

## REGISTRATION HOURS

Saturday, November 5	2:00 pm-5:00 pm
Sunday, November 6	7:00 am-7:00 pm
Monday, November 7	7:00 am-5:00 pm
Tuesday, November 8	7:00 am-5:00 pm
Wednesday, November 9	7:00 am-5:00 pm
Thursday, November 10	7:00 am-2:00 pm

## NOTICE FOR SPEAKERS

*All speakers and session chairs must pick up badge and sign in at the Speaker Desk located at the ANS Registration Desk.*

## ANS BOOK FAIR HOURS

Sunday, November 6	11:00 am-7:00 pm
Monday, November 7	7:00 am-5:00 pm
Tuesday, November 8	7:00 am-5:00 pm
Wednesday, November 9	7:00 am-3:00 pm

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## EXPO HOURS - Octavius 24, 25

Sunday, November 6	6:00 pm-8:00 pm	Reception
Monday, November 7	10:00 am-5:00 pm	Lunch & Breaks
Tuesday, November 8	10:00 am-5:00 pm	Lunch & Breaks

## ATTENDEE MEAL FUNCTIONS

### Morning Coffee Service

Morning coffee and tea will be provided to all registered meeting attendees, Monday - Thursday in the Octavius Foyer.

### Lunch & Breaks in the Technology Expo

Lunch will be provided to all registered meeting attendees, Monday - Tuesday. On Wednesday and Thursday attendees will be on their own. **\*\*Please note:** Lunch is a ticketed event. (1) Ticket for Monday, and (1) ticket for Tuesday are included with a full meeting registration, or a ticket for the corresponding day for a 1-day registration. Additional tickets are available for purchase at \$45, each.

### President's Opening Reception in the Technology Expo

This reception is a ticketed event. (2) Drink tickets and hors d'oeuvres are included with a full meeting registration. Additional tickets are available for purchase at the following cost: \$75 (Adult) / \$40 (Child, 16 and under)

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#### 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, video, 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. For any questions or concerns about the use of your Image, please contact the ANS Meetings & Exhibits Department at [meetings@ans.org](mailto:meetings@ans.org).

# General Information

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## ANS BUSINESS OFFICE - Salerno

**Sunday, November 6 - Thursday, November 10**

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

Thursday - 8:00 am-12:00 pm

\*Sponsored by  **MNES**  
MITSUBISHI NUCLEAR ENERGY SYSTEMS, INC.

## ANS CONFERENCE OFFICE - Office 4

**Sunday, November 6 - Thursday, November 10**

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

Thursday - 8:00 am-12:00 pm

## ANS MEDIA CENTER - Sorrento

**Monday, November 7 - Wednesday, November 9**

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

Wednesday - 7:45 am-4:00 pm

## ANS STUDENT HEADQUARTERS - Office 8

**Sunday, November 6 - Thursday, November 10**

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

Thursday - 8:00 am-4:00 pm

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## OTHER THINGS TO ATTEND

### Teacher's Workshop: Detecting Radiation in our Radioactive World Workshop for Science Teachers

Saturday, November 5, 2016 | 7:30 am-5:00 pm

Location: Octavius 2 & 3

Learn how ANS members conduct teacher workshops by observing one in progress. You will learn methods and hands-on activities you can incorporate into your own Local Section programs. Advance Registration is required. Please contact Janice Lindegard, ANS Education and Community Outreach Specialist at 708-579-8290 for further details. This workshop is supported by the ANS Center for Nuclear Science and Technology Information.

### First-Time Attendee Orientation

Sunday, November 6, 2016 | 1:00-1:30 pm

Location: Octavius 4

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, November 6, 2016 | 4:00-5:00 pm

Location: Octavius 12 & 13

Attendance at the 2016 ANS Winter Meeting is an exciting professional opportunity for college and graduate students. For information on the Student Program, see the Student Program instructions document on the Winter Meeting web page.

### Mentor Meeting

Sunday, November 6, 2016 | 5:00-6:00 pm

Location: Octavius 17 & 18

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.

### Sunrise Tai-Chi

Wednesday, November 9, 2016 | 6:00-7:00 am

Location: Octavius 11

Join us on Wednesday morning for Sunrise Tai-Chi. Tai-Chi is an ancient form of gentle exercise which allows you to increase coordination, strength, and endurance, firm your body, reshape your figure and relieve stress all while achieving superb tranquility of mind and body. Achieve all of this without cardiovascular or respiratory stress that may be associated with running, weight lifting or high-repetition fast-paced aerobics. The instructor also covers self-massage and acupressure points to relieve pain. Event is complimentary to all registered attendees and guests (Ages 13+ up). Space is limited.

# General Information

## ANS MOBILE APP

Download the 2016 ANS Winter Meeting and Expo mobile app, your “go-to” resource for the most up-to-date information while on site!

- Scan the QR Code or visit your app store and search for “ANS Winter Meeting” to download.
- Start using schedules, maps, to-do lists and much more!



## ANS BOOK SIGNING

### *Author Signing!*

Sunday, November 6, 2016 | 2:30-4:30 pm  
and

Monday, November 7, 2016 | 11:00 am-1:30 pm

**Location:** Near the ANS Book Fair

Meet author Ann Marie Daniel Winters, available to sign your purchased copy of *Underway on Nuclear Power – The Man Behind the Words*, Eugene P. “Dennis” Wilkinson, Vice Admiral USN. First nuclear submarine commander and first CEO of INPO, Dennis was a superb leader and visionary, with a keen sense of humor and a treasure trove of sea stories.

View ad on page 103 for more information.

## High Temperature Gas-cooled Reactor (HTGR) TECHNOLOGY

*Clean Sustainable Energy for the 21<sup>st</sup> Century*

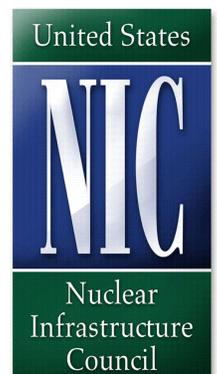
[www.ngnpalliance.org](http://www.ngnpalliance.org)



MEMBER:



**ANS**



# General Information

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## 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.

### Code of Ethics

The Code of Ethics covers the ethical and professional conduct that ANS expects of all members. The Code of Ethics can be found at [www.ans.org/about/coe](http://www.ans.org/about/coe).

### 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 contact person for reports at the Winter Meeting is ANS Executive Director Robert C. Fine, JD, CAE who can be reached at 708-476-7096 or [rfine@ans.org](mailto:rfine@ans.org) during the event. In addition, you may contact ANS President Andrew C. Klein, PE during or after the event at [andrew.klein@oregonstate.edu](mailto:andrew.klein@oregonstate.edu).

The complete Respectful Behavior Policy can be found at [www.ans.org/about/rbp](http://www.ans.org/about/rbp). If you have questions about the policy, please contact ANS Executive Director Robert C. Fine at 708-579-8200 or [rfine@ans.org](mailto:rfine@ans.org).

## SATURDAY, NOVEMBER 5

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### HIGH TEMPERATURE REACTOR TECHNOLOGY (HTR 2016) WORKSHOP

**Location:** Octavius 1

11:00am- 4:00 pm

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Learn about High Temperature Gas-Cooled Reactors as an introduction to the HTR 2016 Imbedded Topical. Topics that will be covered include basic nuclear design of HTRs, thermal hydraulic performance, as well as information on TRISO fuel, graphite, and other materials. Key design features of major systems and components, safety, and licensing will also be discussed. This event is not included in your registration fee. Ticket price is \$50 each. Includes Workshop Materials and Lunch. Pickup badge and check-in at Octavius 1.

## SUNDAY, NOVEMBER 6

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### ANS PRESIDENT'S RECEPTION

**Location:** Technology Expo (Octavius 24 & 25)

6:00 - 8:00 pm

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All attendees are invited to enjoy an evening of networking. This event is included in your full meeting registration and the full guest fee. (2) Drink tickets and hors d'oeuvres will be provided. Additional tickets for guests may be purchased at \$75. A badge is required to enter the Exhibit Hall.

## MONDAY, NOVEMBER 7

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### OPENING PLENARY

#### Building Sustainability in the Nuclear Enterprise

**Chair:** Raymond J. Juzaitis (Retired, Nuclear Security Technologies, LLC)

**Location:** Milano Ballroom

8:00-11:30 am

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In late 2015, the Federal Government reasserted its support for nuclear energy as a key element of its Climate Action Plan, recognizing that 60% of carbon-free electricity generated in the United States in 2014 came from nuclear power.

Ultimately, the success of this vision will hinge on the global nuclear enterprise compellingly addressing **key issues of sustainability** that will ensure a faster expansion of the nuclear energy option than has been seen to date. These key sustainability issues include: **efficient, reliable, and competitive** deployment of nuclear energy within a systemic mosaic of carbon-free energy options; continued **safe and secure operation** of deployed plants; societally-acceptable systemic solutions to the issue of **nuclear waste**, and an effective and technology-informed framework to resist or eliminate **nuclear weapon proliferation**.

The panelists, each distinguished by their outstanding service toward these objectives in their particular sectors, will represent the full range of government, industry, laboratory, and policy perspectives on building a sustainable global nuclear enterprise.

#### SPEAKERS

- Dr. John Gilleland (Chief Technical Officer, TerraPower LLC)
- Mr. John Kotek (Acting Assistant Secretary, Office of Nuclear Energy, DOE)
- Dr. Mark Peters (Director, Idaho National Laboratory)
- Ambassador Thomas R. Pickering (Former Under Secretary of State and Ambassador to the UN, Russia, India, Israel, El Salvador, Nigeria and Jordan)
- Dr. Monica Regalbutto (Assistant Secretary, Environmental Management, DOE)
- Mr. Ray Rothrock (Chairman and Chief Executive Officer, RedSeal, Inc)

## Plenary, Special Events and Other Sessions

## MONDAY, NOVEMBER 7

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### EMBEDDED TOPICAL HTR 2016 OPENING PLENARY

**Chair:** Finis Southworth (NGNP Industry Alliance)

**Location:** Neopolitan 1

1:00 pm

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#### SPEAKERS

- John Kotek (Acting Assistant Secretary, Office of Nuclear Energy, DOE)
- Prof. Grzegorz Wrochna (Director HTGR, Poland)
- Dr. Minwhan Kim (Director HTGR Program, KAERI)
- Dr. Kazuhiko Kunitomi (Director General HTGR Hydrogen and Heat Application Research Center, JAEA)
- Prof. Zhang Zuoyi (Director of INET)
- Chris Hamilton (Executive Director, NGNP Industry Alliance)

### ANS PRESIDENT'S SPECIAL SESSION

#### Identifying the Nuclear Grand Challenges

**Moderator:** Dr. Andrew Klein, ANS President

**Location:** Milano Ballroom

4:30-6:30 pm

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At this session, President Andy Klein will kick off a Society-wide project to identify 6-10 ANS Nuclear Grand Challenges that need to be addressed by 2030. An interactive brainstorming session in roundtable format will follow speakers discussing current advanced nuclear technology directions. Ideas submitted during the session will be analyzed and vetted by ANS Professional Divisions, and the selected ANS Nuclear Grand Challenges will be announced at the ANS Annual Meeting in June 2017.

#### SPEAKERS

- John Kotek (Acting Assistant Secretary, Office of Nuclear Energy, DOE)
- Mark Peters (Laboratory Director, Idaho National Laboratory)

### OPERATIONS AND POWER DIVISION (OPD) DINNER

7:30-9:30 pm

**SOLD OUT**

Join the Operations and Power Division at Carmine's Restaurant (Located at Caesars Palace Hotel in the Forum Shops) to celebrate a successful year as a division. This event is not included in your registration fee.

## TUESDAY, NOVEMBER 8

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### FUKUSHIMA SESSION

#### Enhancement of Risk-Informed Decision Making against External Natural Events - Toward Practical Implementation

**Chair:** Dr. Robert J. Budnitz (Staff Scientist Lawrence Berkeley National Laboratory)

**Location:** Milano 1

10:00 am-12:00 pm

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External natural events have been recognized as among the most important factors for nuclear safety since the 2011 Fukushima Dai-ichi accident. In response to the accident a series of panel discussions were held at several ANS meetings. In the last panel discussion held at the 2015 ANS winter meeting in Washington, approaches were described for the practical application of Risk Informed Decision Making (RIDM) to external natural events that have large uncertainty and are extremely rare. In response to the conclusions from that 2015 panel discussion, this session will discuss some specific practical examples of applying RIDM, namely examples related to seismic induced geotechnical and other hazards (e.g. fault displacements, slope failure etc.) The panel presentations and discussion will emphasize practical initiatives for enhancing how RIDM can address safety concerns related to extreme external natural events.

#### PANELISTS

- Dr. Karl N. Fleming (President KNF Consulting Services LLC)
- Nozar Jahangir (P.E. Manager, Technical Services Diablo Canyon Seismic Engineering)
- Muneo Hori (Professor at University of Tokyo)
- Susumu Nakamura (Professor at Nihon University)
- Katsumi Ebisawa (Senior Visiting Researcher at Central Research Institute of Electric Power Industry)

Plenary,  
Special  
Events  
and  
Other  
Sessions

## TUESDAY, NOVEMBER 8

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### STUDENT POSTER SESSION

**Location:** Technology Expo (Octavius 24 & 25)

11:00 am-1:00 pm

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Stop by the Exhibit Hall and join us for lunch\*, posters and networking! Student Technical posters will be on display Tuesday, during the lunch hour in the Technology Expo. During this time, presenters will stand beside their posters to answer questions and informally discuss the topic of their poster. See page 38 for a complete list of posters being presented.

*\*Please note:* Lunch on Tuesday is a TICKETED EVENT. A ticket is INCLUDED with an ANS Winter Meeting full meeting registration fee, or a Tuesday registration. Additional tickets for guests or committee members are available for purchase at the ANS Registration Desk for \$45, each.

### GENERAL CHAIR'S SPECIAL SESSION

#### Managing Proliferation and Security Risks in the Nuclear Enterprise

**Chair:** Raymond J. Juzaitis (Retired, National Security Technologies, LLC)

**Location:** Milano Ballroom

4:30-6:30 pm

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There exists general consensus on the importance of managing proliferation risks in creating and maintaining a sustainable global nuclear energy enterprise. Although much has been written and discussed regarding “proliferation resistance” (e.g., Generation IV International Forum), and non-proliferation is almost universally stated as an aspirational objective of nuclear technology development, specific strategies and quantifiable metrics to gauge success in meeting this objective need greater visibility in public discourse and deliberation. The invited panelists at this session will provide perspectives from the laboratory, industry, academic, and government sectors. The relative merits of policy and technology strategies to minimize risks associated with nuclear material security, as well as risks of weapons latency in global nuclear infrastructures will be discussed.

#### PANELISTS

- Dr. Matthew Bunn (Professor of Practice, John F. Kennedy School of Government, Harvard University)
- Mr. Seth Grae (President and CEO, Lightbridge Corporation)
- Dr. Howard Hall (Governor's Chair Professor (Nuclear Engineering), University of Tennessee)
- Ms. Nancy Jo Nicholas (Associate Director (Threat Identification and Response), Los Alamos National Laboratory)
- Dr. Larry Satkowiak (Director, Nonproliferation, Safeguards & Security, Oak Ridge National Laboratory)
- Ms. Melissa Scholz (Program Manager, Defense Nuclear Nonproliferation, National Nuclear Security Administration)

### NATIONAL ATOMIC TESTING MUSEUM DINNER

Continuous shuttles begin at 7:00 pm Dinner 7:30-9:30 pm

**SOLD OUT**

You and your guest(s) are welcome to join us for dinner at the National Atomic Testing Museum on Tuesday November, 8, 2016 from 7:30 – 9:30 pm. The Museum showcases its collection of more than 12,000 unique artifacts in educational and inspiring exhibits. There is something for everyone to experience in dynamic displays presenting the history of the development and testing of one of man's most significant inventions, a nuclear bomb.

Continuous shuttles will be available beginning at 7:00 p.m. to the Museum. The exit to Shuttle Buses is located on the main level of Caesars Palace Hotel between FIZZ and the Colosseum. See page 115 to refer to map.

## WEDNESDAY, NOVEMBER 9

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### SPECIAL SESSION ON CHANGE IN ANS INCORPORATION

**Location:** Octavius 5

7:15-7:45 am

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ANS is incorporated in New York State, which as legal requirements that make the Society's election for Board members and officers complicated and confusing. The purpose of this special session is to explain the Society's plans to move its state of incorporation from New York to Illinois in order to make the election process easier and clearer. ANS President Andy Klein and ANS Executive Director Bob Fine will lead this session and discuss the important role the membership will play next year in this process. Please plan to attend this brief special session to learn more.

## WEDNESDAY, NOVEMBER 9

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### FOCUS ON COMMUNICATION WORKSHOP

#### Nuclear Communication and Politics: A Post-Election Look – the Long and Short of It

**Location:** Neopolitan I

5:00-7:00 pm

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This session will take place the day after election day, and we have a stellar group of speakers to share their expertise on how communications and politics have affected nuclear energy, and what the elections mean for the near-term and long-term future. Amy Lientz, Director of Partnerships, Engagement & Technology Deployment at INL, will set the stage and moderate the session. The Department of Energy's Candice Trummell, a longtime communicator who today is Associate Principal Deputy Assistant Secretary of Corporate Services, Office of Environmental Management, will share her experiences and lessons learned over a career in nuclear communications as well as what she sees in the future. Craig Piercy, ANS Washington Rep, will provide his insights on the election and what it means for our nuclear community. Beer, wine, soft drinks and light snacks will be provided, courtesy of AREVA and Exelon Generation.

## THURSDAY, NOVEMBER 10

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### NEVADA NATIONAL SECURITY SITE - TECHNICAL TOUR

6:00 am-6:30 pm

**SOLD OUT**

Nevada Nuclear Security Site, formerly known as the "Nevada Test Site," provides a unique and indispensable extension of the national laboratories' experimental capabilities in support of the Stockpile Stewardship Program. The tour will primarily be a bus tour, as the site is very large. The site is approximately 1.5 hours from the hotel. Visitors will have the opportunity to see several well-known sights, including Mercury camp, the Sedan crater, and the Device Assembly Facility (DAF). A tour guide on the buses will provide briefings during the drive. Participants are prohibited from bringing cameras, cell phones, Bluetooth enabled devices, computers, recording devices, weapons, explosives, animals, ammunition, controlled substances, binoculars, alcoholic beverages, chemical irritants, and GPS devices on the tour. **Meet at 6:00 am on the main level of Caesars Palace Hotel for shuttle between Fizz and the Colosseum. See page 115 for map of the location. This is a ticketed event.**

### CRITICAL EXPERIMENTS WORKSHOP FOR ANS YOUNG MEMBERS & STUDENTS

**Co-Sponsors:** Nuclear Nonproliferation Policy Division, Young Members Group,  
Nuclear Criticality Safety Division

7:30 am-7:30 pm

**SOLD OUT**

Critical experiments support a variety of national security missions, including nuclear nonproliferation, Counterproliferation, criticality safety research and development, nuclear emergency response, and hands-on training.

Join this special workshop to:

- Participate in an experiment using the National Criticality Experiments Research Center's (NCERC) stores of special nuclear materials used for research and training
- Hear presentation and demonstrations about critical experiment design, execution and measurements
- Visit the 1,280' wide x 320' deep Sedan Crater, formed in 1962 during an excavation experiment using a 104 kiloton thermonuclear device.

Need more information contact:

Rian Bahran bahran@lanl.gov

Jesson Hutchinson jesson@lanl.gov

Plenary,  
Special  
Events  
and  
Other  
Sessions

# Technical Sessions by Division

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## SPECIAL SESSIONS

Opening Plenary: *Building Sustainability in the Nuclear Enterprise*, Mon. am (8:00-11:30 am)

ANS President's Special Session: *Identifying Nuclear Grand Challenges*, Mon. pm (4:30-6:30 pm)

Fukushima Session: *Enhancement of Risk-Informed Decision Making against External Natural Events—Toward Practical Implementation*, Tues. am (10:00 am-12:00 pm)

General Chair's Special Session: *Managing Proliferation and Security Risks in the Nuclear Enterprise*, Tues. pm (4:30-6:30 pm)

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(Parentheses indicate Cosponsorship)

## ACCELERATOR APPLICATIONS (AAD)

(Student Design Competition), Mon. pm

Accelerator Applications: General, Tues. am

## AEROSPACE NUCLEAR SCIENCE AND TECHNOLOGY (ANST)

(Student Design Competition), Mon. pm

## BIOLOGY AND MEDICINE (BMD)

Biology and Medicine: General, Wed. pm

## DECOMMISSIONING AND ENVIRONMENTAL SCIENCES (DESD)

Updates from Ongoing Nuclear Decommissioning Projects in U.S. and Canada: An Executive Leadership—Panel, Tues. pm

Decommissioning and Environmental Sciences: General, Wed. pm

NRC Decommissioning Rulemaking: An Update on the Progress and Issues Coming out of the Rulemaking Process—Panel, Thurs. am

## EDUCATION, TRAINING, AND WORKFORCE DEVELOPMENT (ETWDD)

Student Design Competition, Mon. pm

Building a Nuclear Energy and Science Education Program: Successes and Challenges of Developing a Vision for Nuclear Energy Education—Panel, Tues. am

Education, Training and Workforce Development, Tues. am

Focus on Communications: Talking About Nuclear Waste—What Works and What Doesn't—I—Panel, Tues. pm

Focus on Communications: A Picture Really is Worth a Thousand

Words—and People Pay Attention to Them—II—Panel, Tues. pm

Research by U.S. DOE NEUP-Sponsored Students—I, Wed. pm

Research by U.S. DOE NEUP-Sponsored Students—II, Wed. pm

Cutting Edge Technology in Education, Training and Distance Education, Wed. pm

The Innovations in Fuel Cycle Research Awards Program, Thurs. am

## FUEL CYCLE AND WASTE MANAGEMENT (FCWMD)

Yucca Mountain—Is There a Pulse—Panel, Mon. pm

Used Fuel: Once Through or Recycle—Who is Right?—Panel, Mon. pm

International Activities on Used Nuclear Fuel Reprocessing Regulatory Framework—Panel, Tues. am

Used Nuclear Fuel Dry Storage Canister Inspection—I, Tues. am

Used Nuclear Fuel Dry Storage Canister Inspection—II, Tues. pm

Chemistry R&D in Radioactive Waste Management, Tues. am

Progress in DOE's Fuel Cycle Technologies Program—Panel, Tues. pm

Advanced Aqueous Fuel Cycles—International Perspectives—Panel, Wed. am

Transition to a New Fuel Cycle—Needs and Challenges, Wed. am

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

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

Recent Development in Material Accountancy Techniques for Pyroprocessing Facilities, Wed. pm

## HUMAN FACTORS, INSTRUMENTATION, AND CONTROLS

Human Factors, Instrumentation, and Controls: Instrumentation, Tues. am

Human Factors, Instrumentation, and Controls: Human Factors, Safety, and Safety Systems, Wed. pm

Human Factors, Instrumentation, and Controls: Instrumentation and Control Systems, Thurs. am

## ISOTOPES AND RADIATION (IRD)

(Intersection of Policy Development and Technical Innovation for Nuclear Nonproliferation and Security), Tues. am

Advances in Technical Nuclear Forensics: Methods and Analysis—I, Wed. pm

Advances in Technical Nuclear Forensics: Methods and Analysis—II, Wed. pm

(Recent Development in Material Accountancy Techniques for Pyroprocessing Facilities), Wed. pm

## MATERIALS SCIENCE AND TECHNOLOGY (MSTD)

Nuclear Science User Facility: University Capabilities—Panel, Mon. pm

Advanced Manufacturing, Joining and Measurement Techniques, Tues. am

Nuclear Fuels and Materials: Modeling, Tues. am

Nuclear Fuels and Materials: Fast Reactors and Accident Tolerant Fuel, Wed. pm

## MATHEMATICS AND COMPUTATION (MCD)

Current Issues in Computational Methods—Roundtable, Mon. pm

Deterministic Transport Methods, Tues. am

The Nuclear Energy Advanced Modeling and Simulation Program—Panel, Tues. pm

Computational Methods, Wed. am

Monte Carlo Methods, Wed. pm

Mathematical Modeling, Wed. pm

Uncertainty Quantification and Sensitivity Analysis, Thurs. am

### NUCLEAR CRITICALITY SAFETY (NCS)

Data, Analysis and Operations in Nuclear Criticality Safety—I, Tues. pm  
Data, Analysis and Operations in Nuclear Criticality Safety—II, Wed. am  
Data Analysis and Operations in Nuclear Criticality Safety—III, Thurs. pm  
Recent Nuclear Criticality Safety Program Technical Accomplishments, Wed. pm  
(Critical and Subcritical Experiments), Wed. pm  
ANS-8 Standards Forum, Thurs. am  
The Impact of Chemistry in Nuclear Criticality Safety Evaluations—Tutorial, Thurs. am

### NUCLEAR INSTALLATIONS SAFETY (NIS)

Nuclear Safety R&D at the Department of Energy—I, Mon. pm  
Nuclear Safety R&D at the Department of Energy—II, Tues. am  
Current Topics in Probabilistic Risk Analysis—I, Tues. pm  
Current Topics in Probabilistic Risk Analysis—II, Wed. am  
Nuclear Installations Safety: General—I, Wed. pm  
Nuclear Installations Safety: General—II, Wed. pm  
Nuclear Installations Safety: General—III, Thurs. am

### NUCLEAR NONPROLIFERATION POLICY (NNPD)

Intersection of Policy Development and Technical Innovation for Nuclear Nonproliferation and Security, Tues. am  
(Advances in Technical Nuclear Forensics: Methods and Analysis—I), Wed. pm  
(Advances in Technical Nuclear Forensics: Methods and Analysis—II), Wed. pm  
Critical and Subcritical Experiments, Wed. pm  
(Recent Development in Material Accountancy Techniques for Pyroprocessing Facilities), Wed. pm

### OPERATIONS AND POWER (OPD)

Advanced Gen IV Reactors, Mon. pm  
Overview and Purpose of the 52 Reactors that were Built at INL—Panel, Mon. pm  
Operations and Power: General—I, Tues. pm  
Operations and Power: General—II, Wed. pm  
Challenges (Financial Challenge) with Current Operation Fleet—Panel, Tues. pm  
Advanced Reactors—Panel, Wed. am  
New Nuclear Constructions Around the World—Status Report—Panel, Wed. am  
Emerging Issues in Supply Chain—Panel, Wed. am

### RADIATION PROTECTION AND SHIELDING (RPSD)

Novel Detection Methods, Tues. am  
Computational Tools for Radiation Protection and Shielding, Tues. pm  
Radiation Protection and Shielding: General, Wed. pm

### REACTORS PHYSICS (RPD)

Reactor Physics: General—I, Mon. pm  
Reactor Physics: General—II, Tues. am  
Reactor Physics: General—III, Tues. pm  
Reactor Physics: General—IV, Wed. am  
Recent Physics: General—V, Wed. pm  
Reactor Physics: General—VI, Wed. pm  
Reactor Analysis Methods—I, Mon. pm  
Reactor Analysis Methods—II, Tues. am  
Reactor Analysis Methods—III, Tues. pm  
Reactor Analysis Methods—IV, Wed. pm  
Fast Reactors, Wed. am  
Reactor Physics Design, Validation and Operational Experience—I, Thurs. am  
Reactor Physics Design, Validation and Operational Experience—II, Thurs. pm  
TREAT, Thurs. am

### ROBOTICS AND REMOTE SYSTEMS (RRSD)

Robotics and Remote Systems Topics, Wed. pm

### THERMAL HYDRAULICS (THD)

Computational Thermal Hydraulics, Mon. pm  
In Memory of Salomon Levy on His Technical Contributions to the Advancements of Thermal Hydraulics—Panel, Mon. pm  
Technical Achievement Award Lecture, Mon. pm  
Toward a Longer-Life Core: Thermal-Hydraulic Simulations and Experiments of Deformed Fuel Assemblies, Tues. am  
Challenges in Computational Tools for Reactor Thermal Hydraulics—Panel, Tues. am  
(The Nuclear Energy Advanced Modeling and Simulation Program—Panel), Tues. pm  
Two-Phase Flows—I, Tues. pm  
Two-Phase Flows—II, Wed. pm  
General Thermal Hydraulics—I, Tues. pm  
General Thermal Hydraulics—II, Thurs. am  
Severe Accident Modeling and Experiments for Advanced Reactor Safety, Tues. pm  
Subchannel Thermal-Hydraulic Analysis—I, Wed. am  
Subchannel Thermal-Hydraulic Analysis—II, Thurs. am  
Large Eddy Simulation and Direct Numerical Simulation, Wed. am  
Experimental Thermal Hydraulics—I, Wed. am  
Experimental Thermal Hydraulics—II, Thurs. am  
Uncertainty, Scaling and Global Sensitivity Methods in Thermal Hydraulics, Wed. pm  
Young Professional Thermal-Hydraulics Research Competition—I, Wed. pm  
Young Professional Thermal-Hydraulics Research Competition—II, Wed. pm  
Thermal-Hydraulics of Severe Accidents, Thurs. am

### YOUNG MEMBERS GROUP

(Overview and Purpose of the 52 Reactors that were Built at INL—Panel), Mon. pm  
Roles of Regulatory Organizations—Panel, Mon. pm  
(Chemistry R&D in Radioactive Waste Management), Tues. am  
Your Role in ANS National Committees—Panel, Tues. am  
ANS Congressional Fellowship—Panel, Tues. am  
(Challenges (Financial Challenge) with Current Operation Fleet—Panel), Tues. pm  
Potent Policies: Understanding ANS Position Papers—Panel, Tues. pm  
Nuclear Politics: Advocacy—Panel, Wed. am  
Knowledge Transfer and Retention—Panel, Wed. am  
Proposal Writing 101—Panel, Wed. am  
(Young Professional Thermal-Hydraulics Research Competition—I), Wed. pm  
(Young Professional Thermal-Hydraulics Research Competition—II), Wed. pm  
ANS Standards and You—Panel, Wed. pm  
(Critical and Subcritical Experiments), Wed. pm  
Student Conference Proposal Writing—Panel, Wed. pm

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## MONDAY, NOVEMBER 7

### TECHNICAL SESSIONS - 1:00 PM

#### Advanced Gen IV Reactors

**Sponsored by:** OPD

**Session Organizer:** Piyush Sabharwall (INL) **Chair:** Vivek P. Utgikar (Univ of Idaho)

**Location:** Octavius 1 **Time:** 1:00-2:40 pm

##### 1:00 pm

Helium Brayton Cycle Design for Advanced High Temperature Reactor System, I. Skavdahl, V. Utgikar, R.N. Christensen (Univ of Idaho), P. Sabharwall (INL), M. Chen, X. Sun (Ohio State)

##### 1:25 pm

Improving Passive Safety in Small Modular Reactors by Quantifying SMR-Specific Natural Decontamination Phoretic Phenomena, Sola Talabi (Pittsburgh Technical)

##### 1:50 pm

Density Effects on Lock Exchange Flow During a DCC, Molly Glass, Brian Woods, Seth Cadell (Oregon State Univ)

##### 2:15 pm

Establishing Right-Sized Regulations for Small Modular Reactors—Updates on Establishing SMR-Specific Emergency Planning Zones, Sola Talabi (Pittsburgh Technical)

#### Student Design Competition

**Sponsored by:** ETWDD **Cosponsored by:** ANSTD, AAD

**Session Organizer and Chair:** Travis Knight (Univ of South Carolina)

**Location:** Octavius 2 & 3 **Time:** 1:00-3:00 pm

The following undergraduate and graduate entries have been selected by a panel of judges from industry as finalists in the 2016 Student Design Competition. Oral presentations will be made by students in front of a second panel of judges who will determine the undergraduate winner.

#### Undergraduate Category

##### 1:00 pm

Helium-3 Production via Lithium-6 Activation in an Accelerator-Driven Reactor, C. Choi, P. Dressman, A. Jassem, T. Kyle, R. Nicholson, S. Sanders, D. Toneff (Purdue Univ)

##### 1:30 pm

Design Report of the Molten-Chloride High Temperature Reactor (M-CHTR), Alex Gross, Andrew Maile, Jordan Rein, John Murphy (Univ of Wisconsin, Madison)

##### 2:00 pm

VASIMR® Interfaced High Temperature Gas-Cooled Fast Reactor for Space Applications, Joe Kelsey, Andrés Morell-Pacheco, Tyler Hughes, Nicholas Whitman, Pavel Tsvetkov (Texas A&M)

#### Graduate Category

##### 2:30 pm

Near-Term Deployment Viability of Liquid-Fuel Molten Salt Reactors, S. Bogetic, A. Greenop, N. Haneklaus, C. Poresky, D. Shen (Univ of California, Berkeley)

## MONDAY, NOVEMBER 7

### TECHNICAL SESSIONS - 1:00 PM

#### Overview and Purpose of the 52 Reactors that were Built at INL—Panel

**Sponsored by:** OPD **Cosponsored by:** YMG

**Session Organizer:** Joseph L. Campbell (INL), Piyush Sabharwall (INL) **Chair:** Piyush Sabharwall (INL)

**Location:** Octavius 6 **Time:** 1:00 pm-4:00 pm

Most discussions of the origins of nuclear energy technology in the U.S. include some reference to the 52 reactors constructed at INL - originally known as the National Reactor Testing Station. But, what were they really about? Developed from a presentation delivered at the Advanced Reactors Technical Summit at Oak Ridge National Lab in 2015, a panel of speakers will provide a fascinating synopsis of the nation's original test-bed for nuclear technology, including the many first-of-a-kind reactors built to test materials, prove and demonstrate operational, safety, and spent fuel handling concepts, and explore safety limits.

**Panelists:**

Harold McFarlane (INL Retired)

Vince Gilbert (EXCEL Services)

Don Miley (INL)

#### Current Issues in Computational Methods—Roundtable

**Sponsored by:** MCD

**Session Organizer and Chair:** Rachel N. Slaybaugh (Univ of California, Berkeley)

**Location:** Octavius 7 & 8 **Time:** 1:00-4:00 pm

But I just want to write software?

The details can feel overwhelming and stifling in pursuit of writing high-impact, high-quality software: intellectual property, licensing, copyright, export control, open source, access on clusters... All of this can deeply impact how accessible your work is. Our panel members will share lessons-learned and experiences in the legal realm, with an emphasis on highly collaborative software development involving multiple institutions.

**Panelists:**

Kevin Clarno (ORNL)

Rich Martineau (INL)

Kathryn Huff (Univ of Illinois, Urbana-Champaign)

Aaron Sauers (FNAL)

Arthur Baker (INL)

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**MONDAY, NOVEMBER 7**

**TECHNICAL SESSIONS - 1:00 PM**

**Nuclear Safety R&D at the Department of Energy—I**

**Sponsored by:** NISD

**Session Organizer and Chair:** Alan E. Levin (DOE)

**Location:** Octavius 9 **Time:** 1:00-3:30 pm

**1:00 pm**

Development of MELCOR 2.1 Guidance Report for LPF Applications, David L.Y. Louie, Kyle W. Ross, Larry L. Humphries (SNL)

**1:25 pm**

Particle Resuspension Simulation Capability to Substantiate DOE-HDBK-3010 Data, Tyler G. Voskuilen, Flint G. Pierce, Alexander L. Brown, Fred E. Gelbard, David L.Y. Louie (SNL)

**1:50 pm**

Contaminant Entrainment in a Liquid Fuel Fire with Multi-Component Evaporation Droplet Model, Flint G. Pierce, Alex L. Brown, Ethan Zepper, David L.Y. Louie (SNL)

**2:15 pm**

Evaluating a Historical Airborne Release Test with Modern Modeling Methods, Alexander L. Brown (SNL), Flint Pierce, Ethan Zepper, David L. Y. Louie (SNL), Louis Restrepo (Atkins NS)

**2:40 pm**

Lagrangian 3D CFD Simulation of Turbulent Aerosol Experiments, Sal Rodriguez, Cole Mueller, Bobbi Merryman (SNL)

**3:05 pm**

Fragmentation Prediction for a Brittle Ceramic: A Two-Scale Model Approach. Pierre-Alexandre Juan, John Bignell, Rémi Dingreville (SNL)

## MONDAY, NOVEMBER 7

### TECHNICAL SESSIONS - 1:00 PM

#### **Nuclear Science User Facility: University Capabilities—Panel**

**Sponsored by:** MSTD

**Session Organizer:** J. Rory Kennedy (INL) **Chair:** Brenden J. Heidrich (INL)

**Location:** Octavius 10 **Time:** 1:00-4:00 pm

This session will include speakers from universities that contribute capabilities to the Nuclear Science User Facility (NSUF) program. The NSUF program provides the nation's top researchers access to a wide variety of facilities and instruments with the goal of advancing nuclear energy science and technology in the United States.

**Panelists:**

Brenden Heidrich (INL)

Peter Hosemann (Univ of California, Berkeley)

Lin-Wen Hu (MIT)

Yaqiao Wu (Boise State Univ)

Janelle Wharry (Purdue Univ)

George Jiao (Univ of Michigan)

#### **Reactor Physics: General—I**

**Sponsored by:** RPD

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

**Location:** Octavius 12 **Time:** 1:00-3:55 pm

**1:00 pm**

An Overview on the Role of Nuclear Data: Analysis and Evaluation, Luiz Carlos Leal (IRSN)

**1:25 pm**

Resonance Self-Shielding using Deterministic Transport Methods with Pointwise Cross Sections, Mark L. Williams (ORNL)

**1:50 pm**

Characterization of the Pulsed Radiation Environment in FREC-II at the ACRR, Nicholas Whitman, Bradley Cox (LANL)

**2:15 pm**

Phenomena Identification and Ranking Table (PIRT) for Fluoride High-Temperature Reactor (FHR) Neutronics, Farzad Rahnema, Dingkang Zhang, Bojan Petrovic (Georgia Tech), David Diamond (BNL), Dumitru Serghiuta (CNSC), Christopher Edgar (Georgia Tech), Max Fratoni (Univ of California, Davis), Hans Gougar (INL), Ayman Hawari (NCSU), Jianwei Hu (ORNL), Nathanael Hudson (NRC), Dan Ilas (ORNL), Ivan Maldonado (Univ of Tennessee, Knoxville)

**2:40 pm**

Uncertainty Quantification of Spatial Correction Factor for Sjöstrand Method due to Cross-Section Data, Toshiki Kimura, Tomohiro Endo, Akio Yamamoto (Nagoya Univ)

**3:05 pm**

Uncertainty Quantification of Activation Due to Cross Section Data in Neutron Shielding Calculation, Kimihiro Yokoi, Tomohiro Endo, Akio Yamamoto, (Nagoya Univ), Ryoji Mizuno, Yoshio Kimura (Chuden-CTI)

**3:30 pm**

Channel Bow Constraint Option in the BWR Loading Pattern Optimization System FINELOAD-3, Akihiro Fukao, Takashi Yoshii, Yusuke Kuroda (TEPCO Systems Corp)

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**MONDAY, NOVEMBER 7**

**TECHNICAL SESSIONS - 1:00 PM**

**Reactor Analysis Methods—I**

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Zeyun Wu (NIST)

**Location:** Octavius 13 **Time:** 1:00-4:20 pm

**1:00 pm**

Predicting Correlation Coefficients for Monte Carlo Eigenvalue Simulations, Jilang Miao, Benoit Forget, Kord Smith (MIT)

**1:25 pm**

Prediction on Underestimation of Statistical Uncertainty in Monte Carlo Eigenvalue Calculation for Two-Dimensional Heterogeneous Color Set Geometry, Koji Hayashi, Tomohiro Endo, Akio Yamamoto (Nagoya Univ)

**1:50 pm**

Application of Variance Reduction Techniques in RMC Burnup and Thermal-Hydraulic Coupled Calculation, Qu Wu, Shichang Liu, Juanjuan Guo, Kan Wang (Tsinghua Univ)

**2:15 pm**

Spatially Continuous Depletion Algorithm for Monte Carlo Simulations, Matthew S. Ellis, Colin Josey, Benoit Forget, Kord Smith (MIT)

**2:40 pm**

Dynamic Monte Carlo Transient Analysis with Thermal-Hydraulic Feedback by McCARD/CUPID, Soomin Kang, Nadeem Shaukat, Hyungjin Shim, Hyoung-Kyu Cho (Seoul Natl Univ)

**3:05 pm**

Improved Few-Group Homogenized Cross-Section Sensitivity Analysis for Lattice Physics Calculation, Liangzhi Cao, Yong Liu, Hongchun Wu (Xi'an Jiaotong Univ)

**3:30 pm**

The Effects of Different Lattice Codes on Results of Sensitivity and Uncertainty Analysis, Liangzhi Cao, Chenghui Wan, Hongchun Wu, (Xi'an Jiaotong Univ)

**3:55 pm**

Unbiased Ratio Estimator for k-Eigenvalue in Monte Carlo Criticality Calculations, YuGwon Jo, Nam Zin Cho (KAIST)



## MONDAY, NOVEMBER 7

### TECHNICAL SESSIONS - 1:00 PM

#### Computational Thermal Hydraulics

**Sponsored by:** THD

**Session Organizer:** Selim Kuran (NuScale Power LLC) **Cochairs:** Ling Zou (INL), Donna Post Guillen (INL)

**Location:** Octavius 14 **Time:** 1:00-4:20 pm

**1:00 pm**

Toward Linear Stability Analysis of Upper Plenum Flows, John Patrick Mulloy (Texas A&M), Elia Merzari, Oana Marin (ANL), Yassin A. Hassan (Texas A&M)

**1:25 pm**

Computational Fluid Dynamics Simulation of a Pilot-Scale Waste Glass Melter, Alexander Abboud, Donna Post Guillen (INL)

**1:50 pm**

Modeling Analysis for Nuclear Material Transport Package, Si Y. Lee (SRNL)

**2:15 pm**

Development of Multiple Solid Components Capability in GOTHIC Droplet Fields, Nate Carstens, Tom George (Numerical Applications)

**2:40 pm**

Preliminary Development of a Drift-Flux Model Based Pin-Resolved Core Thermal-Hydraulic Code for Dedicated Use in Efficient High-Fidelity Neutronics Coupled Calculations, Jaejin Lee, Han Gyu Joo (Seoul Natl Univ)

**3:05 pm**

Assessment of a Smoothed Particle Hydrodynamics Method for Thin Film on Textured Surface, Linyu Lin, Nam Dinh (NCSU)

**3:30 pm**

Fuel Rod Thermo-Mechanic Analysis of Kuosheng NPP in MSIVC Transient with RELAP5 MOD3.3/FRAPTRAN/Python Code in SNAP Interface, H. C. Chang, C. Shih, J. R. Wang (Natl Tsing Hua Univ), S. C. Chiang, T. Y. Yu (Taiwan Power Co.), I. C. Lee, W. S. Hsu (Natl Tsing Hua Univ)

**3:55 pm**

Development of Accident Tolerant Fuel Options for Near Term Applications: Fuel Performance Modeling under Transient/Severe Accidents by MELCOR: PART I: Benchmark for SURRY: Short Term Station Black Out (STSBO), Jun Wang, Michael L. Corradini, Troy Haskin (Univ of Wisconsin, Madison)

#### In Memory of Salomon Levy on his Technical Contributions to the Advancements of Thermal-Hydraulics—Panel

**Sponsored by:** THD

**Session Organizer:** Michael L. Corradini (Univ of Wisconsin, Madison) **Cochairs:** Fan-Bill Cheung (Penn State), Yassin A. Hassan (Texas A&M)

**Location:** Octavius 15 & 16 **Time:** 1:00-3:30 pm

This session honors the many contributions to the art and science of Thermal-hydraulics of the late Dr. Salomon Levy as well as his leadership service to the American Nuclear Society. Dr. Levy was one of the founding leaders of the Thermal-hydraulic division as its second chair (1985-1986). He was also the third recipient of the Technical Achievement Award (1987), the highest award bestowed by the division. The panel session will include presentation from early leaders of the Thermal-hydraulic division who had personal, first-hand knowledge of Dr. Levy and his many achievements. Dr. Levy received his Bachelor's Degree, Master's Degree and a PhD at UC Berkeley. Dr. Levy began his influential career with General Electric. In April 1975, he became General Manager of Boiling Water Reactor Operations where he was responsible for all the engineering and manufacturing of General Electric nuclear power business. After his many great accomplishments at GE Dr. Levy decided to form his own consulting firm called S. Levy Incorporated (SLI) in 1977. Throughout his career, Dr. Levy became a mentor to many in the Nuclear Industry and helped to shape the future of nuclear power throughout the world. Dr. Levy published over 70 publications and 3 books and, in addition to the TAA he has received many prestigious awards including the Donald Q. Kern Award from the American Institute of Chemical Engineers in 1993 and the American Nuclear Society's Presidential Citation in 2012 for his 50 years of contributions to nuclear power.

**Panelists:**

Jong Kim (KAIST)

Bill Sha (Retired)

Robert Henry (Fauske and Assoc)

Fred Moody (Retired)

Hans Fauske (Fauske and Assoc)

Ed Fuller (Retired)

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## MONDAY, NOVEMBER 7

### TECHNICAL SESSIONS - 1:00 PM

#### Roles of Regulatory Organizations—Panel

**Sponsored by:** YMG

**Session Organizer:** Jitesh A. Kuntawala (Duke Energy) **Chair:** Timothy M. Crook (Texas A&M)

**Location:** Neopolitan 2 **Time:** 1:00-4:00 pm

As companies trend towards one specific reactor design, a major hurdle is ensuring that the design meets regulatory requirements which can differ from country to country, as each country has its own regulatory organization. We will hear from a number of different regulatory organizations about how they interact with reactor vendors and utilities to address issues unique to their region while meeting global nuclear safety standards.

#### Panelists:

Eugene S. Grecheck (Grecheck Consulting LLC)

Lars Jorgensen (Thorcon Power)

John Kutsch (Terrestrial Energy)

Stephanie Seely (NuScale Power)

Catherine Perego (Westinghouse)

#### Yucca Mountain-Is There a Pulse?—Panel

**Sponsored by:** FCWMD

**Session Organizer and Chair:** Steve P. Nesbit (Duke Energy)

**Location:** Neopolitan 3 **Time:** 1:00-4:00 pm

While some other countries that use nuclear power are making significant strides toward true closure of the back end of the fuel cycle, United States efforts remain stalled. A well-advanced Yucca Mountain, Nevada project was stopped in 2010 by political considerations, and administration efforts to move forward in other directions are gathering little steam. A panel of Yucca Mountain experts will offer their viewpoints on the feasibility of resuming the project as well as the advisability of doing so. Panelists will include Nye County, Nevada; the state of Nevada; and others with extensive Yucca Mountain project experience.

#### Panelists:

Mike Voegele (Retired)

Bob Halstead (Agency for Nuclear Projects)

Dan Schinhofen (Nye County Commission)

Andy Griffith (DOE)

Alec Hoppes (AREVA)

#### Used Fuel: Once Through or Recycle—Who is Right?—Panel

**Sponsored by:** FCWMD

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

**Location:** Neopolitan 4 **Time:** 1:00-4:00 pm

Recycle or once through nuclear fuel cycles is a debate that has continued to create a high degree of interest and opposing views across a number of stakeholders for many decades. Pro-recycle enthusiasts tend to focus on the long term view citing benefits on repository capacity, sustainability, and the potential for a fully closed fuel cycle using Plutonium fuel. Pro-once through enthusiasts tend to be more short to medium term focused and will highlight the economic argument for direct disposal of the fuel. This panel will continue this debate through discussing the best approaches to used fuel management. It will focus on a number of key aspects including economics, technical challenges, proliferation resistance and the final disposal solution. Perspectives will be given from a personal, organizational and country perspective by international fuel cycle experts from USA, France, UK and Belgium. To ensure a lively debate and to create full audience participation, at the beginning of the panel session the audience will be asked to vote for one of the options—once through or recycle. Following this ballot, each panelist will be given the floor to provide their perspectives. Once all panelists have presented their view, the result of the initial ballot will be made known. Following this, the remainder of the panel session will engage in a general debate between the panelists and the audience, hosted by the chair/co-chair. At the end of the debate, key insights will be summarized and a further vote taken from the audience to see how views have altered following the debate.

#### Panelists:

Roald Wigeland (INL)

Andrew Sowder (EPRI)

Cecile Evans (Areva)

Luc Van den Durpel (nuclear21.net)

Fiona Rayment (NNL)

## MONDAY, NOVEMBER 7

TECHNICAL SESSIONS - 3:35 PM

### Technical Achievement Award Lecture

**Sponsored by:** THD

**Session Organizer:** Xiaodong Sun (Ohio State) **Cochairs:** Xiaodong Sun (Ohio State), Seungjin Kim (Penn State)

**Location:** Octavius 15 & 16 **Time:** 3:35-4:35 pm

#### 3:35 pm

Thermal-Hydraulics in LWR Severe Accidents: State of the Art, Challenges and Perspectives, Nam Truc Dinh (NCSSU)

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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 8:00 AM

#### Intersection of Policy Development and Technical Innovation for Nuclear Nonproliferation and Security

**Sponsored by:** NNPD **Cosponsored by:** IRD

**Session Organizer:** Rian M. Bahran (LANL) **Chair:** Sunil Sunny Chirayath (Nuclear Security Science & Policy Inst)

**Location:** Octavius 1 **Time:** 8:00-9:40 am

**8:00 am**

Development of a Discrete Event Simulation Model for Pyroprocessing Safeguardability, R. A. Borrelli, Malachi Tolman (Univ of Idaho)

**8:25 am**

The Effect of Localized Pin Flux on Short-Term Gamma Intensities of Spent Fuel Assemblies, B. J. Adigun, H. R. Trellue, G. J. Dean, S. J. Tobin, J. D. Galloway (LANL)

**8:50 am**

Material Balance Area Design for the Transuranic Fuel Cycle Employing High Temperature Gas Cooled Reactors, Takeshi Aoki (Tokyo Inst Technol), Sunil S. Chirayath (Nuclear Security Science & Policy Inst), Hiroshi Sagara (Tokyo Inst Technol)

**9:15 am**

Estimation Technique of Cs Retention Fraction in Irradiated Nuclear Fuel with Intact/Damaged Form, Hiroshi Sagara, Kazuki Nakahara, Chi Young Han (Tokyo Inst Technol)

#### Building a Nuclear Energy and Science Education Program: Successes and Challenges of Developing a Vision for Nuclear Energy Education—Panel

**Sponsored by:** ETWDD

**Session Organizer:** Andrew E. Thomas (INL) **Chair:** Lisa Marshall (NCSU)

**Location:** Octavius 2 & 3 **Time:** 8:00-11:30 am

The emergence of new nuclear majors and minors has increased the opportunity for student exposure to nuclear-related topics. A larger number of colleges and universities have begun to include nuclear curriculum in engineering programs. This panel will explore the challenges and successes of universities and colleges that are in various stages of the program development and ABET certification process. Panelists will include faculty from several non-traditional nuclear programs to share strategies and experiences on how to grow nuclear-related curriculum and major/minor/emphasis programs.

**Panelists:**

Sama Bilbao y Leon (Virginia Commonwealth Univ)

Anil Prinja (Univ of New Mexico)

Heng Ban (Utah State Univ)

Mary Lou Dunzik Gougar (Idaho State Univ)

#### Novel Detection Methods

**Sponsored by:** RPSD

**Session Organizer:** John Kelly Mattingly (NCSU) **Chair:** Peter Caracappa (RPI)

**Location:** Octavius 6 **Time:** 8:00-9:15 am

**8:00 am**

Thin-Film Solid State Active Dosimetry, Erin Vaughan, Adam Hecht, Ganesh Balakrishnan, Sadhvikas Addamane, Eduardo Padilla (Univ of New Mexico)

**8:25 am**

Some Non-Equilibrium Effects of Gamma Dose Deposition in Brick, Robert B. Hayes (NCSU)

**8:50 am**

Evaluation of MSNDs for Fast-Neutron Detection and the TREAT Hodoscope, Priyarshini Ghosh, Wenkai Fu, Ryan Fronk, Douglas S. McGregor, Jeremy A. Roberts (Kansas State Univ)

## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 8:00 AM

#### Deterministic Transport Methods

**Sponsored by:** MCD

**Session Organizer:** Jeffery D. Densmore (BAPL) **Chair:** David P. Griesheimer (BAPL)

**Location:** Octavius 7 & 8 **Time:** 8:00-11:20 am

##### 8:00 am

Fourier Analysis of the Multilevel QD Method with Alpha-Approximation for Time-Dependent Radiative Transfer Problems, Dmitriy Y. Anistratov (NCSU)

##### 8:25 am

A Coarse-Mesh Nonlinear Diffusion Acceleration Scheme with Local Refinement for Neutron Transport Calculations, Dean Wang, Sicong Xiao, Ryan Magruder (Univ of Massachusetts Lowell)

##### 8:50 am

Using Directional Diffusion Coefficients for Nonlinear Diffusion Acceleration of the First Order SW Equations in Near-Void Regions, Sebastian Schunert (INL), Hans Hammer, Jijie Lou (Texas A&M), Yaqi Wang, Javier Ortensi, Frederick Gleicher, Benjamin Baker, Mark DeHart, Richard Martineau (INL)

##### 9:15 am

A Full Multigrid Method for the Self-Adjoint Angular Flux Equation Based on Cellwise Block Jacobi Iteration, Gabriel Kooreman (Georgia Tech), Daniel F. Gill, Jeffery D. Densmore (BAPL)

##### 9:40 am

Second-Order Method of Characteristics Through Local Cell Refinement, Justin M. Pounders (Univ of Massachusetts Lowell)

##### 10:05 am

Localized Radial Basis Functions for Radiation Transport in Slab Geometry, Brody R. Bassett, Brian C. Kiedrowski (Univ of Michigan)

##### 10:30 am

Pn-FEM Method for Solving the First-Order Neutron Transport Equation, Yunzhao Li, Chao Fang, Hongchun Wu, Liangzhi Cao (Xi'an Jiaotong Univ), Guoshu Zhang (Southwestern Institute of Physics)

##### 10:55 am

Improved Variable-Transformation Algorithm for the Hexagonal Variational Nodal Method, Yunzhao Li, Zhipeng Li, Hongchun Wu, Liangzhi Cao (Xi'an Jiaotong Univ)

#### Nuclear Safety R&D at the Department of Energy—II

**Sponsored by:** NISD

**Session Organizer and Chair:** Alan E. Levin (DOE)

**Location:** Octavius 9 **Time:** 8:00-10:05 am

##### 8:00 am

Development of Advanced Numerical Tools for the Nonlinear Seismic Analysis of Nuclear Systems, Floriana Petrone, Jenna Wong (LBNL), David McCallen, Frank McKenna (LBNL/ Univ of California, Berkeley)

##### 8:25 am

Evaluating Age Effects on HEPA Filters, Charles A. Waggoner Julie Stormo, Chris Boone, Jaime Rickert (Mississippi State Univ)

##### 8:50 am

Miniature High Temperature Testing Unit for HEPA Filter Materials R&D, Juan Nagengast (LLNL)

##### 9:15 am

High Temperature Sealants and Gaskets in Nuclear Applications, Elisa N. Carrillo, Chintalapalle V. Ramana (Univ of Texas at El Paso), Erik Brown, Mark Mitchell (LLNL)

##### 9:40 am

Recent Progress on the Stochastic Objective Decision Aide (SODA) Application, Andrew Maas, Mary Toston, Kushal Bhattarai, Chad L. Pope (Idaho State Univ), Jason P. Andrus (INL)

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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 8:00 AM

#### Advanced Manufacturing, Joining and Measurement Techniques

Sponsored by: MSTD

**Session Organizer:** Kenneth J. Geelhood (PNNL) **Chair:** Gokul Vasudevamurthy (General Atomics)

**Location:** Octavius 10 **Time:** 8:00-10:05 am

**8:00 am**

Bond Strength of Plasma Sprayed Zr Diffusion Barrier on U-Mo Fuels, Dustin R. Cummins, Kendall J. Hollis, David E. Dombrowski (LANL)

**8:25 am**

Mechanical Properties and Characterization of Coated SiC Fuel Cladding, Caen K. Ang, James Kiggans (ORNL), Craig Kemery (NEO Knoxville), Scott O'Dell (Plasma Processes), Joseph Burns, Kurt A. Terrani, Yutai Katoh (ORNL)

**8:50 am**

Sic-Sic Composite Interphase Evaluation via Small Scale Mechanical Testing, J. Kabel, M. Balooch, Y. Yang (Univ of California, Berkeley), T. Koyanagi, K. Terrani (ORNL), P. Hosemann (Univ of California, Berkeley)

**9:15 am**

Instrumentation Development for Transient Testing in TREAT, Colby Jensen (INL), Heng Ban, Charles Folsom (Utah State Univ), Robert O'Brien, Troy Unruh, Daniel Wachs, Nicolas Woolstenhulme (INL)

**9:40 am**

Chloride-Induced Stress Corrosion Cracking Characteristics of the Used Nuclear Fuel Canister Material, Yi Xie, Jinsuo Zhang (Ohio State)

#### Reactor Physics: General—II

Sponsored by: RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Carlo Parisi (INL)

**Location:** Octavius 12 **Time:** 8:00-11:20 am

**8:00 am**

Quantifying Transient Uncertainty in the BEAVRS Benchmark using Time Series Analysis Methods, Shikhar Kumar, Jingang Liang, Benoit Forget, Kord S. Smith (MIT)

**8:25 am**

Dynamic Simulation with on the Fly Doppler Broadening Treatment in RMC, Yuan Yuan, Shichang Liu, Qi Xu, Kan Wang (Tsinghua Univ)

**8:50 am**

Benchmark Comparisons of Lattice Physics Calculations for Thorium-Based Fuels in Pressure-Tube Heavy Water Reactors, A. V. Colton, B. P. Bromley, C. Dugal, H. Yan, S. Golesorkhi (Canadian Nuclear Laboratories)

**9:15 am**

Status and Ongoing Developments for the GeN-Foam Multi-Physics Solver, Carlo Fiorina (EPFL), Andreas Pautz (EP FL-Paul Scherrer Inst)

**9:40 am**

MCNP6 Modification for the Calculation of Rossi and Feynman Distributions, Alberto Talamo, Yousry Gohar (ANL)

**10:05 am**

Investigation of Heterogeneity Effects on Calculated Sensitivities of the ZPPR-15B Assemblies, Gerardo Aliberti, Michael A. Smith, Richard M. Lell (ANL)

**10:30 am**

Variational Nodal 2D/1D Transport/Diffusion Solutions of the C5G7 Benchmark Problems, Tengfei Zhang (Xi'an Jiaotong Univ), E. E. Lewis (Northwestern Univ), M. A. Smith (ANL), W. S. Yang (Purdue Univ), Hongchun Wu (Xi'an Jiaotong Univ)

**10:55 am**

An Analysis Method for Experiment Power in the ATR, Joseph W. Nielsen (Battelle Energy Alliance), David W. Nigg, Nicolas E. Woolstenhulme, A. Andy Beasley (INL)

## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 8:00 AM

#### Reactor Analysis Methods—II

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Javier Ortensi (INL)

**Location:** Octavius 13 **Time:** 8:00-10:30 am

**8:00 am**

Application of Simplified Pn Approximation to Angular Distribution of Neutron Source in MOC Calculations, Akio Yamamoto, Akinori Giho, Tomohiro Endo (Nagoya Univ)

**8:25 am**

Comparison of the Numerical Stability between CMFD and GCMR with Stabilization Techniques, Akinori Giho (Univ of Pittsburgh), Akio Yamamoto (Nagoya Univ)

**8:50 am**

Verification of the 2D Finite Element SP<sub>3</sub> Solutions, Eun Hyun Ryu, Yong Mann Song (KAERI)

**9:15 am**

Implementation of a Red-Black SOR CMFD Solver in MPACT, Shane Stimpson, Benjamin Collins (ORNL)

**9:40 am**

A Study on Reconstruction of Intra-Pin Information in Pin-Wise Reactor Analysis, Ha Xuan Nguyen, Yonghee Kim (KAIST)

**10:05 am**

Application of NEM-Based Pin-by-Pin HCMFD Algorithm to 3-D Core Analysis, Jaeha Kim, Yonghee Kim (KAIST)

#### Toward a Longer-Life Core: Thermal-Hydraulic Simulations and Experiments of Deformed Fuel Assemblies

**Sponsored by:** THD

**Session Organizer:** Anthony A. Chang (AREVA Federal Services) **Cochairs:** Brian E. Mays (AREVA Inc.), Brian Jackson (TerraPower)

**Location:** Octavius 14 **Time:** 8:00-10:55 am

**8:00 am**

Experimental Data Sets for CFD Calculations of Flow and Heat Transfer in Deformed Fuel Assemblies, Brian E. Mays (AREVA Inc.), R. Brian Jackson, Tom Reeves (TerraPower LLC), Nate Salpeter (AER Consulting)

**8:25 am**

Heated Bundle Test in AREVA Inc. Fuel Cooling Test Facility, Mathieu Martin, Kelly Duggan, Tom Galioto (AREVA NP)

**8:50 am**

Flow Field and Pressure Measurements in a 61-Pin Wire-Wrapped Bundle, R. Vaghetto, N. Goth, M. Childs, P. Jones, S. Lee, D. T. Nguyen, Y. A. Hassan (Texas A&M)

**9:15 am**

Particle Image Velocimetry Measurements in a Wire-Wrapped 61-Pin Hexagonal Fuel Bundle, N. Goth, M. Childs, P. Jones, S. Lee, D. T. Nguyen, R. Vaghetto, Y. A. Hassan (Texas A&M)

**9:40 am**

Pressure Measurements in a Wire-Wrapped 61-Pin Hexagonal Fuel Bundle, N. Goth, P. Jones, M. Childs, S. Lee, D. T. Nguyen, R. Vaghetto, Y. A. Hassan (Texas A&M)

**10:05 am**

CFD Verification and Validation of Wire-Wrapped Pin Assemblies, Daniel J. Leonard, R. Brian Jackson, K. Michael Steer, Tom Reeves (TerraPower), Nate Salpeter (AER Consulting)

**10:30 am**

Nek5000 Large-Eddy Simulations for Thermal-Hydraulics of Deformed Wire-Wrap Fuel Assemblies, Aleksandr V. Obabko, Elia Merzari, Paul F. Fischer (ANL)

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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 8:00 AM

#### Challenges in Computational Tools for Reactor Thermal Hydraulics–Panel

**Sponsored by:** THD

**Session Organizer:** Fatih Aydogan (Univ of Idaho) **Chair:** Fatih Aydogan (Univ of Idaho), Jun Liao (Westinghouse)

**Location:** Octavius 15 & 16 **Time:** 8:00-11:30 am

The newest nuclear power plants currently being developed in the United States are Generation III+ and Generation IV concepts. In addition, new experimental facilities are being designed especially in national laboratories and universities. All of them provide incentive to drive the development of innovative new capabilities in thermal fluid science and technology—capabilities that impact technologies well beyond nuclear reactors. Is there a need for continued development and improvement in thermal hydraulics computational tools and understanding to support the continued development, improvement and licensing of these Generation III+/IV designs as well as new experiments? What type of development and improvement for these tools are required to enable the deployment of these technologies? Is there a need to maintain a national capability in nuclear thermal hydraulics at all? What conditions need to exist in the U.S. NRC, vendors, utilities, national labs and in public policy to encourage those development to occur and that capability to be maintained? What would happen to these organizations if they were trying to use the old computational tools? This panel will discuss the reactor thermal hydraulics challenges and opportunities associated with computational tools for licensing, developing/designing, improving and deployment of these technologies.

#### Panelists:

Chul-Hwa Song (KAERI)

Tanju Sofu (ANL)

Yang Xingtuan (Tsinghua Univ)

Zeses Karoutas (Westinghouse)

#### Human Factors, Instrumentation and Controls: Instrumentation

**Sponsored by:** HFICD

**Session Organizer:** Kathryn Ann McCarthy (INL) **Chair:** Jamie Coble (Univ of Tennessee, Knoxville)

**Location:** Neopolitan 2 **Time:** 8:00-10:05 am

#### 8:00 am

Dead-time Calculations of N-Probe Neutron Detector using Attenuation Law, T. Akyurek (Marmara Univ), S. Usman (Missouri Univ Sci Tech)

#### 8:25 am

Dead-time Determination of Helium Detector using MCNP Code, T. Akyurek (Marmara Univ), L. P. Tucker, S. Usman (Missouri Univ Sci Technol)

#### 8:50 am

Detection of Special Nuclear Material in Cargo using Continuous Neutron Interrogation and Tension Metastable Fluid Detectors, Alex Hagen (Purdue Univ), Brian Archambault (Sagamore Adams Lab, LLC), Rusi Taleyarkhan (Purdue Univ)

#### 9:15 am

High Accuracy Signal Validation Framework for Sensor Calibration Assessment in NPPs, Anjali Muraleedharan Nair, Samuel Boring, Jamie Coble (Univ of Tennessee, Knoxville)

#### 9:40 am

Progress Towards Development of High Temperature Ultrasonic Single Element Transducer, Prathamesh N. Bilgunde, Leonard J. Bond (Iowa State Univ)

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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 8:00 AM

#### International Activities on Used Nuclear Fuel Reprocessing Regulatory Framework—Panel

**Sponsored by:** FCWMD

**Session Organizer and Chair:** Patricia D. Paviet (DOE)

**Location:** Neopolitan 3 **Time:** 8:00-11:30 am

The world energy needs is projected to increase during the coming decades. To limit the use of fossil fuel and the dangerous consequences of greenhouse effect, it's necessary and recommended to develop the sustainability of the nuclear fuel cycle. Long-term strategy for nuclear energy deployment and the availability of technologies is different from one country to the other one. Some countries have opted or will opt to recycle their used nuclear fuel panel will present and discuss the work that has been done or is being done to develop a regulatory framework for reprocessing/recycling used nuclear fuel. Presentations from the panelists will cover the technical information needed to develop a regulatory framework for potential commercial used nuclear fuel reprocessing/recycling facilities that ensures the protection of public health and safety and the environment and promotes the common defense and security.

**Panelists:**

Josquin Vernon (Autorite de Surete Nucleaire)

Min Baek (Korea Institute Nuclear Non-Proliferation and Control)

Fiona Rayment (NNL)

Sven Bader (Areva)

Patricia Paviet (DOE)

#### Used Nuclear Fuel Dry Storage Canister Inspection—

**Sponsored by:** FCWMD

**Session Organizer and Chair:** Daniel G. Ogg (NWTRB)

**Location:** Neopolitan 4 **Time:** 8:00-9:40 am

**8:00 am**

Dry Canister Storage System Inspection and Robotic Delivery System Development, Jeremy Renshaw, Shannon Chu (EPRI)

**8:25 am**

Development of Robotic Multisensor Inspection System for Used Nuclear Fuel Canisters, C. J. Lissenden, A. M. Motta, Sean Brennan, Karl Reichard (Penn State), I. Jovanovic (Univ of Michigan), T. Knight (Univ of South Carolina), J. Popovics (Univ of Illinois)

**8:50 am**

Quantitative Determination of Chlorine Concentration by Measurement of Sodium Deposited on Steel via Laser-Induced Breakdown Spectroscopy, X. Xiao, K. C. Hartig, S. Le Berre, A. T. Motta (Penn State), I. Jovanovic (Univ of Michigan)

**9:15 am**

Nondestructive Evaluation in Steel Structures using Ultrasonic Guided Waves, Lingyu Yu (Univ of South Carolina)

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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 8:00 AM

#### Your Role in ANS National Committees—Panel

**Sponsored by:** YMG

**Session Organizer and Chair:** Brett D. Rampal (NuScale Power, LLC)

**Location:** Messina **Time:** 8:00-9:45 am

ANS National Committees cover a wide variety of diverse and important areas. From Membership to Public Policy, to National Program, and everything in between, a great deal of ANS work gets done within the committees. ANS members with involvement over a wide variety of diverse committees, and roles and responsibilities therein, will discuss their experiences and how those uninitiated may become more involved.

**Panelists:**

Art Wharton (Westinghouse)

Rachel Slaybaugh (Univ of California, Berkeley)

Darby Kimball (LLNL)

Brian Collins (PNNL)

David Pointer (ORNL)

### TECHNICAL SESSIONS - 9:20 AM

#### Accelerator Applications: General

**Sponsored by:** AAD

**Session Organizer:** Peter Hosemann (Univ of California, Berkeley) **Chair:** Erich A. Schneider (Univ of Texas, Austin)

**Location:** Octavius 6 **Time:** 9:20-10:10 am

**9:20 am**

Fusion-Driven Subcritical System FDS-SFB and Its Blankes Materials Activation Analysis, Minghuang Wang, Chao Lian, Dehong Chen (CAS)

**9:45 am**

Multi-Physics Coupling to Model a RbCl-RbCl-Ga Target Stack, E. M. O'Brien, J. M. Doster (NCSU), J. W. Engle, F. M. Nortier, E. R. Olivas (LANL), J. Peebles, M. Stokely (BTI Targetry LLC), I. A. Bolotnov (NCSU)

### TECHNICAL SESSIONS - 9:45 AM

#### Chemistry R&D in Radioactive Waste Management

**Sponsored by:** FCWMD **Co-sponsored by:** YMG

**Session Organizer:** Jean-Francois Lucchini (LANL) **Chair:** He Ho Park (SNL)

**Location:** Neopolitan 3 **Time:** 9:45-11:00 am

**9:45 am**

Impacts of Tritium Management Approaches on Tritium Distribution and Capture Requirements for UNF Reprocessing, Robert T. Jubin, Barry B. Spencer (ORNL)

**10:10 am**

Product Consistency Testing of a Hot Isostatically Pressed Iodine-Containing Waste Form, Stephanie H. Bruffey, Robert T. Jubin (ORNL)

**10:35 am**

PFLOTRAN Integrated Performance Assessment at Waste Isolation Pilot Plant, HeeHo Park, Glenn Hammond (SNL)

## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 9:50 AM

#### ANS Congressional Fellowship–Panel

**Sponsored by:** YMG

**Session Organizer and Chair:** Harsh S. Desai (BMPC)

**Location:** Messina **Time:** 9:50-11:05 am

The objective of this session is to discuss the ANS Congressional Fellowship experience, the need for public policy engagement on nuclear issues, and highlight career development opportunities in public policy. The panel members will discuss their experience working with policy makers and the benefits of fellowship experience on their current and future endeavors.

**Panelists:**

Timothy E. Valentine (ORNL) - 2003 ANS Congressional Fellow

Eric P. Loewen (GE Hitachi Nuclear Energy) - 2005 ANS Congressional Fellow

Chad J. Boyer (CB&I) - 2012 ANS Congressional Fellow

Vincent Esposito (Univ of Pittsburgh) - 2013 ANS Congressional Fellow

Harsh S. Desai (DOE) - 2014 ANS Congressional Fellow

Jeremy Pearson - 2015 ANS Congressional Fellow

Benjamin Reinke - 2016 and Current ANS Congressional Fellow (Senate Energy and Natural Resources Committee - majority)

Craig H. Piercy (ANS Washington Representative)

### TECHNICAL SESSIONS - 10:10 AM

#### Education, Training and Workforce Development

**Sponsored by:** ETWDD

**Session Organizer:** John S. Bennion (GE Hitachi Nuclear) **Chair:** Marsha J. Bala (INL)

**Location:** Octavius 9 **Time:** 10:10-11:00 am

**10:10 am**

University of Nevada, Reno Graduate Certificate in Nuclear Packaging, Miles Greiner (Univ of Nevada, Reno), Yung Y. Liu (ANL), James Shuler (DOE)

**10:35 am**

The Use of Ljubljana TRIGA Reactor in Training of NPP Operators and Public Information, Igor Jencic (Jozef Stefan Inst)

#### Nuclear Fuels and Materials: Modeling

**Sponsored by:** MSTD

**Session Organizer:** Kenneth J. Geelhood (PNNL) **Chair:** Colby B. Jensen (INL)

**Location:** Octavius 10 **Time:** 10:10-11:50 am

**10:10 am**

Rethinking of Zircaloy Embrittlement Criteria for Improving Safety Margin of Light Water Reactor, Youho Lee, Bokyoung Kim, Hee Cheon No (KAIST)

**10:35 am**

Statistical Study of Primary Knock-on Atoms under Neutron Irradiation in RMC Code, Hao Li, Bingyan Zhou, Ganglin Yu, Kan Wang (Tsinghua Univ)

**11:00 am**

Modeling Crud Attachment on Fuel Surfaces—Role of Interaction Forces, Hitesh Bindra (Kansas State Univ), David Harbottle (Univ of Leeds)

**11:25 am**

Uncertainty and Sensitivity Analysis of Reactivity Insertion Accidents using BISON Fuel Performance Code, C. Folsom (Utah State Univ), C. Jensen, R. Williamson, N. Woolstenhulme (INL), H. Ban (Utah State Univ), D. Wachs (INL)

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## TUESDAY, NOVEMBER 8

### STUDENT POSTER SESSION - 11:00 AM

**Location:** Exhibit Hall (Octavius 24 & 25) **Time:** 11:00 am-1:00 pm

#### Aerospace Nuclear Science and Technology

1. Nuclear-Energy Deposition and Shock Propagation in Rubble Pile Asteroids, Harrison Agrusa (University of California, Berkeley), Robert Managan
2. Increasing the Ballistics Efficiency for a Fusion-Induced Propulsion System, Daniel A. Arizaga (University of Florida), Shirlly Spath, Leigh Winfrey

#### Biology and Medicine

3. Measuring Potassium Concentrations Utilizing Aqueous Conductivity, Jason T. Coffman (University of California, Berkeley), Jacqueline Garcia
4. Xray Synthesis of TiO<sub>2</sub>/Au Nanoparticles using NaOH and Urea as a Ligand, Maria C. Molina Higgins (Virginia Commonwealth University), Jessika Rojas Marin

#### Fuel Cycle and Waste Management

5. How to Pack Hotter SNF, Yongsoo Park (Massachusetts Institute of Technology), Thomas J. McKrell, Michael J. Driscoll
6. The Process of Plutonium and Uranium Recovery by Extraction, Gabrielle M. LaBlanc (Oregon State University)
7. Comparison of Experimental Exchange Current Density Acquisition Methods for La/La<sup>3+</sup> in LiCl-KCl Eutectic Salt, Hunter B. Andrews (Virginia Commonwealth University), Supathorn Phongikaroon PhD
8. Selecting the Optimum Nuclear Fuel Cycle using a MAUT Based Decision Model, Stephen Clement (Virginia Commonwealth University), Sama Bilbao y León
9. A New Group Crystallization Approach in Used Nuclear Fuel Recycling: A Look at Fission Product Behaviors, James C. Bunsen (Texas A&M University), Bruce A. Moyer, Jonathan D. Burns
10. Effect of Electrolyte Purity on Electrolytic Reduction of TiO<sub>2</sub>, Meng Shi (University of Idaho), Haiyan Zhao
11. Electrochemical and Thermal Behavior of BaCl<sub>2</sub> on a Liquid Bi Electrode in LiCl-KCl Melts, Michael Woods (Virginia Commonwealth University), Chaiwat Temjiraseranee, Supathorn Phongikaroon
12. NEUP IRP: Experimental Determination and Modeling of Used Fuel Drying by Vacuum and Gas Circulation for Dry Cask Storage, Patrick Moo (University of Florida), James Tulenko, Travis Knight
13. Benchmarking Fluent for Determining Cladding Temperature of Used Nuclear Fuel During Vacuum Drying using Experiment, Dilesh Maharjan (University of Nevada, Reno)
14. Berkelium Complexation with Iminodiacetic Acid, Morgan Luckey (Colorado School of Mines)

#### Fusion Energy

15. Investigation of Spheromak Plasma Cooling through Metallic Liner Spallation during Compression, Keeton T. Ross (University of California, Berkeley)
16. Surface Damage to Tungsten Resulting from Helium Ion and Deuterium Ion Implantation in DAISIE, Matthew J. Jasica (University of Wisconsin-Madison), Gerald L. Kulcinski, John F. Santarius
17. Impurity Characterization Study in DIII-D using Inductively Coupled Plasma Mass Spectroscopy, Christopher Eley (University of Tennessee)
18. Pulse Dilation Technique on Gas Cherenkov Detectors for Application in Inertial Confinement Fusion, Tyler J. Remedés (University of Florida), Hans W. Herrmann, Yongho Kim

#### Human Factors, Instrumentation, and Controls

19. Real-Time Simulation and Control of Coupled SmAHTR Reactors, Christopher J. D'Angelo (University of Pittsburgh), Daniel G. Cole
20. Development of a Modular Micro-Pocket Fission Detector Instrumentation System for Test Nuclear Reactors, Sarah R. Stevenson (Kansas State University), Michael A. Reichenberger, Dan M. Nichols, Troy C. Unruh, Jeremy A. Roberts, Tanner M. Swope, Caden W. Hilger, Douglas S. McGregor

#### Isotopes and Radiation

21. Organic Photodetectors for Low Dose Current Mode Spectroscopy, Paul Johns (University of Florida)
22. Measuring Thermal Neutron Flux for Solid-State Neutron Detector Calibration, Adam Weltz (Rensselaer Polytechnic Institute)
23. Analyzing Use of Variable Cylindrical Moderation for Neutron Source Detection and Spatial Awareness, Christopher Haseler (University of Tennessee, Knoxville), Eric Lukosi

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### STUDENT POSTER SESSION - 11:00 AM

**Location:** Exhibit Hall (Octavius 24 & 25) **Time:** 11:00 am-1:00 pm

#### Materials Science and Technology

24. Use of Plutonium Surrogates to Age-Date Interdicted Material Via Radiolytic Damage, Rachel N. Gaudet (University of Tennessee-Knoxville), Chris Eley, Duncan Brocklehurst, Josh Gurka, Jessica Bishop, Ryan Unger, Maik Lang, John Auxier II, Howard Hall
25. Conductivity, Radiolytic Effects, and Diffusion Measurements of Interdicted Time-dependent Metallic Signatures, Duncan R. Brocklehurst (University of Tennessee-Knoxville), Josh Gurka, Rachel Gaudet, Chris Eley, Jessica Bishop, Ryan Unger, Maik Lang, John Auxier II, Howard Hall
26. Comparative Microstructural Analysis of Graphite Matrix A3 and Nuclear Graphite IG-110, Ruchi Gakhar (University of Wisconsin, Madison)
27. Microstructural Creep, Fatigue and Creep-fatigue Modeling of Nickel-based Superalloy Inconel 617 at High Temperature, Xiang Zhang (Vanderbilt University), Van Tung Phan, Caglar Oskay
28. Tritium Transport in Fluoride-salt Cooled High Temperature Reactors (FHR'S), Nisarg M. Patel (University of Wisconsin, Madison), Meredy Brichford, Huali Wu, Francesco Carotti, Raluca Scarlat

#### Mathematics and Computation

29. Fringe Biasing Implementation for Implicit Monte Carlo (IMC), Jacob T. Landman (Texas A&M University), Ryan G. McClarren
30. Preliminary MCNP6 Simulations of the Year 5 Experiment, Lance Merchant (Texas A&M University)
31. Direct Accelerated Geometry Monte Carlo CAD Package Development in Shift for Radiation Transport, Kalin R. Kiesling (University of Wisconsin-Madison), Gregory G. Davidson
32. A Comparison of MCNP and PDT vs Experimental Data for Different AmBe Source Spectra, Christopher D. Bowman (Texas A&M University), Clara Abdelmessih, John Kliewer, Milan Hanus
33. Accuracy of the Discrete Generalized Multigroup Method using Truncated Basis Sets, Richard L. Reed (Kansas State University), Jeremy A. Roberts

#### Nuclear Nonproliferation

34. Advanced Superheated Bubble Detector Test Bench for Zero-Knowledge Warhead Verification, Joseph Labrum (University of California, Berkeley), Sebastien Philippe, Rob Goldston
35. Non-Destructive Assay via Gamma Spectroscopy using FIER, Isaac C. Meyer (University of California, Berkeley), B. L. Goldblum, E. F. Matthews, J. A. Brown, B. A. Ludewigt, N. R. Patel, B. J. Quiter, V. V. Mozin, E. T. E. Reedy, H. A. Seipel, A. W. Hunt
36. Characterization of MC-15 Neutron Multiplicity Detector Response using MCNP6, Gabriel Sandler (University of Florida), Scott Kiff
37. Preliminary Investigation for the Development of Surrogate Debris from Nuclear Detonations in Marine-Urban Environments, Adam Seybert (University of Tennessee)
38. Characterization of Neutron Radiation Damage of BiI3 Detectors, James Totten (University of Florida), Jyothir Nimmagadda, Kelly Jordan
39. Advanced Gas-Phase Separations of Organometallic Fission Products, Colton J. Oldham (University of Tennessee, Knoxville), S. Adam Stratz, Steven A. Jones, John D. Auxier II, Howard L. Hall

#### Operations and Power

40. Implementation of a Non-Inverting Schmitt Trigger Optical Switch, Caleb Davis (Morehouse College), Brian Davis

#### Radiation Protection and Shielding

41. Simulation of Double Sided Silicon Strip Detectors with 5 um Spatial Resolution, Jinghui Wang (Stanford University)
42. MCNP Calculation Speed Benchmark for Computational Phantoms, Miriam A. Rathbun (University of Pittsburgh), Mauritius Hiller

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## TUESDAY, NOVEMBER 8

STUDENT POSTER SESSION - 11:00 AM

**Location:** Exhibit Hall (Octavius 24 & 25) **Time:** 11:00 am-1:00 pm

### Reactor Physics

43. Evaluation of Cross-Section Libraries for Fast Reactors through PROTEUS-GCFR Benchmarking, Gareth R. Newman (University of Florida), Kelly A. Jordan
44. Self-Shielding in Fast Reactor Control Rods, Alexander A. Swenson (University of Wisconsin, Madison)
45. Burnup Estimation Methods for KSU TRIGA Fuel, Saqr M. Alshogheathri (Kansas State University), Jeremy A. Roberts
46. The Effect of Surface Tension on Liquid Mixing under Two-phase Flow in a Rod Bundle Geometry, Simon Kleinbart (City College of New York)
47. VERA to OpenMC: Verification and Validation, Travis J. Labossiere-Hickman (Massachusetts Institute of Technology), Benoit Forget

### Thermal Hydraulics

48. Flow Simulations with a Thermodynamically Consistent Equation of State for Supercritical Water Reactors, Rebecca A. Barney (University of California, Davis), Robert Nourgaliev, Jean-Pierre Delplanque, Rose McCallen
49. Conceptual Design of Containment Model using Phase Change Material (PCM) for Passive Cooling with CAP Code, Areum Ko (Korea Advanced Institute of Science and Technology (KAIST)), Hwa-Young Jung
50. Part Load Operation of KAIST Micro Modular Reactor with Modified GAMMA+ Code, Bong Seong Oh (Korea Advanced Institute of Science and Technology (KAIST)), Hwanyeol Yu, Jeong Ik Lee
51. Development of the System Analysis Code using Homogeneous Equilibrium Model for Transient Analyses of S-CO<sub>2</sub> Brayton Cycle, Seong Jun Bae (Korea Advanced Institute of Science and Technology-KAIST), Won Woong Lee, Bongseong Oh, Jeong Ik Lee
52. Experiment Investigation On the Interaction of Molten Copper in De-ionized Water and Sea Water, Yu-You Chang (National Tsing Hua University)
53. Experimental and Numerical Investigation of Supercritical CO<sub>2</sub> Critical Flow in Turbomachinery Seal Geometry, Min Seok Kim (Korea Advanced Institute of Science and Technology (KAIST)), Hwa-Young Jung, Jeong Ik Lee
54. Preliminary Test of Friction Disk Type Turbine for Small Size S-CO<sub>2</sub> Cycle Application, Seungjoon Baik (Korea Advanced Institute of Science and Technology (KAIST)), Jin Young Heo, Seong Kuk Cho, Jeong Ik Lee
55. Comparison the Steam Rankine Cycle with the Supercritical CO<sub>2</sub> Brayton Cycle as a Power Conversion System for Water-Cooled SMR, Jinsu Kwon (Korea Advanced Institute of Science and Technology (KAIST)), Jeong Ik Lee
56. Comparison of Experimental and Simulated Flow Characteristics using Positron Emission Particle Tracking, Matthew T. Herald (University of Tennessee), Nitant Patel
57. Molten Salt Static Freezing Phenomena Modeling and Benchmarking Experiment, Louis J. Chapdelaine (University of Wisconsin, Madison), Raluca Scarlat
58. A Feature Point Identification Method for Positron Emission Particle Tracking, Cody S. Wiggins (University of Tennessee, Knoxville), Nitant Patel, Roque Santos, Seth Langford, Matthew Buttrey, Arthur Ruggles
59. Tritium Management Options in FHRs, Xiao Wu (Ohio State University), Sheng Zhang, Shanbin Shi, Xiaodong Sun, Richard Christensen, Piyush Sabharwall
60. Heat Transfer Analysis in Advanced Nuclear Reactors through Simulation with Sinusoidal Heat Input over Copper Pebble Bed, Connie Lee (University of California, Berkeley)
61. Horizontal Two-Phase Flow in a Large Diameter (4-in.) Pipe, Ran Kong (Penn State University)
62. Characterization of the Elbow Effects in Bubbly Two-phase Flows, Shouxu Qiao (Penn State University), Seungjin Kim
63. Image Processing in Horizontal Plug Flow, Adam J. Rau (Penn State University), Ran Kong, Cihang Lu, Seungjin Kim
64. Investigations of Turbulence Modeling of Hexagonal Duct Flows for Sodium Fast Reactors, Lane B. Carasik (Texas A&M University), Oana Marin, Ricardo Vinuesa, Phillipp Schlatter, Elia Merzari

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## TUESDAY, NOVEMBER 8

### STUDENT POSTER SESSION - 11:00 AM

**Location:** Exhibit Hall (Octavius 24 & 25) **Time:** 11:00 am-1:00 pm

#### **Nuclear Engineering Lab Experiments**

65. Advanced Critical and Subcritical Neutron Multiplication Measurements for Nuclear Data and Computational Methods Validation, Jennifer Arthur (University of Michigan), R.M. Bahrn, J. Hutchinson, A. Sood, S. Pozzi

#### **Co-Op or Internship Experience and Results**

66. Applicability of a Tool to Organize Experiments in the Advanced Test Reactor, Monica Gehrig (Missouri University of Science and Technology)
67. Investigating the Effects of Fuel Pellet Geometry on Pellet-Cladding Mechanical Interaction (PCMI) using BISON, Kathryn Mummah (University of Illinois), Richard Williamson

#### **Student Outreach Activities**

68. Organizing State-level Political Action Groups, Kurt Harris (Utah State University), Jacob Ladd, Jeremy Pearson, Craig Piercy

#### **Best Practices for Student Sections**

69. How to Revitalize an ANS Student Chapter, Noah McFerran (University of Florida)

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**TUESDAY, NOVEMBER 8**  
**TECHNICAL SESSIONS - 1:00 PM**

**Computational Tools for Radiation Protection and Shielding**

**Sponsored by:** RPSD

**Session Organizer:** Peter F. Caracappa (RPI) **Chair:** Michael Lorne Fensin (LANL)

**Location:** Octavius 1 **Time:** 1:00-3:55 pm

**1:00 pm**

Dose Mapping from a DD Neutron Generator at the University of Sharjah, Walid A. Metwally, Osama A. Taqatqa, Mohammed M. Ballaith (Univ of Sharjah), Allan X. Chen, Melvin A. Piestrup (Adelphi Technology)

**1:25 pm**

Advanced Capability of Monte Carlo Transport and Depletion Calculation Program SuperMC for Fusion and Fission Applications, Jing Song, Lijuan Hao, Chaobin Chen, Yican Wu, FDS Team (CAS)

**1:50 pm**

Shielding Analysis of TN-32 Spent Fuel Dry Cask with SCALE, Yuan Gao, Haitang Wang, James E. Baciak, Andreas Enqvist (Univ of Florida)

**2:15 pm**

Assessment of the Multi-Step CADIS Parameters sensitivity to Neutron Flux spectrum in Shutdown Dose Rate Calculations, Ahmad Ibrahim (ORNL), Lucas J. Jacobson (Univ of Wisconsin, Madison), Scott W. Mosher, William A. Wieselquist (ORNL)

**2:40 pm**

Predicting Solar Modulation Potentials for Modeling Cosmic Background Radiation, P. A. Behne, G. E. McMath, G. W. McKinney, C. M. Marianno (LANL)

**3:05 pm**

Using Python for 3D Visualizations of MCNP Output, C. W. Arnold (Pajarito Scientific Corp.)

**3:30 pm**

Delayed-Gamma Energy Biasing with Exact Energy Sampling in MCNP 6.2.0, J. R. Tutt, C.A. Anderson, G. W. McKinney (LANL)

**Operations and Power: General—I**

**Sponsored by:** OPD

**Session Organizer:** Edward L. Quinn (Technology Resources) **Chair:** Hitesh Bindra (KSU)

**Location:** Octavius 2, 3 **Time:** 1:00-3:05 pm

**1:00 pm**

An Economic Model of a Steam Accumulator Storage System for Nuclear Power Plants, Alina LaPotin, Erich Schneider (Univ of Texas, Austin)

**1:25 pm**

The Zero-Discharge Policy and its Implications for Tritium Inventory at Columbia Generating Station, Bruce R. Hugo, Glenn M. Pierce (Energy Northwest)

**1:50 pm**

Analysis of ELAP and Mitigation Strategies in Maanshan PWR with PCTTRAN, Y. T. Hsu, J. H. Yang (Nat'l Tsing Hua Univ), S. C. Chiang, T. Y. Yu (Taiwan Power Co.), C. Shih (Nat'l Tsing Hua Univ)

**2:15 pm**

Potential Ancillary Services Revenue for Nuclear Power Plants with Thermal Energy Storage, W. Neal Mann, Erich A. Schneider (Univ of Texas, Austin)

**2:40 pm**

Systems Safety Evaluation based on System Thinking, Hiroshi Ujita (Inst for Environmental & Safety Studies)

## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 1:00 PM

#### U.S. Reactor Fleet Viability in a Challenging Financial Market

**Sponsored by:** OPD **Cosponsored by:** YMG

**Session Organizers:** Timothy M. Crook (Texas A&M), Catherine Perego (Westinghouse)

**Cochairs:** Timothy M. Crook (Texas A&M), Hitesh Bindra (KSU)

**Location:** Octavius 6 **Time:** 1:00-4:00 pm

The U.S. nuclear fleet is faced with both external and internal financial pressures. As the industry internally attempts to reduce costs through Delivering the Nuclear Promise, operating plants are being forced into early shutdown because of unfavorable market conditions driven by external factors. This panel will discuss the financial impact of corporate and governmental policies, socio-technological changes, decommissioning, and operational challenges on the nuclear energy industry. Representatives from nuclear engineering academia, nuclear energy industry, and environmental protection organizations will participate in this panel to envision the current and future roles of education, outreach, policy, and advocacy in addressing these challenges.

**Panelists:**

Michael Shellenberger (Environmental Progress) or Eric Meyer (Environmental Progress)

Kathryn McCarthy (INL)

Paul Wilson (Univ of Wisconsin)

David Fein (Exelon Corp.)

Rod Adams (Atom Insights)

#### The Nuclear Energy Advanced Modeling and Simulation Program–Panel

**Sponsored by:** MCD **Cosponsored by:** THD

**Session Organizer:** Chris Stanek (LANL) **Cochairs:** Robert Shane Johnson (DOE), Dan Funk (DOE)

**Location:** Octavius 7 & 8 **Time:** 1:00-4:00 pm

Modeling and simulation has a long history with researchers and scientists exploring nuclear energy technologies. Researchers and scientists in Nuclear Energy Advanced Modeling and Simulation (NEAMS) program are developing a predictive modeling and simulation toolkit for the design and analysis of current and future nuclear energy systems using computing architectures from laptops to leadership class facilities. The NEAMS program organizes its R&D activities into three distinct categories: the Fuels Product Line, the Reactors Product Line and the Integration Product Line. The Fuels Product Line is developing improved, mechanistic, and predictive models for fuel performance using hierarchical, multiscale modeling–applied to existing, advanced (including accident tolerant) and used fuel. The Reactor Product Line team is developing high-fidelity, coupled-physics design tools to study the full nuclear reactor system, with a specific emphasis on advanced reactor technologies. The Integration Product Line provides the capability to couple the Fuels and Reactors Product Lines: entirely new classes of problems can be tackled with fidelity never before attained. In addition to the product lines NEAMS funds High Impact Problem (HIP) projects focused on demonstrating the use of NEAMS tools to solve pressing nuclear engineering problems. Two HIP projects are currently funded focusing on Accident Tolerant Fuels and Flow Induced Vibrations in Advanced Steam Generators. This panel will provide an overview of the five components of the program as well as an opportunity to meet its national leadership.

**Panelists:**

Chris Stanek (LANL)

Steve Hayes (INL)

Tanju Sofu (ANL)

Bradley Rearden (ORNL)

Jason Hales (INL)

Elia Merzari (ANL)

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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 1:00 PM

#### Current Topics in Probabilistic Risk Analysis—I

**Sponsored by:** NISD

**Session Organizer:** Virginia D. Cleary-Ivanoff (LANL) **Chair:** Girja Shukla (NRC)

**Location:** Octavius 9 **Time:** 1:00-3:55 pm

**1:00 pm**

Pruning of Discrete Dynamic Event Trees using Density Peaks and Dynamic Time Warping, N. S. Martin, M. R. Denman, T. A. Wheeler (SNL)

**1:25 pm**

Preliminary Cyber-Informed Dynamic Branch Conditions for Analysis with the Dynamic Simplified Cyber MELCOR Model, M. R. Denman, P. L. Turner, R. A. Williams, J. N. Cardoni T. A. Wheeler (SNL)

**1:50 pm**

Effect of Aging and Demand for Reliability Analysis of Degrading Components, Muzhi Zhu, Rachit Aggarwal (Ohio State), Shannon M. Bragg-Sitton (INL), Carol S. Smidts (Ohio State)

**2:15 pm**

Finite-Test-Case Development to Demonstrate Logical Integrity of Software in DRPS, Sung Min Shin (KAERI), Hyun Gook Kang (KAIST), Jaehyun Cho, Wondea Jung (KAERI)

**2:40 pm**

Dynamic Importance Measures in the ADAPT Framework, Zachary K. Jankovsky (Ohio State), Matthew R. Denman (SNL), Tunc Aldemir (Ohio State)

**3:05 pm**

Tuning and Verification of an Internal Flooding Model for Dynamic PRA, Zachary Jankovsky (Ohio State), Richard Denning (Richard Denning, Consultant), Tunc Aldemir (Ohio State)

**3:30 pm**

Rich-Text based PSA Model Transformation and Verification in Risk A, Shanqi Chen, Jin Wang, Jiaqun Wang, Fang Wang, Tongqiang Dang, FDS Team (CAS)

#### Focus on Communications: Talking About Nuclear Waste—What Works and What Doesn't—I—Panel

**Sponsored by:** ETWDD

**Session Organizer and Chair:** Laura Hermann (Potomac Communications Group, Inc.)

**Location:** Octavius 10 **Time:** 1:00-2:30 pm

The long-term storage of nuclear waste continues to have technical solutions but not political ones. In this session experts will discuss how they communicate about a variety of approaches to managing nuclear waste. These include jump-starting the Yucca Mountain project, the U.S. Department of Energy's approach to consent-based siting along with various approaches to recycling. This is one area where how we talk about the issue and solutions is critically important to generating public support.

**Panelists:**

Maureen Brown (SCE)

Gary Duarte (U.S. Nuclear Energy Foundation)

Candice Trummel (Office of the Deputy Secretary of Energy)

Sama Bilbao y Leon (Virginia Commonwealth Univ)

## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 1:00 PM

#### Reactor Physics: General—III

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Florent Heidet (ANL)

**Location:** Octavius 12 **Time:** 1:00-3:05 pm

##### 1:00 pm

Enrichment Penalty for Molybdenum Cladded Accident Tolerant Fuel, Steven A. Thompson (Dominion)

##### 1:25 pm

Mesh Adaptive Search Optimization in SERPENT2 Stereolithography Geometry, A. Talamo, Y. Gohar (ANL), J. Leppänen (VTT)

##### 1:50 pm

Measurement of Kinetic Parameters by Oscillated Experiments, Sandra Dulla, Hoh Siew Sin, Piero Ravetto (Politecnico di Torino), Paolo Saracco (INFN)

##### 2:15 pm

Treatments for Neutron Resonance Elastic Scattering using the Multipole Formalism in Monte Carlo Codes, Vivian Y. Tran (MIT), Jonathan A. Walsh (LLNL), Benoit Forget (MIT)

##### 2:40 pm

Neutronics Analysis of Fuel-in Fiber Concept, Briana Hiscox, Korooush Shirvan (MIT)

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

**Sponsored by:** NCS

**Session Organizer:** Deborah Ann Hill (NNL) **Chair:** Kevin H. Reynolds (Y-12 National Security Complex)

**Location:** Octavius 13 **Time:** 1:00-3:55 pm

##### 1:00 pm

Point Kinetics Modelling of Decay Heat and the Xenon Effect, George E. Adams, Christopher M. Cooling, Matthew D. Eaton (Imperial College London)

##### 1:25 pm

Transitions from Stochastic to Point Kinetics Models In Fissile Solutions, C. M. Cooling, G. E. Adams, M. D. Eaton (Imperial College London)

##### 1:50 pm

The Criticality Safety Program of the Swedish Nuclear Fuel and Waste Management Co (SKB), Fredrik Sten Johansson (SKB)

##### 2:15 pm

Evaluation of Neutron Absorber Panels from Zion Spent Fuel Pool, Hatice Akkurt (EPRI), Matt Harris, Ashleigh Quigley (Curtiss-Wright Corp.)

##### 2:40 pm

A Practical Assessment of the Effect of Water Interspersed with Plutonium Metal Hemishells —Summary, Ning Zhang, Mark V. Mitchell, David K. Miko (LANL)

##### 3:05 pm

Characterization of a Polyethylene Moderated Highly Enriched Uranium System, George McKenzie, Joetta Goda, Travis Grove, Rene Sanchez (INL)

##### 3:30 pm

Generation of Low Fidelity Experimental Covariance Matrices for ICSBEP Cases, Ian Hill (Nuclear Energy Agency)

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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 1:00 PM

#### Two-Phase Flows—I

**Sponsored by:** THD

**Session Organizer:** Seungjin Kim (Penn State) **Cochairs:** Bao-Wen Yang (XJTU), Seungjin Kim (Penn State)

**Location:** Octavius 14 **Time:** 1:00-3:55 pm

**1:00 pm**

Characterization of Impedance Void Meter Performance in Two-Phase Flow Measurement, Zhuoran Dang, Peng Ju, Yang Zhao, Xiaohong Yang, Robert Bean, Mamoru Ishii (Purdue Univ)

**1:25 pm**

Local Measurement in Annular Flows using a Two-Sensor Droplet-Capable Conductivity Probe, Qingzi Zhu (Purdue Univ), Joshua P. Schlegel (Missouri Univ Sci Tech), Xiaohong Yang (Purdue Univ), Yang Liu (Virginia Tech), John R. Buchanan (Bechtel Marine Propulsion Corp.), Mamoru Ishii (Purdue Univ)

**1:50 pm**

A Semi-Empirical Correlation for Counter-Current Flow Limitation in a Vertical Pipe, Katsuya Mori, Kosuke Hayashi, Shigeo Hosokawa, Akio Tomiyama (Kobe Univ)

**2:15 pm**

Comparison of 3-D Bubble Reconstruction Algorithms, Yucheng Fu, Yang Liu, (Virginia Tech)

**2:40 pm**

Image Analysis for Plug Bubbles in Horizontal Flow, Adam Rau, Ran Kong (Penn State), Stephen Bajorek (NRC), Kirk Tien, Chris Hoxie (NRC)

**3:05 pm**

X-Ray Spectral Analysis for Void Fraction Measurement, Kyle Song, Yang Liu (Virginia Tech)

**3:30 pm**

Drift-Flux Analysis in Horizontal Two-Phase Flow, Ran Kong, Seungjin Kim (Penn State), Stephen Bajorek (NRC), Kirk Tien, Chris Hoxie (NRC)

#### General Thermal Hydraulics—I

**Sponsored by:** THD

**Session Organizer:** Huajian Chang (State Nuclear Power Technology R&D Ctr)

**Cochairs:** Kurshad Muftuoglu (GE Hitachi Nuclear Energy), Selim Kuran (NuScale Power LLC)

**Location:** Octavius 15 & 16 **Time:** 1:00-3:55 pm

**1:00 pm**

Sensitivity Tests of Aluminum Precipitate Preparation Methods on Head Loss through Debris Beds on a Sump Screen, Saya Lee, Vasileios Kyriakopoulos, Suhaeb S. Abdulsattar, Rodolfo Vaghetto, Yassin A. Hassan (Texas A&M), Janet J. Leavitt (Alion Science & Technology Corp.)

**1:25 pm**

Development and Verification of MATLAB Functions for Pressure Drop Estimation in Crossflow Tube Bundles, J. B. Haefner, L. B. Carasik, Y. A. Hassan (Texas A&M)

**1:50 pm**

Mixed Effects Associated with Air Ingress in Graphite Channels, Daniel Gould, Hitesh Bindra (Kansas State Univ)

**2:15 pm**

Vibration Analysis of Advanced Test Reactor Mini-Plate Hydraulic Test in the OSU HMFTF, G. D. Latimer, W. R. Marcum, T. K. Howard (Oregon State Univ), W. F. Jones, A. M. Phillips, N. E. Woolstenhulme (INL), A. W. Weiss (Oregon State Univ)

**2:40 pm**

An Approach to Assessment of Added Mass for a Plate in a Channel, T. K. Howard, W. R. Marcum (Oregon State Univ)

**3:05 pm**

Comparison of Calculated and Experimental Flows and Pressures in the Orifice Flow Test Facility, Juan J. Carbajo, Joel L. McDuffee, David K. Felde (ORNL)

**3:30 pm**

SIT Makeup Effect on the Loss of Residual Heat Removal during Mid-Loop Operation, Cheolwoo Kim, Yonghee Lee, Jongcheol Park (KEPCO E&C)

## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 1:00 PM

#### Severe Accident Modeling and Experiments for Advanced Reactor Safety

**Sponsored by:** THD

**Session Organizer:** Adrian Tentner (ANL) **Co-chairs:** Adrian Tentner (ANL), Heung Seok Kang (KAERI)

**Location:** Neopolitan 2 **Time:** 1:00-3:30 pm

**1:00 pm**

Sodium Spray Fire Simulations using CONTAIN-LMR, Andrew J. Clark, Matthew Roy Denman (SNL)

**1:25 pm**

Experimental Study of Molten Metallic Fuel Relocation in Sodium-Filled Fuel Structures, Taeil Kim, Dzmitry Habaruk, Craig D. Gerardi, Mitchell Farmer, Yoon Il Chang (ANL)

**1:50 pm**

Validation of Advanced In-Pin Metallic Fuel Models of SAS4A, Aydin Karahan, Adrian M. Tentner (ANL), Seok-Hun Kang (KAERI)

**2:15 pm**

SAS4A Model Development for the Analysis of Postulated Severe Accidents in Metal Fuel Sodium Fast Reactors A. M. Tentner (ANL), S. H. Kang (KAERI), A. Karahan (ANL)

**2:40 pm**

Effects of Coolant Void Condition on Melt Fragmentation using Simulants in Initial Phase of Metal-Fueled SFR Severe Accident, Hyo Heo, Min Ho Lee (UNIST), Dong Wook Jerng (Chung-Ang Univ), In Cheol Bang (UNIST)

**3:05 pm**

Validation Study in SAS4A Code in Simulated Mild TOP Condition, Kenichi Kawada, Tohru Suzuki (JAEA)

#### Progress in DOE's Fuel Cycle Technologies Program—Panel

**Sponsored by:** FCWMD

**Session Organizer:** Jack D. Law (INL) **Chair:** Patricia Paviet (DOE)

**Location:** Neopolitan 3 **Time:** 1:00-4:00 pm

The objective of this session is to disseminate information and stimulate discussion regarding recent research and development (R&D) progress by early to mid-career researchers in the U.S. Department of Energy's (DOE's) Fuel Cycle Technologies (FCT) program. The session will consist of technical presentations provided by researchers in several technical areas of the FCT program. Talks will cover a broad range of subjects, including but not limited to: separation technologies, waste form development, innovative fuels, systems analysis, used fuel disposition, material protection and control, and modeling/simulation. The participants will also be recognized by DOE for their contributions to the FCT Program.

**Panelists:**

Fuel Cycle Options, Sonny Kim (PNNL)

MRWFD, Pepa Matyas (PNNL, Santa Jansone-Popova (ORNL)

Fuels, Assel Aitkaliyeva (INL), Chris Petrie (ORNL)

MPACT, Cari Launiere (ANL), Greg Galbreth (INL)

UFD, Charles Bryan (SNL)

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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 1:00 PM

#### Used Nuclear Fuel Dry Storage Canister Inspection—II

**Sponsored by:** FCWMD

**Session Organizer and Chair:** Daniel G. Ogg (NWTRB)

**Location:** Neopolitan 4 **Time:** 1:00-2:40 pm

##### 1:00 pm

Regulatory Basis for Dry Spent Nuclear Fuel Storage Canister Inspections, Rodney McCullum (Nuclear Energy Inst), Brian Gutherman (Gutherman Technical Services)

##### 1:25 pm

Estimating the Penetration Depth and Orientation of Stress Corrosion Cracks using Time-Reversal Acoustics, Marcel C. Remillieux, Pierre-Yves Le Bas (LANL), Lukasz Pieczonka (AGH Univ of Science and Technology), Brian E. Anderson (Brigham Young Univ), T. J. Ulrich (LANL)

##### 1:50 pm

Remote Monitoring for Stress Corrosion Cracking in Dry Cask Storage Systems, Paul Ziehl (Univ of South Carolina), Bruce Greer, Jeremy Renshaw (EPRI)

##### 2:15 pm

Inspection of Dry Storage Casks using PGAA and NAA Techniques, Jason Brookman, Zeev Shayer (CSM)

#### Updates from Ongoing Nuclear Decommissioning Projects in U.S. and Canada: An Executive Leadership—Panel

**Sponsored by:** DESD

**Session Organizer and Chair:** Brooke Traynham (PricewaterhouseCoopers LLP)

**Location:** Milano 1 **Time:** 1:00-4:00 pm

The purpose of this session is to showcase progress and lessons learned from ongoing U.S. Commercial nuclear decommissioning projects. Executive leadership from several utilities will share their stories of challenges and accomplishments while planning and performing this work. This session will provide valuable insights to the other industry owners, decision makers, and vendors who are navigating the unthinkable path of shutting down yet another well performing plant due to the current transient energy market price depression.

##### Panelists:

Peter Swigart (Entergy)

Chris Massey (Atkins)

John Sauger (EnergySolutions)

Chris Wilson (Exelon)

Matt Marston (AECOM)



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## TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 2:00 PM

#### Potent Policies: Understanding ANS Position Papers—Panel

**Sponsored by:** YMG

**Session Organizer and Chair:** Jitesh A. Kuntawala (Duke Energy) **Chair:** Catherine Perego (Westinghouse)

**Location:** Messina **Time:** 2:00-4:00 pm

The American Nuclear Society provides statements which reflect the Society's perspectives on issues of public interest that involve various aspects of nuclear science and technology. Position statements are prepared by key members whose relevant experience or publications inform the documents and then the documents are reviewed by ANS committees and divisions. Panelist will introduce members of ANS to the various position statements, the process by which they come to fruition, and will field questions on all all aspects of the policy statements.

**Panelists:**

Paul Dickman (ANL)

Steve Nesbit (Duke Energy)

Craig Piercy (ANS Washington DC Representative)

Nick Thompson (RPI)

Daniel Curtis (MIT)

Chad Boyer (WECTEC)

### TECHNICAL SESSIONS - 2:35 PM

#### Focus on Communications: A Picture is Worth a Thousand Words—And People Pay Attention to Them—II—Panel

**Sponsored by:** ETWDD

**Session Organizer and Chair:** Mimi H. Limbach (Potomac Communications Group, Inc.)

**Location:** Octavius 10 **Time:** 2:35-4:05 pm

In our time-crunched, information-rich, digital society, many people don't read much anymore. Instead they look at headlines, photos and graphics. The nuclear energy industry is catching up to this trend. Several organizations have made major progress in their visual communications. In this workshop-style session, participants are invited to bring their best examples of visual communications - info-graphics, illustrations, charts, etc. - and share them with the audience.

**Panelists:**

Jason Bohne (Consolidated Nuclear Security)

Fred Digler (Black Mountain Research)

David Schumacher (Magnetic Media Productions)

Jaime Williams (NEI)

### TECHNICAL SESSIONS - 3:10 PM

#### Reactor Analysis Methods—III

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Stephanie A. Kempf (BMPC)

**Location:** Octavius 12 **Time:** 3:10-4:50 pm

**3:10 pm**

Comparison of Fuel Loading Pattern Optimization Results using Exhaustive Search for Fresh Fuels and Local Search for Burned Fuels, Satomi Ishiguro, Tomohiro Endo, Akio Yamamoto (Nagoya Univ)

**3:35 pm**

A Methodology for Loading the Advanced Test Reactor Driver Core for Experiment Analysis, Wilson M. Cowherd (INL), Joseph W. Nielsen (Battelle Energy Alliance), Dong Choe (INL)

**4:00 pm**

Solution of the C5G7 Benchmark using the MOCUM Transport Code with ANSYS Unstructured Mesh, Makanjuola M. Adara, Xue Yang (Texas A&M, Kingsville)

**4:25 pm**

Neutronics and Computational Fluid Dynamics Analyses for a Natural Circulation Loop of Molten Fuel Salt, R. J. Sheu, C. H. Chuang, Y. M. Ferng (Natl Tsing Hua Univ), O. Feynberg (Kurchatov Inst)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Advanced Reactors–Panel

**Sponsored by:** OPD

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

**Location:** Octavius 1 **Time:** 8:00-9:45 am

The panel will focus on efforts to accelerate their commercialization of small modular reactors and advanced reactors. The panelists will cover various key aspects: technical challenges, economics/energy market changes and deployment strategy.

**Panelists:**

Alice Caponiti (DOE)

Andrew Sowder (EPRI)

Fiona Rayment (UK National Nuclear Laboratory)

Han Kwon Choi (AECOM)

#### Nuclear Politics: Advocacy–Panel

**Sponsored by:** YMG

**Session Organizer:** Harsh S. Desai (BMPC) **Chair:** Brett Rampal (NuScale Power, LLC)

**Location:** Octavius 2 & 3 **Time:** 8:00-9:45 am

The importance of advocacy for the modern nuclear industry cannot be discounted. Experienced experts will discuss and interact with the audience on the need for public engagement on nuclear issues, their own personal involvement in nuclear policy efforts, general nuclear advocacy, and future efforts to advocate for the nuclear industry.

**Panelists:**

Nick Thompson (RPI)

Brett Rampal (NuScale Power, LLC)

Craig Piercy (ANS DC Representative)

Ben Reinke (ANS Congressional Fellow)

#### Emerging Issues in Supply Chain–Panel

**Sponsored by:** OPD

**Session Organizer:** Luis M. Sanchez (United Controls International) **Chair:** James V. Gilbert (EXCEL Services Corp)

**Location:** Octavius 6 **Time:** 8:00-11:30 am

This panel will focus on new challenges faced by NPPs and the supply chain during dedication of replacement components. The panelists will cover various key aspects: replacement components technical challenges, global market changes and new dedication strategy.

**Panelists:**

Luis Sanchez (United Controls International)

Divya Paidy (United Controls International)

# Technical Sessions: Wednesday November 9

## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Computational Methods

**Sponsored by:** MCD

**Session Organizer:** Jeffery D. Densmore (BAPL) **Chair:** Barry D. Ganapol (Univ of Arizona)

**Location:** Octavius 7 & 8 **Time:** 8:00-10:55 am

#### 8:00 am

GPU Acceleration of History-Based Multigroup Monte Carlo, Steven P. Hamilton, Thomas M. Evans, Stuart R. Slattery (ORNL)

#### 8:25 am

GPU Acceleration of Kernel Density Estimators in Monte Carlo Neutron Transport Simulations, Timothy P. Burke, Brian C. Kiedrowski, William R. Martin (Univ of Michigan), Forrest B. Brown (LANL)

#### 8:50 am

Algorithmic Improvements for Portable Event-Based Monte Carlo Transport using the Nvidia Thrust Library, Ryan C. Bleile, Patrick S. Brantley, Matthew J. O'Brien (LLNL), Hank Childs (Univ of Oregon)

#### 9:15 am

Performance Improvements to the Cross Section Calculation in MPACT, Yuxuan Liu (Univ of Michigan), Shane Stimpson, Kang-Seog Kim, Benjamin Collins (ORNL), Brendan Kochunas (Univ of Michigan)

#### 9:40 am

Penalty-Free Method for Multi-Constrained Optimization Problems Based on Parallel Simulated Annealing, David J. Kropaczek (NCSU)

#### 10:05 am

Conditional Tree Reduction in the ADAPT Framework, Zachary K. Jankovsky (Ohio State), Matthew R. Denman (SNL), Tunc Aldemir (Ohio State)

#### 10:30 am

Extension of the ADAPT Framework for Multiple Simulators, Zachary K. Jankovsky (Ohio State), Matthew R. Denman (SNL), Tunc Aldemir (Ohio State)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Current Topics in Probabilistic Risk Analysis—II

**Sponsored by:** NISD

**Session Organizer:** Virginia D. Cleary-Ivanoff (LANL) **Chair:** Matthew R. Denman (SNL)

**Location:** Octavius 9 **Time:** 8:00-10:30 am

##### 8:00 am

A Statistical Testing Approach for Quantifying Software Reliability: Application to an Example System, Tsong-Lun Chu, Athi Varuttamaseni, Joo-Seok Baek (BNL)

##### 8:25 am

Probabilistic Risk Assessment of Spent Fuel Pool Cooling System Failure Considering Safety and Security Initiating Events, Mohammad A. Hawila, Sunil S. Chirayath (Texas A&M)

##### 8:50 am

Identification of Significant NPP Cyber-Attack Scenarios based on Risk Information, Jong Woo Park, Seung Jun Lee (Ulsan Natl Inst Sci Tech)

##### 9:15 am

Analysis of Time Dependent Data and PRA, D. Mandelli, D. Maljovec, A. Alfonsi, C. Picoco, C. Smith, C. Rabiti (INL)

##### 9:40 am

A Simplified Multi-Path Event Tree for the Integral, Inherently-Safe Light Water Reactor (I2S-LWR), Kellen R. McCarroll, John C. Lee (Univ of Michigan)

##### 10:05 am

Development of a Severe Accident Analysis Engine using Approximate Reasoning, Joomyung Lee, Nam Dinh (NCSU), Tran Cao Son (New Mexico State Univ)

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

**Sponsored by:** NCSU

**Session Organizer:** Deborah Ann Hill (NNL) **Chair:** Larry L. Wetzel (BWV Technologies, Inc.)

**Location:** Octavius 10 **Time:** 8:00-11:20 am

##### 8:00 am

Validation of Criticality Analysis Capability of SuperMC with ICSBEP, Chaobin Chen, Qi Yang, Bin Wu, Guangyao Sun, FDS Team (CAS)

##### 8:25 am

New Version of the MCNP Analytic Criticality Benchmark Suite, Forrest B. Brown (LANL)

##### 8:50 am

Verification of MCNP6.1, MCNP6.1.1, and MCNP6.2-Pre for Criticality Safety Applications, Forrest B. Brown, Michael E. Rising (LANL)

##### 9:15 am

Validation of <sup>233</sup>U-Fueled Systems in KENO V.a in SCALE 6.2, J. A. Hanna, R. A. L. Rosenthal (U.S. Naval Academy), W. J. Marshall, D. E. Mueller (ORNL), E. L. Jones (Univ of Tennessee, Knoxville), S. R. Blair (U. S. Naval Academy), B. T. Rearden (ORNL)

##### 9:40 am

Adjoint-Based Sensitivity and Uncertainty Analysis for Density and Composition: A User's Guide, Jeffrey A. Favorite (LANL), Brian C. Kiedrowski (Univ of Michigan), Christopher M. Perfetti (ORNL)

##### 10:05 am

A Case Study in the Application of TSUNAMI-3D—Part 1, Multigroup, W. J. Marshall (ORNL), E. L. Jones (Univ of Tennessee, Knoxville), B. T. Rearden, M. E. Dunn (ORNL)

##### 10:30 am

A Case Study in the Application of TSUNAMI-3D—Part 2, Continuous Energy, E. L. Jones (Univ of Tennessee, Knoxville), W. J. Marshall, B. T. Rearden, M. E. Dunn (ORNL), G. I. Maldonado (Univ of Tennessee, Knoxville)

##### 10:55 am

Nuclear Data Testing of Pu<sup>239</sup> CIELO Evaluation with NDaST, Ian Hill (Nuclear Energy Agency), James Dyrda (OECD/NEA)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Reactor Physics: General—IV

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Massimiliano Fratoni (Univ of California, Berkeley)

**Location:** Octavius 12 **Time:** 8:00-10:55 am

##### 8:00 am

Small CaH<sub>2</sub> Moderated Thermal Reactor for Surface Power Generation I: Conceptual Design, Rei Kimura, Taishi Yoshida, Satoshi Wada, Yoshihiro Hyodo, Yoshiro Nishioka, Kunio Hoshino (Toshiba)

##### 8:25 am

Small CaH<sub>2</sub>-Moderated Thermal Reactor for Surface Power Generation II: Core Neutronics Design, Satoshi Wada, Rei Kimura, Taishi Yoshida, Yoshiro Nishioka, Yoshihiro Hyodo, Kunio Hoshino (Toshiba)

##### 8:50 am

Optimal Temperature Grid for Accurate Doppler Kernel Reconstruction, Pablo Ducru, Karia Dibert, Colin J. Josey, Benoit Forget (MIT), Vladimir Sobes (ORNL), Kord Smith (MIT)

##### 9:15 am

Benchmark for Free-Gas Elastic Scattering with the Heavy-Gas Model and Piecewise-Constant Cross Sections, Matthew A. Gonzales, Anil K. Prinja (Univ of New Mexico), Brian C. Kiedrowski (Univ of Michigan), Forrest B. Brown (LANL)

##### 9:40 am

Ab Initio Generation of Thermal Neutron Scattering Law for Uranium Dioxide, J. L. Wormald, A. I. Hawari (NCSU)

##### 10:05 am

Impact of Spatial Discretization on Reactivity Biases in Depleted TRIGA Fuel, Ye Cheng, Jeremy A. Roberts (Kansas State Univ)

##### 10:30 am

A BWR Fuel Assembly Concept with Partial Segregation of Fertile Material, F. Y. Odeh, W. S. Yang (Purdue Univ)

#### Fast Reactors

**Sponsored by:** RPD

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

**Location:** Octavius 13 **Time:** 8:00-11:20 am

##### 8:00 am

Improved Gamma Yield and Interaction Cross-Section Libraries of MC2-3, B. K. Jeon, W. S. Yang (Purdue Univ), C. H. Lee (ANL)

##### 8:25 am

Coupled Neutron and Gamma Heating Calculation Based on VARIANT Nodal Transport Method, Puran Deng, Won Sik Yang, Gang Yang (Purdue Univ)

##### 8:50 am

MC<sup>2</sup>-3/DIF3D Analysis of the ZPPR-15B Foil Measurements, M. A. Smith, R. M. Lell, C. H. Lee, R. N. Hill (ANL)

##### 9:15 am

Impact of Americium-241 (n, γ) Branching Ratio on SFR Core Reactivity and Spent Fuel Characteristics, Hikaru Hiruta, Gilles J. Youinou, Brent W. Dixon (INL)

##### 9:40 am

SE2-ANL Subchannel Analysis with New Heating Calculation Based on VARIANT Transport Code, G. Yang, W. S. Yang, P. Deng (Purdue Univ)

##### 10:05 am

CANDLE Burning Reactor with Plutonium Fuel Start-up Core, Toru Obara, Jun Nishiyama, Hiroki Osato (Tokyo Inst Technol)

##### 10:30 am

Ultra-Long-Life Cores having Axial Blanket-Driver-Blanket Burnup Strategy with Thorium and PWR Spent Fuels, Ser Gi Hong, HaeLee Hyun, Wuseung Seung You (Kyung Hee Univ)

##### 10:55 am

An Investigation on the Sustainability of a Sodium-Cooled Breed-and-Burn Fast Reactor (B&BR), Chihyung Kim (KAIST), Donny Hartanto (KAERI), Yonghee Kim (KAIST)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Subchannel Thermal-Hydraulic Analysis—I

**Sponsored by:** THD

**Session Organizer:** Maria N. Avramova (NCSU) **Cochairs:** Hisashi Ninokata (Politecnico di Milano), Frank Buschman (Bettis)

**Location:** Octavius 14 **Time:** 8:00-11:20 am

##### 8:00 am

CTF Parallel Performance Improvements, R. Salko (ORNL), S. Palmtag (Core Physics, Inc.), B.. Collins (ORNL)

##### 8:25 am

Improvement of Wall Drag Modeling Capabilities of CTF, Aysenur Toptan (NCSU), Robert K. Salko (ORNL), Maria Avramova (NCSU)

##### 8:50 am

Assessment of the Cobra-TF Post-CHF Models using FEBA Experimental Data, Jorge Perez, Christophe Schneidesch (Tractebel ENGIE), Javier Jimenez (KIT)

##### 9:15 am

Advances in Fuel Rod Modeling in Subchannel Thermal-Hydraulic Codes, Aysenur Toptan, Maria Avramova (NCSU)

##### 9:40 am

Towards a Neutronic and Thermal-Hydraulic Safety Analysis of PWR Fuel Bow with SIMULATE5 and COBRA-TF, M. Seidl, A. Wensauer, D. Janin (E.ON Kernkraft GmbH), L. Belblidia (Studsvik Scandpower)

##### 10:05 am

Comparison of Subchannel and Averaged Channel Thermal-Hydraulic Descriptions on Coupled Pin-By-Pin Neutronic Calculations, Adrian Sabater, Diana Cuervo, Santiago Sánchez-Cervera (UPM)

##### 10:30 am

Integration and Coupling of ATHLET, CTF and DYN3D on the Salomé Platform—Application to a MSLB Transient, Yann Perin, Kiril Velkov (GRS)

##### 10:55 am

Characteristics of Axial Power Shape and Flow Field at Low Flow Condition, Chong Kuk Chun, Beomjun Jang, Hyeongseog Kim, Joo Il Yoon, Hae-seuk Woo (Kepco Nuclear Fuel)

#### Large Eddy Simulation and Direct Numerical Simulation

**Sponsored by:** THD

**Session Organizer:** Igor A. Bolotnov (NCSU) **Cochairs:** Aleksandr V. Obabko (ANL), Jun Fang (NCSU)

**Location:** Octavius 15 & 16 **Time:** 8:00-10:30 am

##### 8:00 am

Single Bubble Drag Force Evaluation in Turbulent Flow based on DNS Results, Jinyong Feng, Igor A. Bolotnov (NCSU)

##### 8:25 am

Single-Bubble Flow Boiling Phenomena—Interface Tracking Simulation, Mengnan Li, Igor A. Bolotnov (NCSU)

##### 8:50 am

Two-Phase Flow Regime Transition Study using Level-Set Method, Matthew D. Zimmer, Igor A. Bolotnov (NCSU)

##### 9:15 am

DNS Study of Supercritical CO<sub>2</sub> Flow using Spectral Element Code Nek5000, Haomin Yuan, Elia Merzari, Yiqi Yu (ANL)

##### 9:40 am

Large Eddy Simulations for a Helical Coil Steam Generator, J. K. Lai (Texas A&M), E. Merzari (ANL), S. J. Lee, M. Delgado, S. Lee, Y. A. Hassan (Texas A&M)

##### 10:05 am

Simulations of a Helical Tube Bundle in Cross-Flow for Application to Flow-Induced Vibration, Adam Kraus, Haomin Yuan, Elia Merzari (ANL)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Experimental Thermal Hydraulics—I

**Sponsored by:** THD

**Session Organizer:** Craig D. Gerardi (ANL) **Cochairs:** Wade R. Marcum (Oregon State Univ), Si Young Lee (SRNL)

**Location:** Neopolitan 2 **Time:** 8:00-11:45 am

##### 8:00 am

Finding MP and CP using Ultrasonic Velocity Profile on Rectangular Twin Jets, Arturo Cabral, Saya Lee, Yassin A. Hassan (Texas A&M)

##### 8:25 am

A Radiotracer Assessment of Pulsatile Flow, Nitant Patel, Cody Wiggins, Arthur Ruggles (Univ of Tennessee, Knoxville)

##### 8:50 am

Mapping Turbulent Flow around a Rod Bundle Induced by a 5x5 PWR Mixing Vane Grid using Particle Tracking Velocimetry, Carlos Estrada-Perez, Nasan Tsengeg, Ezra Hein, Yassin A. Hassan (Texas A&M)

##### 9:15 am

Distributed Temperature Sensing within a 19-Pin Wire-Wrapped Fuel Bundle Model, S. Lomperski, N. Bremer (ANL)

##### 9:40 am

The Dynamic Response of a Wire-Wrapped Pin—A New Experimental Method, C. A. Nixon, W. R. Marcum (Oregon State Univ), K. M. Steer, R. D. Widdle, R. B. Jackson (TerraPower), A. Weiss (Oregon State Univ)

##### 10:05 am

Development of TDLAS for Water Vapor Concentration Measurement during VHTR Steam Ingress, Michael C. Button, Philippe M. Bardet (George Washington Univ)

##### 10:30 am

Experimental Study of the Downstream Effect of LOCA-Generated Debris on the Pressure Drop of Fuel Assembly, Weiqian Zhuo, Fenglei Niu, Zhangpeng Guo, Da Wang (North China Electric Power Univ)

##### 10:55 am

Overview of the Salt at WALL Thermal Exchanges (SWATH) Experiment, P. R. Rubiolo, M. Tano Retamales, J. Giraud, V. Ghetta (LPSC)

##### 11:20 am

Analysis on the Heat Transfer Phenomena Inside the Scaled-Down VHTR RCCS Riser Experiment, Dong-Ho Shin, Sin-Yoeb Kim (Seoul Natl Univ), Chan-Soo Kimm (KAERI), Hyoung Kyu Cho, Goon-Cherl Park (Seoul Natl Univ)

#### Advanced Aqueous Fuel Cycles—International Perspectives—Panel

**Sponsored by:** FCWMD

**Session Organizer and Chair:** Terry Todd (INL)

**Location:** Neopolitan 3 **Time:** 8:00-11:30 am

The objective of this panel is to highlight similarities and differences in international approaches to advanced aqueous processing techniques. The different technologies being studied and developed will be highlighted, along with challenges that need to be addressed to raise the technical maturity of the processes. Discussion of potential challenges that may arise from new fuels (such as accident tolerant fuels) will be discussed. Priorities for future R&D activities will be discussed.

##### Panelists:

Terry Todd (INL)

Fiona Rayment (NNL)

Bernard Boullis (or delegate) (CEA)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Transition to a New Fuel Cycle—Needs and Challenges

**Sponsored by:** FCWMD

**Session Organizer:** Bhupinder P. Singh (DOE) **Chair:** Patricia D. Paviet (DOE)

**Location:** Neopolitan 4 **Time:** 8:00-10:55 am

##### 8:00 am

Assessing Government and Industry Roles to Accelerate Commercialization of Advanced Reactors and Supporting Fuel Cycles, Steven Krahn, Bethany Burkhardt (Vanderbilt Univ), Andrew Sowder (EPRI)

##### 8:25 am

Going from Closed to Open and Then Back Again: How to Keep a Level Head, Tim Tinsley, Fiona Rayment (NNL)

##### 8:50 am

Transition to a Thorium-Based Fuel Cycle—Choices, Challenges, and Options, Andrew Worrall, Eva Sunny (ORNL), Michael Todosow (BNL), Nick Brown, Florent Heidet (ANL)

##### 9:15 am

Reactor Physics Analysis of Transitioning to a Thorium Fuel Cycle with Molten Salt Reactors, B. R. Betzler, J. J. Powers, A. Worrall (ORNL)

##### 9:40 am

Transition to a U/Pu Fuel Cycle with Fast and Thermal Reactors, Bo Feng (ANL), Eva Sunny (ORNL), Ross Hays (INL), Baptiste Mougnot (Univ of Wisconsin, Madison), Jennifer Littell (Univ of Tennessee, Knoxville), Andrew Worrall (ORNL), Edward Hoffman (ANL)

##### 10:05 am

Transition to Uranium-Based Fast Reactor Fuel Cycle Options, E. Hoffman (ANL), B. Carlsen (INL), Bo Feng (ANL), Ross Hays (INL), E. Sunny, Andrew Worrall (ORNL)

##### 10:30 am

Impact of Using Cross Sections Versus Recipes in Transition Fuel Cycle Analysis using ORION, Joshua Peterson, Eva Sunny (ORNL), Robert Gregg (NNL)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Proposal Writing 101–Panel

**Sponsored by:** YMG

**Session Organizer and Chair:** Holly Coghill (Coghill Communications/The Document Laboratory)

**Location:** Messina **Time:** 8:00-11:30 am

Laying a holistic foundation is critical to writing a winning proposal. This session offers an overview of a typical proposal process. It equips attendees with critical tools to position them for the next generation of proposals including storyboards, compliance matrices, and templates. In addition, we present the overall proposal process, laying a holistic foundation for writing winning proposals. Specifically, we will present the process for developing integrated compliant outlines, teaching several techniques that results in a higher scored proposal. Attendees actively participate in RFP analysis workshops and compliance outlining exercises to ensure complete understanding of this critical element.

Upon completion of a winning compliance matrix, developing a compelling storyline and defining the supporting approaches is one of the most important elements to writing a winning proposal. Attendees will learn how to leverage core competencies to demonstrate integrated approaches for performing contract work, including exercises for addressing those challenging scope of work areas.

Now that you have that great approach, how do you convey it in a compelling way to your customer? The next step is to write the overall storyline using headlines and message boxes that grab the readers' attention. Included are methods for gaining consensus on overarching themes that underpin the contract win strategy and workshops for developing theme imagery, pictos, and icons.

In this session, attendees learn the process for defining graphics that directly satisfy the requirements of the RFP instructions, enhance readability, and optimize graphic formats and structures for conveying information. We include exercises for sketching illustrations for scope of work approaches, timelines, processes, data sets, hierarchical structures, and schedules- graphics that are included in all types of winning scientific and engineering proposals.

**Panelists:**

Holly Coghill (Coghill Communications)

Anita Magriplis (Coghill Communications)

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## WEDNESDAY, NOVEMBER 9

TECHNICAL SESSIONS - 9:50 AM

### New Nuclear Construction Around the World—Status Report—Panel

**Sponsored by:** OPD

**Session Organizer:** Edward L. Quinn (Technology Resources) **Cochairs:** Edward L. Quinn (Technology Resources), Corey K. McDaniel (INL)

**Location:** Octavius 1 **Time:** 9:50-11:05 am

This panel will focus on the major events and participants in designing, licensing and building new reactors in the U.S. and around the world. Speakers from DOE, NRC, NEI, and international representatives, will address the key aspects in this area from each of their perspectives.

**Panelists:**

Frank Akstulewicz (NRC)

John Kelly (DOE)

Rod McCullum (NEI)

### Knowledge Transfer and Retention

**Sponsored by:** YMG

**Session Organizer and Chair:** Alyse M. Scurlock (Duke Energy Corp.)

**Location:** Octavius 2 & 3 **Time:** 9:50-11:05 am

Knowledge transfer and retention (KT&R) is a key industry initiative. This panel will feature speakers who work in the industry who have knowledge and experience implementing or participating in various KT&R methods. A question and answer session will allow attendees to exchange KT&R ideas and applications.

**Panelists:**

Ben Sell (Duke Energy)

Charmaine Davis (EPRI)

Matthew Smith (Exelon)

David Neal (Westinghouse)

Alyse Scurlock, NAYGN (Duke Energy)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 1:00 PM

#### Radiation Protection and Shielding: General

**Sponsored by:** RPSD

**Session Organizer:** Peter F. Caracappa (RPI) **Chair:** Jason D. Haverkamp (KAPL)

**Location:** Octavius 1 **Time:** 1:00-3:30 pm

##### 1:00 pm

Computational Study of 15 MeV Linac Radiation Doses at UNLV Accelerator Facility, Matthew Hodges, Alexander Barzilov, Yitung Chen (UNLV)

##### 1:25 pm

Comparison of the MCNP6 and FLUKA Codes in Shielding Calculation at Proton Therapy Facility, Z. Xia, V. P. Derenchuk (Ponova Solutions LLC), Doug Hardtmayer, Lei Cao (Ohio State), L. Derenchuk, H. Chen, M. Hansen, R. Moore, Z. Nevitt, J. Volk (Pronova Solutions, LLC),

##### 1:50 pm

Characterizing Fluence as a Function of Areal Density for 1 and 14 MeV Neutrons Transported Through Air, M. L. Fensin, S. S. McCready, K. C. Kelley (LANL)

##### 2:15 pm

Shielding and Activation Analyses for Beam Test Facility at SNS, Irina I. Popova, Franz X. Gallmeier (ORNL)

##### 2:40 pm

Dose Rate Investigation for Cobalt Isotope Rods Retrieval Campaign, C. Fung Poon, K. Bennett (GE-Hitachi Nuclear)

##### 3:05 pm

Tritium Release Limit for Fluoride Salt-Cooled High-Temperature Reactors, Xiao Wu, Sheng Zhang, Shanbin Shi, Xiaodong Sun (Ohio State), David Holcomb (ORNL), Richard N. Christensen (Univ of Idaho), Piyush Sabharwall (INL)

#### Research by U.S. DOE NEUP-Sponsored Students—I

**Sponsored by:** ETWDD

**Session Organizer:** Gregory A. Bala (INL) **Cochairs:** Jenna Payne (INL), Gregory A. Bala (INL)

**Location:** Octavius 2 & 3 **Time:** 1:00-4:20 pm

##### 1:00 pm

Establishing a Database of High Temperature Salt Properties for Nuclear Applications, R. R. Romatoski, L.W. Hu (MIT)

##### 1:25 pm

Preliminary Insights on Potential Transitions to Closed Thorium-Based Fuel Cycles, Timothy Ault, Steven Krahn (Vanderbilt Univ)

##### 1:50 pm

Computational Studies of Thermal Conductivity of Multiphase Ceramics for Inert Matrix Fuel, Austin W. Travis (Univ of California, Irvine), Andrew T. Nelson (LANL), Martha L. Mecartney (Univ of California, Irvine)

##### 2:15 pm

Computational Modeling, Simulation and Analysis of the RPI Walthousen Reactor Critical Facility (RCF), Matthew D. Eklund, Mathieu Dupont, Peter F. Caracappa, Wei Ji (RPI)

##### 2:40 pm

Sensitivity Analysis of an Experimental Breeder Reactor II Fuel Assembly, Emerald D. Ryan, Chad L. Pope (INL)

##### 3:05 pm

Development of Zirconium-Silicide Coatings for Improved Performance Zirconium-Alloy Fuel Cladding, Hwasung Yeom, Benjamin Maier, Steven Fronek, Greg Johnson, Elliot Strand Michael Corradini, Kumar Sridharan (Univ of Wisconsin, Madison), Robert Mariani, Xianming Bai (INL), Peng Xu, Ed Lahoda (Westinghouse),

##### 3:30 pm

A Scintillation-Fiber Based Cosmic-Ray Muon Tomography System for Imaging Dry Storage Cask, Can Liao, Haori Yang (Oregon State Univ), Zhengshi Liu, Jason Hayward (Univ of Tennessee, Knoxville)

##### 3:55 pm

Computed Tomography of Dry Cask Storage for Used Fuel, Christopher R. Greulich, Yuan Gao, Andreas Enqvist, James Tulenko, James E. Baciak (Univ of Florida)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 1:00 PM

#### Monte Carlo Methods

**Sponsored by:** MCD

**Session Organizer and Chair:** Jeffery D. Densmore (BAPL)

**Location:** Octavius 7 & 8 **Time:** 1:00-3:30 pm

**1:00 pm**

Cylindrical Kernel Density Estimators for Monte Carlo Neutron Transport Reactor Physics Problems, Timothy P. Burke, Brian C. Kiedrowski, William R. Martin (Univ of Michigan)

**1:25 pm**

The Iterated Fission Matrix Method, Manuele Aufiero, Yishu Qiu, Massimiliano Fratoni (Univ of California, Berkeley)

**1:50 pm**

Fission Matrix Convergence Diagnostic of the Iterated Fission Probability Method, Aaron G. Tumalak, Brian C. Kiedrowski (Univ of Michigan)

**2:15 pm**

Generalized Sensitivity Calculation in the Monte Carlo Wielandt Method, Sung Hoon Choi, Hyungjin Shim (Seoul Natl Univ)

**2:40 pm**

In-Line Method for Calculating Peak Neutron Absorption by Fission Products Following a Change in Reactor Power, D. P. Griesheimer (Bechtel Marine Propulsion Corp)

**3:05 pm**

Monte Carlo Direct Simulation Method for Initiation Probability Problems, Qi Xu, Gang Xiao, Xuerong Wang (IAPCM)

#### Nuclear Installations Safety: General—I

**Sponsored by:** NISD

**Session Organizer and Chair:** Nicholas R. Brown (ORNL)

**Location:** Octavius 9 **Time:** 1:00-3:30 pm

**1:00 pm**

Severe Accident Modeling for Cyber Scenarios, Jeff Cardoni, Matt Denman, Tim Wheeler (SNL)

**1:25 pm**

An Approach for Assessing Consequences of Potential Supply Chain and Insider Contributed Cyber Attacks on Nuclear Power Plants, Tsong-Lun Chu, Athi Varuttamaseni, Joo-Seok Baek, Susan Pepper (BNL)

**1:50 pm**

Development and Application of Virtual Nuclear Power Plant Platform Concerning Environment and Society Digitally, Yican Wu, Liqin Hu, Pengcheng Long, Fang Wang, Jing Song, Tao He, Jin Wang, Tongqiang Dang, Jingting Zou (CAS)

**2:15 pm**

Fukushima Containment Dose Assessment, Jeff Cardoni, Nathan Andrews, (SNL)

**2:40 pm**

Preliminary Assessment of the Dose near the Shield Plug at Fukushima Daiichi Unit 2 (1F2), Nathan Andrews, Jeffrey Cardoni, Randall Gauntt (SNL)

**3:05 pm**

Time Constants for Optical Fiber Temperature Sensing using a Thermal Resistance Approach, Robert Palmer, Kelly M. McCary, Thomas E. Blue (Ohio State)

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## WEDNESDAY, NOVEMBER 9

TECHNICAL SESSIONS - 1:00 PM

### Recent Nuclear Criticality Safety Program Technical Accomplishments

**Sponsored by:** NCSD

**Session Organizer:** Lori Scott (Leidos, Inc.) **Chair:** Angela Chambers (DOE)

**Location:** Octavius 10 **Time:** 1:00-3:55 pm

#### 1:00 pm

Titanium and Aluminum Rod-Replacement Experiments in Fully-Reflected 6.90% Enriched UO<sub>2</sub> Fuel Rod Lattices, Gary A. Harms, John T. Ford, David E. Ames, Rafe D. Campbell (SNL)

#### 1:25 pm

Subcritical Benchmark of the BeRP Ball Reflected by Tungsten, J. Hutchinson, T. Cutler, B. Richard, A. Sood, Mark Smith-Nelson (LANL)

#### 1:50 pm

MCNP Progress for the Nuclear Criticality Safety Program, Forrest B. Brown, Michael E. Rising, Jennifer L. Alwin (LANL)

#### 2:15 pm

Finalizing the <sup>63</sup>Cu and <sup>65</sup>Cu Resonance Evaluations for the ENDF/B-VIII Release, Vladimir Sobes, Klaus Guber (ORNL), Luiz Leal (IRSN)

#### 2:40 pm

Measurements of the Fission Neutron Spectrum using Threshold Activation Detectors Final Design, Theresa Cutler, Jessie Walker, John Bounds, Travis Grove, Cal Moss, William Myers, Rene Sanchez, Morgan White (LANL)

#### 3:05 pm

Analysis Capability and Data Needs Identified during the Evaluation of the SILENE CAAS Benchmarks, Thomas M. Miller, Cihangir Celik (ORNL), Soon Sam Kim (LLNL), Yi-Kang Lee (CEA)

#### 3:30 pm

Evaluation of Engineering Controls Implemented to Mitigate Godiva Contamination, J. Goda, J. Bounds, D. Hayes (LANL)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 1:00 PM

#### Reactor Physics: General—V

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Bo Feng (ANL)

**Location:** Octavius 12 **Time:** 1:00-3:55 pm

##### 1:00 pm

Neutronics Code Benchmark for Fluoride-Salt-Cooled Reactors, Lance Maul (ANSTO/ UNSW), Dan Shen, Massimiliano Fratoni (Univ of California, Berkeley)

##### 1:25 pm

Commercial-Scale, Fluoride-Salt-Cooled, High-Temperature Reactors with Novel Refueling and Decay Heat Removal Capabilities, Justin Pounders (Univ of Massachusetts Lowell), Charles Forsberg (MIT), Rich Kochendarfer (AREVA), Eugene Shwageraus, Geoff Parks (Univ of Cambridge)

##### 1:50 pm

Preliminary Neutronic Assessment of a Novel Fluoride-Salt-Cooled High-Temperature Reactor Design, Yao Li, Justin M. Pounders (Univ of Massachusetts Lowell)

##### 2:15 pm

Depletion Analysis of Additively Manufactured Control Elements in HFIR, J. R. Burns (Georgia Tech), D. Chandler (ORNL), B. Petrovic (Georgia Tech), K. A. Terrani (ORNL)

##### 2:40 pm

Criticality Control of a High-Performance Soluble-Boron-Free Small Modular Reactor Core, Mohd-Syukri Yahya, Yonghee Kim (KAIST), Chang Kyu Chung (KEPCO)

##### 3:05 pm

The Water Ingress Effects on the Reactivity Change of the Conceptual Designed Reactor at NIST, Zeyun Wu, Robert E. Williams (NIST)

##### 3:30 pm

HFIR Core Modeling and Analysis for PROSPECT Reactor Antineutrino Experiment, Andrew Conant (Georgia Tech)

#### Reactor Analysis Methods—IV

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Massimiliano Fratoni (Univ of California, Berkeley)

**Location:** Octavius 13 **Time:** 1:00-2:40 pm

##### 1:00 pm

Neutronics/Thermal-Hydraulics Coupling with RMC and CTF for BEAVRS Benchmark Calculation, Juanjuan Guo, Shichang Liu, Xiaotong Shang, Kan Wang (Tsinghua Univ)

##### 1:25 pm

Dead-Time Correction of Pulsed Neutron Source Experiments with the Backward Extrapolation Method, A. Talamo, Y. Gohar (ANL)

##### 1:50 pm

On-the-Fly Doppler Broadening with Probability Table Interpolation for Unresolved Resonance Region in RMC, Yuan Yuan, Shichang Liu, Jiankai Yu, Kan Wang (Tsinghua Univ)

##### 2:15 pm

The Reducibility of Reactor Physics Depletion and Decay Calculation, Siqi Zhang, Hany S. Abdel-Khalik (Purdue Univ)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 1:00 PM

#### Uncertainty, Scaling and Global Sensitivity Methods in Thermal Hydraulics

**Sponsored by:** THD

**Session Organizer:** Cesare Frepoli (FPoliSolutions LLC) **Cochairs:** Robert P. Martin (BWX Technologies, Inc.), Cesare Frepoli (FPoliSolutions LLC)

**Location:** Octavius 14 **Time:** 1:00-3:55 pm

**1:00 pm**

RISMC Analysis Framework in Response to Proposed 10 CFR 50.46c Rulemaking, Hongbin Zhang, Ronaldo Szilard, Ling Zou, Haihua Zhao (INL)

**1:25 pm**

SMR Re-Scaling and Modeling for Load Following Studies, K. Hoover, Q. Wu, (Oregon State Univ), S. Bragg-Sitton (INL)

**1:50 pm**

Best-Estimate-Plus-Uncertainty-Informed Deterministic Safety Evaluation, R. P. Martin (BWX Technol)

**2:15 pm**

ROM-Based Subset Selection Algorithm for Efficient Surrogate Modeling, Yeni Li, Hany Abdel-Khalik (Purdue Univ)

**2:40 pm**

Uncertainty Quantification by Monte Carlo Analysis using CFD Simulations for GEMIX Benchmark Activities, A. M. Krueger, F. S. Sarikurt, L. B. Carasik, Y. A. Hassan (Texas A&M)

**3:05 pm**

Sensitivity Analysis of OECD ATLAS A5.1 Test using MARS-KS Code, Yusun Park, Byoung-Uhn Bae, Kyoung-Ho Kang, Ki Yong-Choi (KAERI)

**3:30 pm**

Sensitivity Analysis of Passive Heat Removal Capability of FHR based on Efficient Surrogate Model and GenFlow, Zhangpeng Guo, Yiping Luo, Fenglei Niu (North China Electric Power Univ)

#### Young Professional Thermal-Hydraulics Research Competition—I

**Sponsored by:** THD **Cosponsored by:** YMG

**Session Organizer:** Rui Hu (ANL) **Cochairs:** Paolo Ferroni (Westinghouse), W. David Pointer (ORNL)

**Location:** Octavius 15 & 16 **Time:** 1:00-3:55 pm

**1:00 pm**

Modeling of Two-Phase Flow around Spacers with Mixing Vanes in Reactor Rod-Bundles, B. M. Waite (RPI), D. R. Shaver (ANL), M. Z. Podowski (RPI)

**1:25 pm**

High Resolution Measurements Reveal Transient Boiling Phenomena under Exponential Heat Inputs, Guanyu Su, Matteo Bucci, Thomas McKrell, Jacopo Buongiorno (MIT)

**1:50 pm**

CFD-Grade Experiments Addressing Thermal Fatigue in Nuclear Reactor Branch Lines, J. R. Downing, V. Petrov, A. Manera (Univ of Michigan)

**2:15 pm**

Improved Understanding toward Sliding Bubble Effect on Wall Heat Transfer in Subcooled Boiling Flow, Junsoo Yoo (INL), Carlos E. Estrada-Perez, Yassin A. Hassan (Texas A&M)

**2:40 pm**

Simulation of Boiling Flow in a Helical Coil using a Homogeneous Equilibrium Model with the Nek-2P CFD Code, Dillon R. Shaver, Prasad Vegendla (ANL), W. David Pointer (ORNL), Adrian M. Tentner, Elia Merzari (ANL)

**3:05 pm**

Modeling of a Passive Endothermic Reaction Cooling System, Nathan R. Murray, Mitchell E. Sailsbery, Samuel E. Bischoff, Matthew J. Memmott (Brigham Young Univ)

**3:30 pm**

Dakota Uncertainty Quantification Methods Applied to the CFD Code Nek5000, Marc Olivier G. Delchini, Emilian L. Popov, David W. Pointer (ORNL)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 1:00 PM

#### Human Factors, Instrumentation, and Controls: Human Factors, Safety, and Safety Systems

**Sponsored by:** HFICD

**Session Organizer:** Kathryn Ann McCarthy (INL) **Chair:** Johanna H. Oxstrand (INL)

**Location:** Neopolitan 2 **Time:** 1:00-3:05 pm

**1:00 pm**

Qualitative Evaluation of Human Reliability Analysis Quality, Seungwoo Lee, Dongju Jang, Namchul Cho, Dohyung Kim (KINS)

**1:25 pm**

Modeling the Resilience of Nuclear Power Plant for Unexpected Reactor Trip, Jonghyun Kim, Jooyoung Park (Chosun Univ), Taewan Kim (Incheon National Univ)

**1:50 pm**

Development of Real-Time Quantitative Safety Evaluation Method for Nuclear Power Plants, Seung Geun Kim, Poong Hyun Seong (KAIST)

**2:15 pm**

Quantitative Analysis Guidance in Safety Software Validation, Kenneth Armstrong, Kwok Ivan Chow, Damien Gailliard, Manda Safabash (AREVA)

**2:40 pm**

Gravity Based Non-Invasive Reactor Coolant Inventory Monitoring System, J. Danielson (Oregon State Univ), J. Ridgway (ISL), Q. Wu (Oregon State Univ)

#### Fuel Cycle and Waste Management: General—I

**Sponsored by:** FCWMD

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

**Location:** Neopolitan 3 **Time:** 1:00-3:55 pm

**1:00 pm**

A Higher Fidelity Cost Analysis of Wind and Uranium from Seawater Acquisition SymBiotic Infrastructure, Margaret Byers (Univ of Texas, Austin), Maha N. Haji (MIT), Erich Schneider (Univ of Texas, Austin), Alexander H. Slocum (MIT)

**1:25 pm**

The Nuclear Role in Electricity Supply: Moving Away from Baseload, Daniel Curtis, Charles Forsberg (MIT)

**1:50 pm**

Accelerated Corrosion Tests to Evaluate Long-Term Performance of BORAL® in Spent Fuel Pools, Hatice Akkurt (EPRI), Ashleigh Quigley, Matt Harris (Curtiss-Wright Corp.)

**2:15 pm**

Real-Time Solution Analysis in Microfluidic Channels using Raman Spectroscopy, Amanda Casella, Amanda Lines (PNNL), Gilbert Nelson (College of Idaho), Job Bello (Spectra Solutions), Sam Byan (PNNL)

**2:40 pm**

Simulation of Proposed Heat Treatment Methods for the Sister Rods, Nicolas Silva (Univ of Florida), Rose Montgomery (ORNL), Henrik Liljenfeldt, John Scaglione, Bruce Bevard (ORNL)

**3:05 pm**

Impact of Isotope Fidelity on Fuel Cycle Calculations, Baptiste Mougnot, Paul P. H. Wilson, Robert W. Carlsen (Univ of Wisconsin, Madison)

**3:30 pm**

Spent Nuclear Fuel Package Consolidation using Metallic Void Fillers, Yongsoo Park, Thomas J. McKrell, Michael J. Driscoll (MIT)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 1:00 PM

#### Advances in Technical Nuclear Forensics: Methods and Analysis—I

**Sponsored by:** IRD **Cosponsored by:** NNPD

**Session Organizer:** Igor Jovanovic (Univ of Michigan) **Cochairs:** Steven Skutnik (Univ of Tennessee, Knoxville), Adam Stratz (Univ of Tennessee, Knoxville)

**Location:** Neopolitan 4 **Time:** 1:00-2:40 pm

##### 1:00 p.m.

National Technical Nuclear Forensics: History and U.S. Research Priorities, Jeffrey Morrison (DHS)

##### 1:25 pm

National Technical Nuclear Forensics: U.S. Approach to Capability Sustainment, Amalie Zeitoun (DHS)

##### 1:50 pm

Synthesis and Analysis of Glass Analogs for Solid Fallout Debris, Rebecca Carter, Corinne Dorais, Amy E. Hixon (Univ of Notre Dame), invited

##### 2:15 pm

Surrogate Post-Detonation Urban Debris (SPUD): Standard Reference Materials 4600 & 4601, Jacqueline L. Mann, Mark A. Tyra, John L. Molloy, Rick Paul, Kenneth G. W. Inn (NIST), JoAnn Buscaglia, Jeffrey Leggitt (Federal Bureau of Investigation), Kevin Pfeuffer, Barbara Fallon, Joshua Dettman (Oak Ridge Inst for Science and Education-FBI), Derek Haws, Sarah Castro, Tony D. Kelly, David Turner, John McClory (AFIT), Simon Jerome (National Physical Lab)

#### ANS Standards and You—Panel

**Sponsored by:** YMG

**Session Organizer:** Jitesh A. Kuntawala (Duke Energy) **Chair:** Brett Rampal (NuScale Power, LLC)

**Location:** Messina **Time:** 1:00-2:30 pm

This is the second installment of a series of panels hosted by the Young Members Group which serves to introduce society members to the various National Committees of ANS. ANS Standards, as well as the standards of many other organizations and industries, are documents that set forth requirements for the design, manufacture, or operation of a piece of equipment. Panelists will field questions and discuss their involvement in the ANS Standards Committee which has been active in the development of industry standards ever since 1957.

##### Panelists:

George Flanagan (ORNL)

Gene Carpenter (NRC)

Leah Parks (NRC)

### TECHNICAL SESSIONS - 2:35 PM

#### Cutting Edge Techniques in Education, Training and Distance Education

**Sponsored by:** ETWDD

**Session Organizer and Chair:** Lisa Ching Marshall (NCSU)

**Location:** Messina **Time:** 2:35-3:50 pm

##### 2:35 pm

E-Learning in Neutron Activation Analysis, Sheldon Landsberger (Univ of Texas, Austin), Peter Bode (NUQAM Consulting), Alesia Lunikova, Danas Ridikas (IAEA), Borut Smodis (Josef Stefan Inst), Marta Almedia (Univ de Lisboa), John Preston (Univ of West Indies)

##### 3:00 pm

A Simplified Fission Product Poison Model for Operator Training, Bruce R. Hugo, James E. Stracener (Energy Northwest)

##### 3:25 pm

Remote Gamma Ray Spectrum Acquisition, Roel R. Garcia, Felicia Avila, Xue Yang (Texas A&M, Kingsville)

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**WEDNESDAY, NOVEMBER 9**  
**TECHNICAL SESSIONS - 2:45 PM**

**Robotics and Remote Systems Topics**

**Sponsored by:** RRSD

**Session Organizer:** Mark W. Noakes (ORNL) **Chair:** Mitch W. Pryor (Univ of Texas, Austin)

**Location:** Neopolitan 4 **Time:** 2:45-4:25 pm

**2:45 pm**

A Machine Learning Based System Performance Prediction Model for Transportable FHR, Yuyun Zeng, Jingquan Liu (Tsinghua Univ), Kaichao Sun, Chenglong Wang, Lin-wen Hu (MIT)

**3:10 pm**

Development of Plug-and-Play Interchangeable Components for Unmanned Aerial System with Mobile Manipulation Capability, Jameson Lee, Jessica Hartman, Zachary Cook, Joon S. Lee, Woosoon Yim, Alexander Barzilov (UNLV)

**3:35 pm**

Contour Mapping Based Radiation Source Localization by UAS Swarm, Zachary Cook, Jameson Lee, Jessica Hartman, Alexander Barzilov, Woosoon Yim (UNLV)

**4:00 pm**

Role of Disaster Robot from the Perspective of HTO-Based Safety Assurance, Young Choi, Kyung Min Jeong (KAERI), Inn Seock Kim (ISSA Technology, Inc)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 4:30 PM

#### Operations and Power: General—II

**Sponsored by:** OPD

**Session Organizer:** Edward L. Quinn (Technology Resources) **Chair:** Corey K. McDaniel (INL)

**Location:** Octavius 1 **Time:** 4:30-6:10 pm

#### 4:30 pm

Benchmark of Spacer Grid Models Used In Nuclear Power Plants, Alan B. Maskal, Fatih Aydogan (Univ of Idaho)

#### 4:55 pm

Packed Bed Thermal Storage for Compact Light Water-Cooled Small Modular Reactors, Jacob Edwards, Daniel Franken, Hitesh Bindra (Kansas State Univ), Piyush Sabharwall (INL)

#### 5:20 pm

Sensitivity Study of PWR Upper Vessel Flow and Phenomena using RELAP5-3D, Timothy Crook, Rodolfo Vaghetto, Alessandro Vanni, Yassin A. Hassan (Texas A&M)

#### 5:45 pm

Modeling PWR Systems with a Unique Framework for Hybrid Energy Systems, Fatih Aydogan (Univ of Idaho)

#### Research by U.S. DOE NEUP-Sponsored Students—II

**Sponsored by:** ETWDD

**Session Organizer:** Gregory A. Bala (INL) **Cochairs:** Jenna Payne (INL), Greg Bala (INL)

**Location:** Octavius 2 & 3 **Time:** 4:30-7:50 pm

#### 4:30 pm

Radiation Damage in Multiphase Ceramics, Kenta Ohtaki (Univ of California, Irvine), Maulik Patel (Univ of Tennessee, Knoxville), Martha Mecartney (Univ of California, Irvine)

#### 4:55 pm

Structural Properties of Ditechnetium Heptoxide,  $Tc_2O_7$ , Daniel S. Mast, Bradley C. Childs, Keith Lawler, Kenneth R. Czerwinski, Alfred P. Sattelberger, Frederic Poineau, Paul M. Forster (UNLV)

#### 5:20 pm

Thermal Desorption of Tritium from Fluoride Salt-Cooled Reactor Materials, Alicia M. Elliott, David M. Carpenter, Lin-Wen Hu (MIT)

#### 5:45 pm

Development of Critical Experiments to Benchmark Moderator Temperature Reactivity Worth, Mathieu Dupont, Matthew D. Eklund, Wei Ji, Peter F. Caracappa (RPI)

#### 6:10 pm

Fabrication of New NFA-SiC Composites for Nuclear Applications, Kaijie Ning, Zhihao Hu, Kathy Lu (Virginia Polytechnic Inst and State Univ)

#### 6:35 pm

Radiation Heat Transfer in Molten FLiNaK, Ethan Chaleff, Tom Blue (Ohio State)

#### 7:00 pm

Design of a Symbiotic Device to Harvest Uranium from Seawater through the use of Shell Enclosures, Maha N. Haji, Alexander H. Slocum (MIT)

#### 7:25 pm

Cost-Benefit Analysis of High-Strength Materials for Safety-Related Nuclear Reinforced Concrete Shear Walls, Steven M. Barbachyn, Robert D. Devine, Ashley P. Thrall, Yahya C. Kurama (Univ of Notre Dame)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 4:30 PM

#### Decommissioning and Environmental Sciences: General

**Sponsored by:** DESD

**Session Organizer:** Brooke Traynham (PricewaterhouseCoopers LLP) **Chair:** Nadia S. Glucksberg (Haley & Aldrich, Inc.)

**Location:** Octavius 6 **Time:** 4:30-7:00 pm

#### 4:30 pm

Magnetite Dissolution using Hydrazine-Acid Solution for Chemical Decontamination, Seon-Byeong Kim, Hui-Jun Won, Jei-Kwon Moon, Wang-Kyu Choi (KAERI)

#### 4:55 pm

Assessment of Reactor BN-350 Influence on Environment during its Operation Period, V. Gluchshenko P. Chakrov, (Inst of Nuclear), S. DeMuth (LANL)

#### 5:20 pm

The Economic and Societal Impact of Baseload Power Generation on Local Communities, Travis S. Carless, Paul S. Fischbeck (Carnegie Mellon Univ)

#### 5:45 pm

Study of Reactor Facility BN-350 Wastewater Impact on the Environment, V. Gluchshenko, A. Poleshko, (Inst of Nuclear), S. DeMuth (LANL)

#### 6:10 pm

Atmospheric <sup>41</sup>Ar Plume Tracking of the UF Training Reactor using a Large-Volume NaI Detector, Hannah E. Gardiner, Jesse Bruner, Kelly A. Jordan, James E. Baciak (Univ of Florida)

#### 6:35 pm

Characterization of Plutonium-Contaminated Gloveboxes using a High-Range Alpha Ion Chamber, William Zywiec, Albert Joseph Diaz (LLNL)

#### Mathematical Modeling

**Sponsored by:** MCD

**Session Organizer:** Jeffery D. Densmore (BAPL) **Chair:** Ryan G. McClarren (Texas A&M)

**Location:** Octavius 7 & 8 **Time:** 4:30-6:35 pm

#### 4:30 pm

On Some Criticality Benchmarks in Spherical Geometry, R. D. M. Garcia (Inst de Estudos Avancados)

#### 4:55 pm

Multigroup Transport Equations Derived via Homogeneity and Isotropy Restoration Theory, Nam Zin Cho, YuGwon Jo, Seungsu Yuk (KAIST)

#### 5:20 pm

Analytic Solution for Time-Dependent Neutron Transport with Delayed Neutrons via Singular Eigenfunction Expansion, Jeffery D. Densmore (BAPL)

#### 5:45 pm

Neutronic-Thermal Hydraulic Benchmark using the SKINATH Point Kinetics Model, B. Ganapol (Univ of Arizona), M. DeHart, F. Gleicher, J. Ortensi, R. Martineau (INL)

#### 6:10 pm

Derivation of the Point-Kinetics Parameters for the Coupled Reactors, Yaqi Wang, Sebastian Schunert, Javier Ortensi, Frederick Gleicher, Benjamin Baker, Gilles Youinou, Mark DeHart, Richard Martineau (INL)

# Technical Sessions: Wednesday November 9

## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 4:30 PM

#### Nuclear Installations Safety: General—II

**Sponsored by:** NISD

**Session Organizer:** Nicholas R. Brown (ORNL) **Chair:** Virginia D. Cleary-Ivanoff (LANL)

**Location:** Octavius 9 **Time:** 4:30-6:10 pm

##### 4:30 pm

Development of the SharkFin Distribution for Fuel Lifetime Estimates in Severe Accident Codes, M. R. Denman (SNL)

##### 4:55 pm

Study of Melt Formation and Behavior of a Two-Component Debris Bed in LIVE Facility, A. Miassoedov, X. Gaus-Liu, T. Cron (KIT)

##### 5:20 pm

Comparison of HFIR Core Hydraulic Models with Operational Data, Juan J. Carbajo, Prashant K. Jain (ORNL)

##### 5:45 pm

Thermal Hydraulics Safety Analyses of TRIGA Reactor upon Fuel Reconfiguration, A. Gairola, D. Gould, J. Geuther, J. Roberts, H. Bindra (Kansas State Univ)

#### Critical and Subcritical Experiments

**Sponsored by:** NNPD **Cosponsored by:** NCSD, YMG

**Session Organizer:** Jesson D. Hutchinson (LANL) **Chair:** William L. Myers (LANL)

**Location:** Octavius 10 **Time:** 4:30-7:25 pm

##### 4:30 pm

The 2016 Edition of the ICSBEP Handbook, John D. Bess, Margaret A. Marshall (INL), Jim Gulliford, Ian Hill (Nuclear Energy Agency)

##### 4:55 pm

The PRINCESS Project: An IRSN Project for Experimental Data Acquisition in the Frame of Criticality Safety and Reactor Physics, I. Duhamel, Eric Letang (IRSN)

##### 5:20 pm

Comparison of the Performance of Various Correlated Fission Multiplicity Monte Carlo Codes, Jennifer Arthur (Univ of Michigan), Rian Bahran, Jesson Hutchinson, Michael Rising (LANL), Sara Pozzi (Univ of Michigan)

##### 5:45 pm

Development of a Research Reactor Protocol for Neutron Multiplication Measurements, R. Bahran, J. Hutchinson, J. Arthur, A. Sood (LANL), P. Caracappa, N. Thompson (RPI), S. Pozzi (Univ of Michigan)

##### 6:10 pm

Prompt Neutron Decay Constants in a Highly Enriched Uranium-Lead Copper Reflected System, Rene Sanchez, Travis Grove, George McKenzie, Joetta Goda, John Bounds, Theresa Cutler, David Hayes (LANL)

##### 6:35 pm

Preliminary Design of the TEX-MOX Criticality Experimental Program using Optimization Algorithms Implemented in the IRSN PROMETHEE Tool, M. Brovchenko, I. Duhamel, R. Salmon, Y. Richet (IRSN)

##### 7:00 pm

Use of Criticality Eigenvalue Simulations for Subcritical Benchmark Evaluations, J. Hutchinson, T. Cutler (LANL)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 4:30 PM

#### Reactor Physics: General—VI

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Shane G. Stimpson (ORNL)

**Location:** Octavius 12 **Time:** 4:30-5:45 pm

#### 4:30 pm

Reactivity Impact of Accident Tolerant Claddings in an Equilibrium PWR Core, Troy A. Eckleberry, G. Ivan Maldonado (Univ of Tennessee, Knoxville)

#### 4:55 pm

Analysis of a Nuclear Data Experiment: MANTRA-3, Jyothierkumar Nimmagadda (Univ of Florida) Giuseppe Palmiotti, Gilles Youinou (INL), George Imel (Univ of Florida)

#### 5:20 pm

Preparatory Verification of a New Monte Carlo Code cosRMC based on VERA Core Physics Benchmark, Hui Yu, Yao Qin, Guoping Quan, Xing Wang, Yixue Chen (SNPSSDC)

#### Nuclear Fuels and Materials: Fast Reactors and Accident Tolerant Fuel

**Sponsored by:** MSTD

**Session Organizer and Chair:** Kenneth J. Geelhood (PNNL)

**Location:** Octavius 13 **Time:** 4:30-7:00 pm

#### 4:30 pm

Fundamental Properties for Evaluation of Uranium-Free TRU-Zr Metal Fuel Performance, Yasushi Tsuboi, Kazuo Arie (Toshiba), Cynthia Papesch, Brandon Miller, Robert D. Mariani (INL), Yuji Arita (Univ. of Fukui), Hirokazu Ohta (CRIEPI)

#### 4:55 pm

Morphology and Evolution of 14Cr Powder During Mechanical Alloying for Oxide Dispersion Strengthened Ferritic Alloys, Caleb Massey (Univ of Tennessee), David Hoelzer, Richard Lowden, Kurt Terrani (ORNL), Steven Zinkle (Univ of Tennessee, Knoxville)

#### 5:20 pm

Tensile Behavior of Inconel X750 Sheets: Effect of Heat Treatment, C. Marsh (Univ of South Carolina), D. Kaoumi (NCSU)

#### 5:45 pm

Potential Impact of Cladding Wettability on LWR Transient Progression, Aaron Wysocki, Nicholas R. Brown, Kurt A. Terrani (ORNL), Daniel M. Wachs (INL)

#### 6:10 pm

Thermal Conductivity and Diffusivity for SiC Fibers for use in ATF Cladding Composites, Troy Munro, Changhu Xing, Kurt Harris, Heng Ban (Utah State Univ)

#### 6:35 pm

Thermal Diffusivity Measurement of Irradiated SiC-SiC Composite Material, Zilong Hua (Utah State Univ), Peng Yan, Yanhong Liu, Shuyan Kong, Haihong Xia (SPIC Central Research Inst), Heng Ban (Utah State Univ)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 4:30 PM

#### Two-Phase Flows—II

**Sponsored by:** THD

**Session Organizer:** Francis X. Buschman III (BAPL) **Cochairs:** Xiaodong Sun (Ohio State), Jinyong Feng (NCSU)

**Location:** Octavius 14 **Time:** 4:30-5:45 pm

#### 4:30 pm

Spacer Grid and Mixing Vanes Effects Study on Two-Phase Flow Using Bubble Tracking Simulations, Jun Fang, Igor A. Bolotnov (NCSU)

#### 4:55 pm

Interfacial Area Transport through Vertical-Downward Elbows in Air-Water Two-Phase Flow, S. Qiao, S. Kim, D. Mena (Penn State)

#### 5:20 pm

A Proposed Correlation for Critical Flow Rate of Steam/Water Flow, Yeon-Sik Kim, Hyun-Sik Park, Seok Cho, Ki-Yong Choi (KAERI)

#### Young Professional Thermal-Hydraulics Research Competition—II

**Sponsored by:** THD **Cosponsored by:** YMG

**Session Organizer:** Paolo Ferroni (Westinghouse) **Cochairs:** Rui Hu (ANL), Victor Petrov (Univ of Michigan)

**Location:** Octavius 15 & 16 **Time:** 4:30-5:20 pm

#### 4:30 pm

A Study of Physics-Informed Deep Learning for System Fluid Dynamics Closures, Chih-Wei Chang, Nam Dinh (NCSU)

#### 4:55 pm

Verification and Validation of CFD Simulations Involving Twin Rectangular Jets using Steady RANS in Star-CCM+, L. B. Carasik, H. Wang, Y. A. Hassan (Texas A&M)

#### Biology and Medicine: General

**Sponsored by:** BMD

**Session Organizer:** Bryan P. Bednarz (Univ of Wisconsin, Madison) **Chair:** Lei Raymond Cao (Ohio State)

**Location:** Neopolitan 2 **Time:** 4:30-6:35 pm

#### 4:30 pm

Improving Contrast and Resolution in Plant Root Imaging, Isaac A. Zachary, Scott Kovaleski, Peter Norgard (Univ of Missouri, Columbia)

#### 4:55 pm

Evidence of Radiosensitizing Effects of GdPO<sub>4</sub> Nanostructures, Miguel Toro, Jessika Rojas (Virginia Commonwealth Univ)

#### 5:20 pm

Evaluation of TiO<sub>2</sub> and TiO<sub>2</sub>/Au Nanoparticles as Potential Radiosensitizers by Decomposition of Methylene Blue, M.C. Molina Higgins, J. V. Rojas (Virginia Commonwealth Univ)

#### 5:45 pm

Water Scintillation under Proton Beam Exposure, William Christopher Chuirazzi, Ryan Gallagher, Douglas Hardtmayer (Ohio State), Hao Chen, Niek Schreuder (Pronova Solutions), Lei Cao (Ohio State)

#### 6:10 pm

Tracking Synthetic Particle Paths Generated in Gate with MPEPT, Roque Santos, Matthew Herald, Arthur Ruggles (Univ of Tennessee, Knoxville)

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## WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 4:30 PM

#### Recent Development in Material Accountancy Techniques for Pyroprocessing Facilities

**Sponsored by:** FCWMD **Cosponsored by:** IRD, NNPD

**Session Organizer and Chair:** Steve Eugene Skutnik (Univ of Tennessee, Knoxville)

**Location:** Neopolitan 3 **Time:** 4:30-6:10 pm

**4:30 pm**

Safeguards Approach for Pyroprocessing Facilities, Benjamin B. Cipiti (SNL)

**4:55 pm**

Development of a Smart Signal Detection Method for Cyclic Voltammetry via Artificial Neural Intelligence, Samaneh Rakhshan Pouri, Dumidu Shanika Wijayasekara, Milos Manic, Supathorn Phongikaroon (Virginia Commonwealth Univ)

**5:20 pm**

Multi-Species Modeling of Molten-Salt Electrochemical Process, Sungyeol Choi, Dokyu Kang (UNIST)

**5:45 pm**

Electrochemical Property Determination of Fission Product Elements in Molten Fluoride Salt, Ryan Chesser, Evan Wu, Jinsuo Zhang (Ohio State)

#### Advances in Technical Nuclear Forensics: Methods and Analysis—II

**Sponsored by:** IRD **Cosponsored by:** NNPD

**Session Organizer:** Kenan Unlu (Penn State) **Cochairs:** Hyoung K. Lee (Missouri Univ of Science & Technology), Adam Stratz (Univ of Tennessee, Knoxville)

**Location:** Neopolitan 4 **Time:** 4:30-6:10 pm

**4:30 pm**

Gas-Phase Detection of a Multi-Complex Lanthanide Sample for Nuclear Forensics, S. Adam Stratz, Steven J. Jones, Howard L. Hall (Univ of Tennessee, Knoxville)

**4:55 pm**

Volatility Studies of Lanthanide Hexafluoroacetylacetone Chelates, Shayan Shahbazi, John D. Auxier II, Howard L. Hall (Univ of Tennessee, Knoxville)

**5:20 pm**

Prompt Gamma Neutron Activation Analysis of Niobium for Characterization of Light Interstitials, I. J. Love, S. R. Reese, L. Minc, J. D. Tucker (Oregon State Univ)

**5:45 pm**

Underground Gas Sampling for <sup>37</sup>Ar in Hard Limestone, S. R. Biegalski, C. M. Johnson, D. A. Haas, M. Blood (Univ of Texas, Austin)

#### Student Conference Proposal Writing—Panel

**Sponsored by:** YMG

**Session Organizer:** Brett D. Rampal (NuScale Power, LLC) **Chair:** Catherine M. Perego (Westinghouse)

**Location:** Messina **Time:** 4:30-6:30 pm

Hosting the ANS National Student Conference is a serious undertaking for any student section, and this panel aims to provide guidance to those student sections interested in preparing a bid to host the student conference. A diverse panel of judges and past conference hosts will discuss aspects of past bids to emulate and pitfalls to avoid and address issues that student sections can face when writing a proposal.

**Panelists:**

Catherine Perego (Westinghouse)

Timothy Crook (Texas A&M)

Matthew Jasica (Univ of Wisconsin)

Brett Rampal (NuScale Power, LLC)

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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 8:00 AM

#### The Innovations in Fuel Cycle Research Awards Program

**Sponsored by:** ETWDD

**Session Organizer:** Lisa Ching Marshall (NCSU) **Chair:** Patricia Paviet (DOE)

**Location:** Octavius 2 & 3 **Time:** 8:00-11:45 am

**8:00 am**

Effect of Irradiation Mode on Irradiated Microstructure of HT9, E. Getto, Z. Jiao, A. M. Monterrosa, K. Sun, G. S. Was (Univ of Michigan)

**8:25 am**

Nuisance Alarm Reductions in Organic Scintillation Detector-Based Radiation Portal Monitors, Marc Gerrit Paff, Marc Ruch, Shaun Clarke, Sara Pozzi (Univ of Michigan)

**8:50 am**

Evaluation of Bentonite Engineered Barrier Performance under Repository Conditions, Rachel N. Pope, Brian A. Powell, Mark A. Schlautman (Clemson Univ)

**9:15 am**

Equation of State for Technetium Metal up to 153 GPa, Daniel S. Mast, Keith Lawler, Emily Siska, Frederic Poineau, Kenneth R. Czerwinski, Barbara Lavina, Paul M. Forster (UNLV)

**9:40 am**

Synthesis and Adsorption Studies of a Novel Bifunctional Uranium Chelator, Marek Piechowicz, Wenbin Lin (Univ of Chicago)

**10:05 am**

Advances in the Development and Testing of Micro-Pocket Fission Detectors (MPFDs), Michael Reichenberger (Kansas State Univ)

**10:30 am**

Pulse Shape Discrimination Performance of Stilbene Coupled to Low-Noise Silicon Photomultipliers, Marc Ruch (Univ of Michigan)

**10:55 am**

A Novel Approach towards Synthesis of Apatite Based Ceramic Waste Forms for Immobilization of Radioactive Iodine (I-129), Charles Cao (Rutgers Univ)

**11:20 am**

A Modified Tightly Coupled Method for Reactor Transient Simulations, Jaron Senecal, (Rensselaer Polytechnic Univ)

#### NRC Decommissioning Rulemaking: An Update on the Progress and Issues Coming Out of the Rulemaking Process—Panel

**Sponsored by:** DESD

**Session Organizer and Chair:** Rich St. Onge (Black and Veatch)

**Location:** Octavius 6 **Time:** 8:00-11:30 am

The U.S. NRC Issued an Advanced Notice of Potential Rulemaking (ANPR) on Decommissioning in November 2015. The ANPR sought from the nuclear industry and stakeholders to inform the NRC of those stake holder's issues and concerns regarding the decommissioning regulatory process. The ANPR Comment period closed in March 2016. This session provides an opportunity for the NRC and industry to share their thoughts and concerns with the D&D Rulemaking process that will affect the broader commercial power plant decommissioning community. The session will also provide a forum for the NRC to provide insights and outline the schedule of activities they envision to support the rulemaking process.

**Panelists:**

Meena Khanna (NRC)

Rod McCullum (NEI)

Thomas Magette (Price Waterhouse)

Gerry Vannoordennen (Energy Solutions)

William Zipp (Dominion)

Technical  
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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 8:00 AM

#### Uncertainty Quantification and Sensitivity Analysis

**Sponsored by:** MCD

**Session Organizer:** Jeffery D. Densmore (BAPL) **Chair:** Brian C. Kiedrowski (Univ of Michigan)

**Location:** Octavius 7 & 8 **Time:** 8:00-9:40 am

##### 8:00 am

Quantifying the Uncertainty in Deterministic Phonon Transport Calculations of Thermal Conductivity using Polynomial Chaos Expansions, Jackson R. Harter (Oregon State Univ), P. Alex Greaney (Univ of California, Riverside), Todd S. Palmer (Oregon State Univ)

##### 8:25 am

Comparisons Between a Priori Uncertainty Quantification and Calculation/Measurement Discrepancies Applied to the MERCI UO<sub>2</sub> Fuel Rod Decay Heat Experiment, S. Lahaye, T.-D. Huynh, A. Tsilanizara, J. C. Jaboulay, S. Bourganel (CEA)

##### 8:50 am

Time-Dependent Sensitivity Analysis of OECD Benchmark using BISON and RAVEN, Paul W. Talbot (Univ of New Mexico), Kyle Gamble, C. Rabiti, C. Wang, A. Alfonsi, J. J. Cogliati, D. Mandelli (INL), A. K. Prinja (Univ of New Mexico)

##### 9:15 am

Comparison of Surrogate Model to Physical Model for Dynamic Probabilistic Risk Analysis using the RAVEN Code, Brian Cohn (Ohio State), Andrea Alfonsi, Diego Mandelli, Cristian Rabiti (INL)

#### Nuclear Installations Safety: General—III

**Sponsored by:** NISD

**Session Organizer and Chair:** Nicholas R. Brown (ORNL)

**Location:** Octavius 9 **Time:** 8:00-10:05 am

##### 8:00 am

GSI 191 Closure Issue for EDF PWR Fleet: The Fuel Assembly Test Results, Gilles Champion, Thomas Goubin (EdF)

##### 8:25 am

Failure Diagnosis for the Holdup Tank System via ISFA, Huijuan Li (Ohio State), Shannon Bragg-Sitton (INL), Carol Smidts (Ohio State)

##### 8:50 am

Characteristics Analysis of SGTR Accidents under the Shutdown Conditions, Wook-Jo Lee, Dong-Wook Jerng (Chung-Ang Univ), Seoung Su Jeon, Soon Joon Hong (FNC Technology Co. Ltd.)

##### 9:15 am

Systems Engineering (SE) Approach of Developing a Passive Safety Injection System (PSIS) to Cope with APR 1400 Extended Station Black-Out (SBO) Accident Using RELAP5, A. K. Shiran, S. J. Oh (KINGS)

##### 9:40 am

PWR Station Blackout and External Events Analysis for LWRs/RISMC Project, Carlo Parisi, Steven Prescott, Richard Yorg, Justin Coleman, Ronaldo H. Szilard (INL)

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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 8:00 AM

#### ANS-8 Standards Forum

**Sponsored by:** NCSD

**Session Organizer and Chair:** Brian O. Kidd (Paschal Solutions, Inc.)

**Location:** Octavius 10 **Time:** 8:00-10:00 am

Subcommittee ANS-8, Operations with Fissile Material Outside Reactors, meets to discuss various technical and administrative aspects of the approximately 20 national consensus standards under its purview. In addition to status and progress updates by representatives of individual working groups, formal presentations on the technical bases of numerical values such as subcritical limits and experiences with applications of particular standards are solicited. Agenda topics such as new and expanded standards are also encouraged.

#### Reactor Physics Design, Validation and Operational Experience—I

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Sebastian Schunert (INL)

**Location:** Octavius 12 **Time:** 8:00-10:05 am

##### 8:00 am

A Simulation of Rod Ejection Accident in an Advanced Small PWR Core without Soluble Boron, Hoseong Yoo, Ser Gi Hong (Kyung Hee Univ)

##### 8:25 am

Data Assimilation Needs for RR Performance Improvement, Evgeny Ivanov (IRSN), Perry Young (NRG)

##### 8:50 am

Criticality Benchmarking of the Oregon State TRIGA Reactor using the MCNP Burn Option, R. A. Schickler, T. S. Palmer (Oregon State Univ)

##### 9:15 am

The 2016 Edition of the IRPhEP Handbook, John D. Bess, Margaret A. Marshall (INL), Jim Gulliford (OECD/NEA), Ian Hill (Nuclear Energy Agency)

##### 9:40 am

MOCUM Verification with a Heterogeneous MOX Whole Core C5G7 Benchmark Problem, Ayoola Oredeko, Xue Yang (Texas A&M, Kingsville), Zeyun Wu (NIST)

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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 8:00 AM

#### TREAT

**Sponsored by:** RPD

**Session Organizer and Chair:** Javier Ortensi (INL)

**Location:** Octavius 13 **Time:** 8:00-11:20 am

#### 8:00 am

Improved Quasi-Static Method with Step Doubling Time Adaptation, Zachary M. Prince, Jean C. Ragusa (Texas A&M)

#### 8:25 am

Local Doppler Broadening Effects from Thermal Neutrons during Transient Testing, Logan M. Scott (Texas A&M), Samuel E. Bays (INL), Jean C. Ragusa (Texas A&M)

#### 8:50 am

A Neutron Streaming Problem to Test Rattlesnake Methods for TREAT, Javier Ortensi, Sebastian Schunert, Yaqi Wang, Benjamin Baker, Frederick Gleicher, Mark DeHart (INL)

#### 9:15 am

Transient Reactor Test Facility (TREAT) Startup Status, J. R. Parry (INL)

#### 9:40 am

A Parametric Study of the Adjoint Flux Calculation for TDKENO, Dustin Popp, Zander Jewell Mausolff (Univ of Florida), Mark David DeHart (INL), Sedat Goluoglu (Univ of Florida)

#### 10:05 am

Testing of Graphite Thermal Neutron Scattering Law Data in Support of TREAT Neutronic Analysis, A. I. Hawari, J. L. Wormald, C. A. Manning (NCSU)

#### 10:30 am

Parallel Performance of the Time Dependent Transport Code TDKENO with Applications to TREAT Simulations, Zander Jewell Mausolff (Univ of Florida), Mark David DeHart (INL), Sedat Goluoglu (Univ of Florida)

#### 10:55 am

Conceptual Phase Neutronic and Thermal Analyses for the LEU Conversion of the Transient Reactor Test Facility (TREAT), Heather M. Connaway, Dimitrios C. Kontogeorgakos, Dionissios Papadias, Arthur E. Wright (ANL)

#### Subchannel Thermal-Hydraulic Analysis—II

**Sponsored by:** THD

**Session Organizer:** David L. Aumiller (BMPC) **Cochairs:** Maria N. Avramova (NCSU), Robert K. Salko (ORNL)

**Location:** Octavius 14 **Time:** 8:00-9:15 am

#### 8:00 am

Uncertainty Analysis of CTF for the Uncertainty Analysis in Modeling Benchmark, Nathan Porter, Maria Avramova (NCSU)

#### 8:25 am

CFD-Informed Spacer Grid Models in the Subchannel Code CTF, Taylor Blyth (Penn State), Robert Salko (ORNL), Maria Avramova (NCSU)

#### 8:50 am

Critical Heat Flux Model Improvement in CTF for Natural Circulation Type Reactors, Caleb Jernigan (Penn State), Jordan D. Rader (Holtec International), Maria Avramova (NCSU)

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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 8:00 AM

#### General Thermal Hydraulics—II

**Sponsored by:** THD

**Session Organizer:** Jovica R. Riznic (Canadian Nucl Safety Comm) **Cochairs:** Elia Merzari (ANL), Lane B. Carasik (Texas A&M)

**Location:** Octavius 15 & 16 **Time:** 8:00-10:05 am

**8:00 am**

Measurement of the Radiative Absorption Coefficient of FLiNaK, Ethan S. Chaleff, Thomas E. Blue (Ohio State)

**8:25 am**

Evaluation for Effect of TRACE Spacer Grid Model on RBHT Reflood Tests, Byung Gil Huh (KINS), Stephen M. Bajorek, Chris L. Hoxie (NRC)

**8:50 am**

A Simulation of a Steam Generator Tube Rupture in AP1000 Nuclear Power Plant Based on RELAP5-MV, Eltayeb Yousif, Zhijian Zhang, Zhaofei Tian, Ju Hao-ran (Harbin Engineering Univ)

**9:15 am**

Numerical Study of Vortex Core in Turbulent Swirling Flow, Ari Hamdani, Hiroshige Kikura (Tokyo Inst Technol)

**9:40 am**

The Effect of Support Rod on Film Boiling Heat Transfer for Hot Metal Sphere in Subcooled Water, S. H. Yoon, H. C. No (KAIST)

#### Experimental Thermal Hydraulics—II

**Sponsored by:** THD

**Session Organizer:** Fan-Bill Cheung (Penn State) **Cochairs:** Rodolfo Vaghetto (Texas A&M), Craig D. Geradi (ANL)

**Location:** Neopolitan 2 **Time:** 8:00-9:40 am

**8:00 am**

Experimental and CFD Analysis of Condensation with Non-Condensable Gas in Multi-Tubes, Do Yun Kim, Hee Cheon No (KAIST), Byong Guk Jeon (KAERI)

**8:25 am**

Experimental Study for Two Phase Flow Instability in the PCHE Type Steam Generator in SMR, Chang Wook Shin, Hee Cheon No (KAIST)

**8:50 am**

A New Empirical Correlation for Condensation Heat Transfer Coefficient of Air-Steam Mixture on a Vertical Tube, Yeon-Gun Lee, Yeong-Jun Jang, Un-Ki Kim (Jeju National Univ)

**9:15 am**

Effect of Local Void Fractions on Subcooled Boiling Oscillations in Natural Circulation Boiling Loop, Arnab Karmakar (BIT), Runa Dey (ISM), Swapan Paruya (NIT)

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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 8:00 AM

#### Human Factors, Instrumentation, and Controls: Instrumentation and Control Systems

**Sponsored by:** HFICD

**Session Organizer:** Kathryn Ann McCarthy (INL) **Chair:** Brent Shumaker (AMS Corp)

**Location:** Neopolitan 3 **Time:** 8:00-10:30 am

**8:00 am**

A Study on Safety Evaluation of Safety Grade Smart Transmitter in Nuclear Power Plants, Hyungtae Kim, Jaeyul Choo, Yeong Jin Yu, Hyun Shin Park (KINS)

**8:25 am**

Common Cause Failure Mitigation Experience on Digital I&C System in NPP, Man Woo Kim, Jong Jae Choi (KECO Engineering & Construction)

**8:50 am**

Suggestion of a Framework to Evaluate the Extent of Cyber Security Enhancements in NPP, Chanyoung Lee, Poong Hyun Seong (KAIST)

**9:15 am**

Establishing a Cyber Security Culture for the Nuclear Industry, Raghu Avali (Westinghouse)

**9:40 am**

Coupling of Thermal Energy Storage with Small Modular Reactors, J. Michael Doster, Konor L. Frick (NCSU)

**10:05 am**

Detailed Study of the Transient Rod Pneumatic System on the Annular Core Research Reactor, Brandon Fehr (Georgia Tech)

#### Fuel Cycle and Waste Management: General—II

**Sponsored by:** FCWMD

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

**Location:** Neopolitan 4 **Time:** 8:00-9:40 am

**8:00 am**

CyBORG: An ORIGEN-Based Reactor Analysis Capability for Cyclus, Steve E. Skutnik, Nicholas C. Sly, Jennifer L. Littell (Univ of Tennessee Knoxville)

**8:25 am**

A Degradation Model and Testing Protocol for Metallic Waste Forms, W. L. Ebert (ANL)

**8:50 am**

Consolidating Data on Spent Nuclear Fuel into a Unified Database, Kaushik Banerjee, Henrik Liljenfeldt, Paul Miller, Joshua L. Peterson, Robert A. Joseph III, Justin B. Clarity, Georgeta Radulescu, Robert A. Lefebvre, John M. Scaglione (ORNL)

**9:15 am**

Multicomponent Adsorption of Radioactive Iodine and Krypton using ETS-10 Supported Carbon Nano-Polyhedrons, Kai Coldsnow, Sachin U. Nandanwar, Austin Porter, Vivek P. Utgikar (Univ of Idaho), Piyush Sabharwall (INL), D Eric Aston (Univ of Idaho)

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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 9:20 AM

#### Thermal-Hydraulics of Severe Accidents

**Sponsored by:** THD

**Session Organizer:** John C. Luxat (McMaster Univ) **Co-chairs:** John C. Luxat (McMaster Univ), Haihua Zhao (INL)

**Location:** Octavius 14 **Time:** 9:20-10:35 am

#### 9:20 am

Analytical Models for Terry Turbine Nozzle, Haihua Zhao, Ling Zou, Hongbin Zhang, James O'Brien (INL)

#### 9:45 am

Pressure Drop-Flow Rate Curves for Single Phase Steam in Steam Generator U-Tube during Severe Accidents, Douglas A. Fynan, Kwang-II Ahn (KAERI)

#### 10:10 am

Thermo-Mechanical Analysis of SBLOCA with Loss of One Safety Injection System using SCDAP/RELAP5, Tae Hyun Chun, Wang-Kee In (KAERI), Tae-Wan Kim (Incheon National Univ)

### TECHNICAL SESSIONS - 10:05 AM

#### The Impact of Chemistry in Nuclear Criticality Safety Evaluations–Tutorial

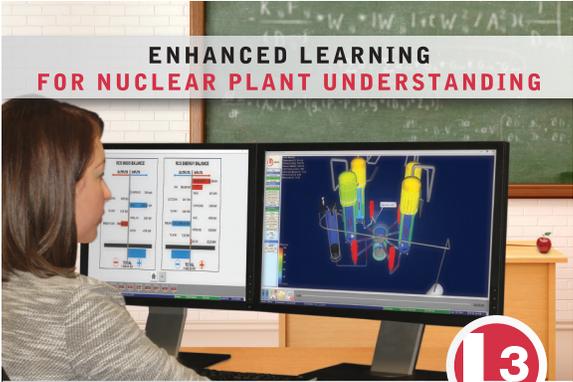
**Sponsored by:** NCSD

**Session Organizer and Chair:** Deborah Ann Hill (NNL)

**Location:** Octavius 10 **Time:** 10:05-12:35 pm

Different nuclear safety considerations apply to each stage of the nuclear fuel cycle. However, reprocessing and recovery facilities present a unique challenge because the diversity of the physical, chemical and isotopic forms results in the criticality safety professional often needing to have a detailed understanding of the chemistry of the process (e.g. because of concerns about unplanned precipitation/separation). The aim of this tutorial is to provide the attendees with an enhanced appreciation of this subject area and, in particular, specific related issues that the criticality safety professional may need to consider as part of their evaluations. Representatives from LANL and UK NNL to be announced.

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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 1:00 PM

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

**Sponsored by:** NCS D

**Session Organizer:** Deborah Ann Hill (NNL) **Chair:** Catherine M. Percher (LLNL)

**Location:** Octavius 10 **Time:** 1:00-3:05 pm

##### 1:00 pm

Improvements to Thermal Neutron Scattering Law of CH<sub>2</sub>, Kemal Ramic, Carl Wendor, Yaron Danon, Li (Emily) Liu (RPI)

##### 1:25 pm

Development of a Thermal Neutron Scattering Law for Polyethylene using Molecular Dynamics Simulations, A. I. Hawari, A. Petersen, Y. Zhu (NCSU), D. P. Heinrichs (LLNL), M. L. Zerkle (BAPL)

##### 1:50 pm

Passive Safety Feature of KIPT Neutron Source Facility, Zhaopeng Zhong, Yousry Gohar (ANL)

##### 2:15 pm

Development of an In-Beam Neutron Flux Monitor for Time of Flight Capture Measurements  
E. Blain, Y. Danon, B. McDermott, A. Youmans, J. Brown, N. Thompson, A. Weltz, K. Mohindroo (RPI),  
G. Leinweber, R. Block, M. Rapp, D. Barry (Bechtel Marine Propulsion Corp)

##### 2:40 pm

Quasi-Differential Neutron Induced Neutron Emission Reaction Measurements at WNR, Kumar S. Mohindroo, Y. Danon, E. Blain (RPI), S. Mosby, M. Devlin (LANL)

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## THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 1:00 PM

#### Reactor Physics Design, Validation and Operational Experience—II

**Sponsored by:** RPD

**Session Organizer:** Cristian Rabiti (INL) **Chair:** Carlo Parisi (INL)

**Location:** Octavius 12 **Time:** 1:00-3:30 pm

##### 1:00 pm

Uncertainty due to Nuclear Data for an MTR Fuel Assembly, D. F. da Cruz (NRG)

##### 1:25 pm

Use of Solid Pyrex Rod for Conceptual Soluble Boron Free SMR, Jinsun Kim, Hyoje Cho, Manseok Do, Kibong Seong (Kepco NF)

##### 1:50 pm

Benchmark Study of Infinite Lattice of Pebble Fuel within FLiBe Coolant for TMSR-SF1 Design, Ruimin Ji, Yafen Liu, Yang Zou (SINAP), Kaichao Sun, Lin-wen Hu (MIT)

##### 2:15 pm

The Optimized Parallel MOC Module in Code cosLATC, Shuo Li, Chenglin Zhu, Hui Yu, Yuhang Yan, Yixue Chen (SNPSDC)

##### 2:40 pm

Comparison of Proposed HANARO Fuel Assemblies in the WWR-SM Reactor, L. M. Peguero, T. S. Palmer (Oregon State Univ)

##### 3:05 pm

Application of PCM Validation to BFBT Experiments, Jia Zhou (Purdue Univ), Guojun Hu (Univ of Illinois), Hany Abdel-Khalik (Purdue Univ)

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# Embedded Topical Meeting

## High Temperature Reactor Technology HTR 2016

### Meeting Officials



GENERAL CHAIR  
Dr. Finis Southworth  
*NGNP Industry Alliance*



TECHNICAL PROGRAM CHAIR  
Dr. David Petti  
*Idaho National Laboratory*

## Tracks and Leads HTR 2016

**Track-1:** National Research Programs and Industrial Projects

**Track-2:** Industrial Applications and Markets

**Track-3:** Fuel and Waste

**Track-4:** Materials and Components

**Track-5:** Reactor Physics Analysis

**Track-6:** Thermal-hydraulics, Structural and Multiphysics Analyses

**Track-7:** Development, Design and Engineering

**Track-8:** Safety and Licensing

Carl Sink (US DOE) and Michael Fuetterer (EU)

Lew Lommers (AREVA) and Michael Fuetterer (EU)

Paul Demkowicz (INL) and John Hunn (ORNL)

Richard Wright (INL) and Manuel Pouchon (EU-PSI, Switzerland)

Hans Gougar (INL) and Frederick Reitsma (IAEA)

Y. Hassan (Texas A&M) Hans Gougar (INL) and Frederick Reitsma (IAEA)

Lew Lommers (AREVA) and Xing Yan (JAEA)

Farshid Sharoki (AREVA) and Jim Kinsey (INL)

## HTR 2016 Embedded Topical

### Sessions at a Glance

#### Monday, November 7

1:00 pm

Opening Plenary

#### Tuesday, November 8

8:00 am

- Fuel Design and Fabrication
- Materials—I
- Fluid Dynamics Methods and Codes—I
- Nuclear Data and Uncertainty
- National Research Programs and Industrial Projects—I

8:55 am

- Safety and Licensing—I

9:50 am

- Materials—II
- Fluid Dynamics Methods and Codes—II
- Pebble Dynamics
- National Research Programs and Industrial Projects—II

1:00 pm

- Fuel Irradiation
- Materials—III
- Heat Transfer Methods and Codes
- Safety and Licensing—II

2:50 pm

- Fuel Postirradiation Examination
- Materials—IV
- Safety and Licensing—III
- Hydrogen Production—I

#### Wednesday, November 9

8:00 am

- Fuel PIE and Safety Testing
- Materials—V
- Natural and Mixed Convection—I
- Progress in New Generation Reactor Designs

9:50 am

- Irradiation TRISO Microanalysis and Silver Retention
- Natural and Mixed Convection—II
- Fuel/Core Design—I
- Plant Dynamics and Control

1:00 pm

- Irradiation and PIE
- Structural Methods and Codes
- Fuel/Core Design—II
- System and Facility Design—I

2:50 pm

- Fuel Modeling and Simulation
- Transient and Accident Analysis Methods and Codes
- System and Facility Design—II

#### Thursday, November 10

8:00 am

- Thermal Hydraulics of Key Components—I
- Industrial Process Heat
- Multiphysics Methods and Codes—I
- System and Facility Design—III

9:50 am

- Thermal Hydraulics of Key Components—II
- Fission and Activation Product Transport
- Multiphysics Methods and Codes—II

10:45 am

- Hydrogen Production—II

## EMBEDDED TOPICAL: HTR 2016 | MONDAY, NOVEMBER 7

OPENING PLENARY - 1:00 PM

### HTR 2016 Opening Plenary

**Chair:** Finis Southworth (NGNP Industry Alliance)

**Location:** Neopolitan 1

#### SPEAKERS

- John Kotek (Acting Assistant Secretary, Office of Nuclear Energy, DOE)
- Eben Mulder Chief Nuclear Officer, and Dr. Kam Ghaffarian, Founder and CEO (X-Energy)
- Prof. Grzegorz Wrochna (Director HTGR, Poland)
- Dr. Minwhan Kim (Director HTGR Program, KAERI)
- Dr. Kazuhiko Kunitomi (Director General HTGR Hydrogen and Heat Application Research Center, JAEA)
- Prof. Zhang Zuoyi (Director of INET)
- Chris Hamilton (Executive Director, NGNP Industry Alliance)

## EMBEDDED TOPICAL: HTR 2016 | TUESDAY, NOVEMBER 8

TECHNICAL SESSIONS - 8:00 AM

### Fuel Design and Fabrication

**Session Organizer:** Paul A. Demkowicz (INL) **Cochairs:** Paul A. Demkowicz (INL), John D. Hunn (ORNL)

**Location:** Neopolitan 1 **Time:** 8:00-8:50 am

#### 8:00 am

Design and Preparation of SiC-ZrC Composite Coating Layers by FB-CVD Used in TRISO Coated Fuel Particles, Rongzheng Liu, Malin Liu, Youlin Shao, Bing Liu (Tsinghua Univ)

#### 8:25 am

Preliminary Simulation Study Particle Coating Process using a CFD-DEM-PBM Model, Malin Liu, Rongzheng Liu, Tianjin Li, Jiaying Chang, Bing Liu, Youlin Shao (Tsinghua Univ)

### Materials—I

**Session Organizer:** Manuel Alexandre Pouchon (Paul Scherrer Inst) **Cochairs:** R. N. Wright (INL), Manuel Alexandre Pouchon (Paul Scherrer Inst)

**Location:** Octavius 17 **Time:** 8:00-9:40 am

#### 8:00 am

Creep and Creep Rupture of Alloy 617, J. K. Wright, T. M. Lilo, R. N. Wright (INL), Woo-Gon Kim, In Jin Sah, Eung Seon Kim, Ji Yeon Park, Min Hwan Kim (KAERI)

#### 8:25 am

Creep-Fatigue Life Prediction of Alloy 617 at 950°C using an Effective Hold Time Approach, Fraaz Tahir, Yongming Liu (Arizona State Univ)

#### 8:50 am

Creep-Fatigue Behavior of Alloy 617, J. K. Wright, L. J. Carroll (INL), T.-L. Sham (ANL), N. J. Lybeck, R. N. Wright (INL)

#### 9:15 am

Study on Fault Diagnosis System of Active Magnetic Bearing, Danhui He, Zhengang Shi, Xunshi Yan, Jingjing Zhao, Xingnan Liu, Zhe Sun, Guojun Yang (Tsinghua Univ)

Embedded  
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## EMBEDDED TOPICAL: HTR 2016 | TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 8:00 AM

#### Fluid Dynamics Methods and Codes—I

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M), W. David Pointer (ORNL)

**Location:** Octavius 18 **Time:** 8:00-9:15 am

**8:00 am**

CFD Investigation of Bypass Flow in HTR-PM, Ximing Sun, Zhipeng Chen, Jun Sun (Tsinghua Univ)

**8:25 am**

A Fully Integrated 3D CFD Model of the Flow and Heat Transfer in a Packed Bed Reactor, Marthinus Christiaan Potgieter, Charl Gabriël du Toit, Jan-Hendrik Kruger (North West Univ)

**8:50 am**

Effects of Bypass Flow and Power Change and Deviation on Performance of Thermal Mixing Structure of HTR-PM, Yangping Zhou, Pengfei Hao, Fu Li, Lei Shi, Yuan Liu, Feng He, Yujie Dong, Zuoyi Zhang (Tsinghua Univ)

#### Nuclear Data and Uncertainty

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Hans David Gougar (INL), Frederick Reitsma (IAEA)

**Location:** Octavius 19 **Time:** 8:00-9:15 am

**8:00 am**

IAEA CRP on HTGR Uncertainties: Sensitivity Study of PHYSICS/RELAP5 MHTGR-350 Core Calculations using Various SCALE/NEWT Cross-Section Sets for Ex. II-1, Pascal Rouxelin (NCSU), Gerhard Strydom, Andrea Alfonsi (INL), Kostadin Ivanov (NCSU)

**8:25 am**

Use of Cross-Section Covariance Information in Uncertainty Analysis at Modeling HTGR Neutron Physics, V. F. Boyarinov, P. A. Fomichenko, A. V. Grol (Kurchatov Inst)

**8:50 am**

Effect of Double Heterogeneity Treatment on Neutronics Modeling of HTGR Unit Cell, Lidong Wang, Jiong Guo, Fu Li (Tsinghua Univ), Jason Hou, Kostadin N. Ivanov (NCSU)

#### National Research Programs and Industrial Projects—I

**Session Organizer:** Carl J. Sink (DOE) **Cochairs:** Carl J. Sink (DOE), Michael Andreas Futterer (JRC)

**Location:** Octavius 21 **Time:** 8:00-9:15 am

**8:00 am**

The Activities at the IAEA in Support of High Temperature Reactors Technology Development, Frederik Reitsma (IAEA)

**8:25 am**

Results from the European NC2I-R Project on Nuclear Cogeneration with High Temperature Reactors, T. Jackowski, A. Przybyszewska, G. Wrochna (NCBJ), O. Baudrand (IRSN), M. A. Futterer (EC JRC), P.-M. Plet (E.ON), F. Roelofs (NRG), V. Chauvet, C. Auriault (LGI), D. Hittner (AREVA), H. Tuomisto, R. Stahl (FORTUM)

**8:50 am**

Recent Research Activities on High Temperature Pebble Bed Reactors at PSI, Jarmo Kalilainen (ETH), Horst-Michael Prasser (ETH/Paul Scherrer Inst), Terttaliisa Lind, Jiri Krepel, Warren Schenler (Paul Scherrer Inst)

#### Safety and Licensing—I

**Session Organizer:** James Kinsey (INL) **Cochairs:** James Kinsey (INL), Farshid Sharoki (AREVA)

**Location:** Neopolitan 1 **Time:** 8:55-9:45 am

**8:55 am**

Validation Status of Design Methods for Predicting Source Terms, David L. Hanson (NODAK2U Consulting)

**9:20 am**

Mechanistic Source Terms for the Xe-100 Reactor XSTERM Code Development Approach, L. D. Oliver (Consultant to X Energy LLC), E. J. Mulder, Z. Wang (X-Energy, LLC)

## EMBEDDED TOPICAL: HTR 2016 | TUESDAY, NOVEMBER 8

TECHNICAL SESSIONS - 9:50 AM

### Materials—II

**Session Organizer:** Manuel Alexandre Pouchon (Scherrer Inst) **Cochairs:** Manuel Alexandre Pouchon (Paul Scherrer Inst), R. N. Wright (INL)

**Location:** Octavius 17 **Time:** 9:50-11:30 am

#### 9:50 am

R&D Activities on VHTR Materials at KAERI, Ji Yeon Park, Woo Gon Kim, Weon Ju Kim, Dong Jin Kim, Se Hwan Chi, Eung Seon Kim, Min Hwan Kim (KAERI)

#### 10:15 am

Composition-Dependence of 316 Austenitic Stainless Steel Deformation and Aging Properties for High-Temperature Applications, G. Meric de Bellefon (Univ of Wisconsin, Madison), M. N. Gushev (ORNL), S. A. Shah, A. Hogrel, M. F. McCabe (Univ of Wisconsin, Madison), J.-C. van Duysen (Univ of Tennessee, Knoxville/EDF/Univ de Lille), K. Sridharan (Univ of Wisconsin, Madison)

#### 10:40 am

Microstructural Creep, Fatigue and Creep-Fatigue Modeling of Nickel-Based Superalloy Inconel 617 at High Temperature, Xiang Zhang, Tung Van Phan, Caglar Oskay (Vanderbilt Univ)

#### 11:05 am

Modeling and Analysis of an AMB System with Flexible Rotor in HTR-10GT, Ying He, Zhe Sun, Zhengang Shi, Lei Shi, Yan Zhou, Xingnan Liu, Xunshi Yan (Tsinghua Univ)

### Fluid Dynamics Methods and Codes—II

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M), W. David Pointer (ORNL)

**Location:** Octavius 18 **Time:** 9:50-11:05 am

#### 9:50 am

Comparison between Flownex and CORONA Thermal Hydraulic Models for a Single HTR Prismatic Fuel Assembly, S. N. Khoza, C. G. duToit (North West Univ), P. G. Rousseau (Univ of Cape Town), S. N. Lee (KAERI)

#### 10:15 am

Proper Orthogonal Decomposition Analysis of Parallel Twin Jets Measured using Particle Image Velocimetry, Saya Lee, Yassin A. Hassan (Texas A&M)

#### 10:40 am

Numerical Study of Film Cooling with Internal Coolant Crossflow Effects, Xiaokai Sun, Wei Peng, Jie Wang, Gang Zhao, Ping Ye (Tsinghua Univ)

### Pebble Dynamics

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Hans David Gougar (INL), Frederick Reitsma (IAEA)

**Location:** Octavius 19 **Time:** 9:50-11:05 am

#### 9:50 am

Development of Random Geometry Capability in RMC Code for Explicit Analysis of Polytype Particle/Pebble, Shichang Liu, Zeguang Li, Quan Cheng, Ding She, Kan Wang (Tsinghua Univ)

#### 10:15 am

Effect of Pebble Friction on Pattern of Pebble Packing, J. Sun, F. Xie, X. M. Sun, Y. Liu, Y. J. Dong, M. G. Lang, L. Shi, F. Li (Tsinghua Univ), Y. T. Feng (Univ of Wales)

#### 10:40 am

Research on Reconstruction Method for Pebble-Detecting CT System for PB-HTGR, Xin Wan, Jichen Miao, Ximing Liu, Zhifang Wu (Tsinghua Univ)

## Embedded Topical: HTR 2016 Technical Sessions

## EMBEDDED TOPICAL: HTR 2016 | TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 9:50 AM

#### National Research Programs and Industrial Projects—II

**Session Organizer:** Carl J. Sink (DOE) **Co-chairs:** Michael Andreas Futterer (JRC), Carl J. Sink (DOE)

**Location:** Octavius 21 **Time:** 9:50-11:05 am

##### 9:50 am

German HTR Phase Out—Experience and Remaining Challenges, H.-J. Allelein (Aachen Univ/Research Center Jülich), K. Verfondern (Research Center Jülich)

##### 10:15 am

Summary and Experience Feedback on the Restart and Power Operation after a Long Term Shutdown of HTR-10, Liqiang Wei, Feng Xie, Xiaoming Chen, Tao Ma, Jiejuan Tong, Fu Li (Tsinghua Univ)

##### 10:40 am

Lessons Learned from the Commissioning of the THTR 300, Hans-Wolfgang Chi (Technology Insights), invited

### TECHNICAL SESSIONS - 1:00 PM

#### Fuel Irradiation

**Session Organizer:** Paul A. Demkowicz (INL) **Co-chairs:** Paul A. Demkowicz (INL), John D. Hunn (ORNL)

**Location:** Neopolitan 1 **Time:** 1:00-2:40 pm

##### 1:00 pm

HTR-PM Fuel Pebble Irradiation Qualification in the High Flux Reactor in Petten, S. Knol, S. de Groot, R. V. Salama, J. Best, K. Bakker, I. Bobeldijk, J. R. Westlake (NRG), M. A. Fütterer, M. Laurie (European Commission), Chunhe Tang, Rongzheng Lui, Bing Liu, Honhsheng Zhao (Tsinghua Univ)

##### 1:25 pm

The First Irradiation Testing and PIE of TRISO-Coated Particle Fuel in Korea, Bong Goo Kim, Sunghwan Yeo, Kyung-Chai Jeong, Yeon-Ku Kim, Young Woo Lee, Moon Sung Cho (KAERI)

##### 1:50 pm

Irradiation Test and Post Irradiation Examination of the High Burnup HTGR Fuel, Shohei Ueta, Jun Aihara (JAEA), Asset Shaimerdenov, Daulet Dyussambayev, Shamil Gizatulin, Petr Chakrov (The Inst of Nuclear Physics), Nariaki Sakaba (JAEA)

##### 2:15 pm

Status of TRISO Fuel Irradiations in the Advanced Test Reactor Supporting High-Temperature Gas-Cooled Reactor Designs, Michael Davenport, D. A. Petti, Joe Palmer (INL)

#### Materials—III

**Session Organizer:** Manuel Alexandre Pouchon (Paul Scherrer Inst) **Co-chairs:** R. N. Wright (INL), Manuel Alexandre Pouchon (Paul Scherrer Inst)

**Location:** Octavius 17 **Time:** 1:00-2:40 pm

##### 1:00 pm

The IAEA Nuclear Graphite Knowledge Base in Support of High Temperature Reactor Deployment, F. Reitsma (IAEA), S. Santoso (IAEA/National Nuclear Energy Agency), D. Beraha (IAEA), A. Wickham (Nuclear Technology Consultancy), N. C. Gallego (ORNL), G. Haag (Retired), M. Gladyshev (IAEA)

##### 1:25 pm

Evaluating Alternate Test Techniques to Characterize Mechanical Properties in Nuclear-Grade Graphites, Mark C. Carroll, David T. Rohrbaugh, Pritam Chakraborty, W. David Swank (INL)

##### 1:50 pm

A Comparison of the Irradiation Creep Behavior of Several Graphites, Timothy D. Burchell (ORNL), William E. Windes (INL)

##### 2:15 pm

Effect of PyC Interlayer Amorphisation on the Thermal Conductivity of SiC/SiC Composites. Loïc Fave, Manuel A. Pouchon (Paul Scherrer Inst)

## EMBEDDED TOPICAL: HTR 2016 | TUESDAY, NOVEMBER 8

TECHNICAL SESSIONS - 1:00 PM

### Heat Transfer Methods and Codes

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M), W. David Pointer (ORNL)

**Location:** Octavius 18 **Time:** 1:00-2:40 pm

#### 1:00 pm

Impact of Gap Size Uncertainty on Calculated Temperature Uncertainty for the Advanced Gas Reactor Experiments, Binh T. Pham, Jeffrey J. Einerson, Grant L. Hawkes, Nancy J. Lybeck, David A. Petti (INL)

#### 1:25 pm

Investigation of Nuclear Graphite Emissivity Behaviors at Various Temperatures and Oxidation Degrees, Yang Wu, Penghui Chai, Wataru Sagawa, Masahiro Kondo, Koji Okamoto (Univ of Tokyo)

#### 1:50 pm

Application of Frequency Response Methods in Separate and Integral Effects Tests for Molten Salt Cooled and Fueled Reactors, Lakshana Huddar, James C. Kendrick, Chris Poresky, Xin Wang, Per F. Peterson (Univ of California, Berkeley)

#### 2:15 pm

Effects of Wall Thickness on the Flow Instability of Supercritical Pressure Water in a Tube, Zhen Zhang, Xing-Tuan Yang, Pei-Xue Jiang (Tsinghua Univ)

### Safety and Licensing—II

**Session Organizer:** Farshid Sharoki (AREVA) **Cochairs:** James Kinsey (INL), Farshid Sharoki (AREVA)

**Location:** Octavius 19 **Time:** 1:00-2:40 pm

#### 1:00 pm

Development of Safety Requirements for HTGRs Design, Hirofumi Ohashi, Hiroyuki, Sato, Shigeaki Nakagawa, Kazumi Tokuhara, Tetsuo Nishihara, Kazuhiko Kunitomi (JAEA)

#### 1:25 pm

The IAEA Coordinated Research Project on Modular HTGR Safety Design: Status and Outlook, Frederik Reitsma (IAEA), Kazuhiko Kunitomo, Hirofumi Ohashi (JAEA)

#### 1:50 pm

Cost-Saving Opportunities in Emergency Planning at Nuclear Power Plants, Wayne L. Moe, Mark R. Holbrook, Jim C. Kinsey (INL)

#### 2:15 pm

Licensing Basis Event Selection Framework for Advanced Reactors, Mark R. Holbrook, Jim C. Kinsey, Wayne L. Moe (INL)

Embedded  
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## EMBEDDED TOPICAL: HTR 2016 | TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 2:50 PM

#### Fuel Postirradiation Examination

**Session Organizer:** John D. Hunn (ORNL) **Cochairs:** John D. Hunn (ORNL), Paul A. Demkowicz (INL)

**Location:** Neopolitan 1 **Time:** 2:50-4:30 pm

##### 2:50 pm

Key Results from Irradiation and Post-Irradiation Examination of AGR-1 UCO TRISO Fuel, Paul A. Demkowicz (INL), John D. Hunn (ORNL), David A. Petti (INL), Robert N. Morris (ORNL)

##### 3:15 pm

Fission Product Inventory and Burnup Evaluation of the AGR-2 Irradiation by Gamma Spectrometry, Jason M. Harp, Paul A. Demkowicz, John D. Stempien (INL)

##### 3:40 pm

Ceramography of Irradiated TRISO Fuel from the AGR-2 Experiment, F. J. Rice, J. D. Stempien, P. A. Demkowicz (INL)

##### 4:05 pm

Initial Examination of Fuel Compacts and TRISO Particles from the U.S. AGR-2 Irradiation Test, John D. Hunn, Charles A. Baldwin, Fred C. Montgomery, Tyler J. Gerczak, Robert N. Morris, Grant W. Helmreich (ORNL), Paul A. Demkowicz, Jason M. Harp, John D. Stempien (INL)

#### Materials—IV

**Session Organizer:** Manuel Alexandre Pouchon (Paul Scherrer Inst) **Cochairs:** Manuel Alexandre Pouchon (Paul Scherrer Inst), R. N. Wright (INL)

**Location:** Octavius 17 **Time:** 2:50-4:30 pm

##### 2:50 pm

Surface-Modified Microchannel-Type Process Heat Exchanger (PHE) for Hydrogen Production using Sulfur-Iodine Cycle, Injin Sah, Chan Soo Kim, Yong-Wan Kim, Jae-Won Park, Eung-Seon Kim, Min-Hwan Kim (KAERI)

##### 3:15 pm

HTR-GT/H<sub>2</sub> Test Plant—Conceptual Design Study on New Intermediate Heat Exchanger, Kohei Tanaka (IHI Corp.), Atsuhiko Terada (JAEA), Shigeki Maruyama (Toshiba Corp.) Hisashi Komeda, Hisaharu Sakae (IHI Corp.), Xing L. Yan (JAEA)

##### 3:40 pm

Optimization Design of Helium Circulator Diffuser in HTR-PM, Qinzhao Zhang, Hong Wang (Tsinghua Univ)

##### 4:05 pm

Study on Balance of Axial Force in Helium Circulator for HTR-PM, Hong Wang, Wang Yu, Sun Zhe, Zhang Qinzhao (Tsinghua Univ)

## Embedded Topical: HTR 2016 Technical Sessions

## EMBEDDED TOPICAL: HTR 2016 | TUESDAY, NOVEMBER 8

### TECHNICAL SESSIONS - 2:50 PM

#### Safety and Licensing—III

**Session Organizer:** Farshid Sharoki (AREVA) **Cochairs:** Farshid Sharoki (AREVA), James Kinsey (INL)

**Location:** Octavius 19 **Time:** 2:50-4:30 pm

##### 2:50 pm

Influence of Protective Actions on the Ingress-Water Mass in Steam Generator Tube Rupture of HTGR, Yan Wang, Lei Shi, Yanhua Zheng (Tsinghua Univ)

##### 3:15 pm

Fire Compartment Partitioning Approaches for Fire Probabilistic Safety Analysis of a High-Temperature Gas-Cooled Reactor, Yuhao Geng, Jun Zhao, Jiejuan Tong (Tsinghua Univ), Wei Wang, Francesco Di Maio (Politecnico di Milano), Enrico Zio (Politecnico di Milano/EDF)

##### 3:40 pm

Seismic Fragility Analysis for Lateral Supports of HTR-PM RPV, Zhuoer Jiang, Haitao Wang, Jun Zhao, Li Shi (Tsinghua Univ)

##### 4:05 pm

The Control Room Radiological Habitability Assessment of High Temperature Reactor Pebble Bed Module (HTR-PM), Xinpeng Li, Sheng Fang, Hong Li (Tsinghua Univ)

#### Hydrogen Production—I

**Session Organizer:** Lew J. Lommers (AREVA) **Cochairs:** Michael Andreas Futterer (JRC),

Lew J. Lommers (AREVA)

**Location:** Octavius 21 **Time:** 2:50-4:05 pm

##### 2:50 pm

Energy Economic Evaluation of Hydrogen Production by HTGR and Solar Tower, Sarah Schröeders (Aachen Univ), Karl Verfondern (FzJ), Hans-Josef Allelein (Aachen Univ/FzJ)

##### 3:15 pm

Conceptual Design of Iodine-Sulfur Process Flowsheet with More Than 50% Thermal Efficiency for Hydrogen Production, Seiji Kasahara, Yoshiyuki Imai, Koichi Suzuki, Jin Iwatsuki, Atsuhiko Terada, Xing L. Yan (JAEA)

##### 3:40 pm

Base-Load High-Temperature Reactors with Variable Electricity to the Grid using Brayton Cycles to Match Low-Carbon Electricity Markets, Charles Forsberg (MIT)

## Embedded Topical: HTR 2016 Technical Sessions



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## EMBEDDED TOPICAL: HTR 2016 | WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

# Embedded Topical: HTR 2016 Technical Sessions

#### Fuel PIE and Safety Testing

**Session Organizer:** Paul A. Demkowicz (INL) **Cochairs:** Paul A. Demkowicz (INL), John D. Hunn (ORNL)

**Location:** Neopolitan 1 **Time:** 8:00-9:40 am

##### 8:00 am

Initial Gamma Spectrometry Examination of the AGR-3/4 Irradiation, Jason M. Harp, Paul A. Demkowicz, John D. Stempien (INL)

##### 8:25 am

High-Temperature Safety Testing of Irradiated AGR-1 TRISO Fuel, John D. Stempien, Paul A. Demkowicz, Edward L. Reber, Cad L. Christensen (INL)

##### 8:50 am

Initial Results from Safety Testing of U.S. AGR-2 Irradiation Test Fuel, Robert N. Morris, John D. Hunn, Charles A. Baldwin, Fred C. Montgomery, Tyler Gerczak (ORNL), Paul A. Demkowicz (INL)

##### 9:15 am

Evaluation of Fission Product Releases Obtained from KüFA Safety Tests in Light of the Setup's Accuracy, O. Seeger (Aachen Univ), M. Laurie, D. Freis, V. V. Rondinella (EC JRC), A. Xhonneux (FzJ), H.-J. Allelein (Aachen Univ)

#### Materials—V

**Session Organizer:** Manuel Alexandre Pouchon (Paul Scherrer Inst) **Cochairs:** Manuel Alexandre Pouchon (Paul Scherrer Inst), Richard F. Wright (Westinghouse)

**Location:** Octavius 19 **Time:** 8:00-9:40 am

##### 8:00 am

Preliminary Results of the AGC-4 Irradiation in the Advanced Test Reactor and Design of AGC-5, Michael Davenport, D. A. Petti (INL)

##### 8:25 am

The INNOGRAPH Irradiations; HTR Graphite Material Properties from 0 to 25 dpa, M. C. R. Heijna, J. A. Vreeling (NRG)

##### 8:50 am

Irradiation Test of Oxidation-Resistant Graphite in WWR-K Research Reactor, Taiju Shibata, Junya Sumita, Nariaki Sakaba (JAEA), Takashi Osaki (Toto Tanso Co., Ltd.), Hideki Kato (IBIDEN CO., LTD.), Shoichi Izawa (TO-KAI CARBON CO., LTD), Takenori Muto (Nippon Techno-Carbon Co., Ltd.), Shamil Gizatulin, Asset Shaimerdenov, Daulet Dyussambayev, Petr Chakrov (The Inst of Nuclear Physics)

##### 9:15 am

Corrosion Test of HTGR Graphite with SiC Coating, Y. Chikhray, T. Kulsartov, V. Shestakov I. Kenzhina, S. Askerbekov (Kazakh National Univ), J. Sumita, S. Ueta, T. Shibata, N. Sakaba (JAEA), Kh. Abdullin, R. Nemkayeva (Kazakh National Univ)

## EMBEDDED TOPICAL: HTR 2016 | WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 8:00 AM

#### Natural and Mixed Convection—I

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M), W. David Pointer (ORNL)

**Location:** Octavius 18 **Time:** 8:00-9:40 am

##### 8:00 am

Experimental Research of Graphite Behavior under the Accident Condition of High Temperature Gas-Cooled Reactor, Penghui Chai, Masahiro Kondo, Wataru Sagawa, Koji Okamoto (Univ of Tokyo)

##### 8:25 am

Study on Air Ingress Phenomena during a Depressurization Accident of VHTR, Tetsuaki Takeda, Shumpei Funatani (Univ of Yamanashi)

##### 8:50 am

Using CFD Tools to Model Separate Effects of HTR Air Ingress Accident Phenomena, Karel Gregor (Centrum Vyzkumu Rez Czech Technical Univ in Prague), Vaclav Dostal (Czech Technical Univ in Prague)

##### 9:15 am

Experimental Study on a Simplified Facility of HTGR Reactor Building Response to Depressurization Accidental Scenarios, Se Ro Yang, Mark Silberberg, Christopher Fullerton, Thien Nguyen, Rodolfo Vaghetto, Yassin A. Hassan (Texas A&M)

#### Progress in New Generation Reactor Designs

**Session Organizer:** Lew J. Lommers (AREVA) **Cochairs:** Lew J. Lommers (AREVA), Xing Yan (JAEA)

**Location:** Octavius 21 **Time:** 8:00-9:15 am

##### 8:00 am

Conceptual System Design of a Supercritical CO<sub>2</sub> Cooled Micro Modular Reactor, Seong Gu Kim, Bong Seong Oh, Seong Kuk Cho, Seung Joon Baik, Hwanyael Yu, Jangsik Moon, Jeong Ik Lee (KAIST)

##### 8:25 am

MIT Reactor (MITR) Driven Subcritical Facility for the Fluoride-Salt-Cooled High-Temperature Reactor (FHR), Kaichao Sun, Lin-wen Hu, Charles Forsberg (MIT)

##### 8:50 am

AREVA Steam Cycle High Temperature Gas-Cooled Reactor Development and Deployment Plan, Farshid Shahrokhi, Lewis Lommers, John Mayer III (AREVA), Finis Southworth (Retired)

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## EMBEDDED TOPICAL: HTR 2016 | WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 9:50 AM

#### Irradiation TRISO Microanalysis and Silver Retention

**Session Organizer:** John D. Hunn (ORNL) **Cochairs:** John D. Hunn (ORNL), Paul A. Demkowicz (INL)  
**Location:** Neopolitan 1 **Time:** 9:50-11:30 am

**9:50 am**

Electron Probe Microanalysis of Irradiated and 1600°C Safety Tested AGR-1 TRISO Fuel Particles with Low and High Retained <sup>110m</sup>Ag, Karen E. Wright, Isabella J. van Rooyen (INL)

**10:15 am**

Micro/Nano-Structural Examination and Fission Product Identification in Neutron Irradiated AGR-1 TRISO Fuel, I. J. van Rooyen, T. M. M. Lillo (INL), H. M Wen (INL/Idaho State Univ), C. M. Hill (INL), T. Holesinger (LANL), Y. Q. Wu (Boise State Univ/Center for Advanced Energy Studies), J. A. Aguiar (INL)

**10:40 am**

Silicon Carbide Grain Boundary Distributions, Irradiation Conditions and Silver Retention in Irradiated AGR-1 TRISO Fuel Particles, T. M. Lillo, I. J. van Rooyen, J. A. Aguiar (INL)

**11:05 am**

An Approach to Improve the Retention of the Fission Product Ag in TRISO Fuel Particles, Han Liu, Nadia Rohbeck, Ping Xiao (Univ of Manchester)

#### Natural and Mixed Convection—II

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M), W. David Pointer (ORNL)

**Location:** Octavius 18 **Time:** 9:50-11:05 am

**9:50 am**

Study on Water-Ingress Accident during the Initial Core and Running-in Phase of HTR-PM, Zheng Yanhua, Guo Jiong, Chen Zhipeng, Chen Fubing, Wan Yan, Xia Bing, Shi Lei (Tsinghua Univ)

**10:15 am**

The Hydrogen Behavior Analysis in the Water-Ingress Accident of the 250MW Pebble-Bed Modular High Temperature Gas-Cooled Reactor, Yujie Dong, Ximing Sun, Ruidong Zhang, Yuan Liu, Yanhua Zheng, Lei Shi (Tsinghua Univ)

**10:40 am**

Sensitivity Analysis of Xenon Reactivity Temperature Dependency for HTRR LOFC Test by using RELAP5-3D Code, Yuki Honda, Yuji Fukaya, Shigeaki Nakagawa (JAEA), Robin I. Baker (INL), Hiroyuki Sato (JAEA)

#### Fuel/Core Design—I

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Hans David Gougar (INL), Frederick Reitsma (IAEA)  
**Location:** Octavius 19 **Time:** 9:50-11:30 am

**9:50 am**

Development of a Neutronics Analysis Code for Pebble-Bed HTGs, Ding She, Jiong Guo, Zhihong Liu, Lei Shi (Tsinghua Univ)

**10:15 am**

Preliminary Study on Applying the Method of Characteristics to Pebble-Bed HTR, Jian Guo, Jiong Guo, Fu Li (Tsinghua Univ)

**10:40 am**

Design Characteristics of the Idaho National Laboratory High Temperature Gas-Cooled Test Reactor, James Sterbentz, Paul Bayless, Gerhard Strydom, Akansha Kumar, Hans Gougar, (INL)

**11:05 am**

Reducing DLOFC Fuel Temperatures by Mixing Thorium with LEU in a Two-Zone 6-Pass Fuel Cycle in a PBMR-DPP-400 Core, Marius Tchonang, Dawid E. Serfontein (North West Univ)

## EMBEDDED TOPICAL: HTR 2016 | WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 9:50 AM

#### Plant Dynamics and Control

**Session Organizer:** Lew J. Lommers (AREVA) **Cochairs:** Xing Yan (JAEA), Jew J. Lommers (AREVA)

**Location:** Octavius 21 **Time:** 9:50-11:05 am

##### 9:50 am

Coordinated Control Design and Verification of the HTR-PM Plant, Zhe Dong, Xiaojin Huang (Tsinghua Univ)

##### 10:15 am

A Control Approach Investigation of the XE-100 Plant to Perform Load Following Within the Operational Range of 100-25-100%, Yvotte Brits, Frikkie Botha (X-Energy), Herman van Antwerpen (Univ of North West), Hans Wolfgang Chi (Technology Insights)

##### 10:40 am

HTTR-GT/H<sub>2</sub> Test Plant—System Performance Evaluation for HTTR Gas Turbine Cogeneration Plant, Hiroyuki Sato, Yasunobu Nomoto, Shoichi Horii, Junya Sumita, Xing Yan, Hirofumi Ohashi (JAEA)

### TECHNICAL SESSIONS - 1:00 PM

#### Irradiation and PIE

**Session Organizer:** Paul A. Demkowicz (INL) **Cochairs:** Paul A. Demkowicz (INL), John D. Hunn (ORNL)

**Location:** Neopolitan 1 **Time:** 1:00-2:15 pm

##### 1:00 pm

The Electric Current Effect on Electrochemical Deconsolidation of Spherical Fuel Elements, Xiaotong Chen, Lu Zhenming, Zhao Hongsheng, Liu Bing, Zhu Junguo, Tang Chunhe (Tsinghua Univ)

##### 1:25 pm

Property Evaluation and Microstructure Characterization of the A3-3 Matrix Graphite, Xiangwen Zhou (Tsinghua Univ), Anne A. Campbell, Yutai Katoh (ORNL), Zhenming Lu, Jie Zhang (Tsinghua Univ), Cristian I. Contescu (ORNL), Bing Liu (Tsinghua Univ)

##### 1:50 pm

Post-Irradiation Experiment on IG-110 and A3-3 Graphites for HTGR, Sunghwan Yeo, Youngjun Kim, Injin Sa, Moon Sung Cho, Eungseon Kim, Young-Woo Lee, Daegyu Park (KAERI)

#### Structural Methods and Codes

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M), W. David Pointer (ORNL)

**Location:** Octavius 18 **Time:** 1:00-2:15 pm

##### 1:00 pm

Preliminary Structural Assessment of VHTR Graphite Components According to ASME Code, Ji-Ho Kang, Chang Keun Jo (KAERI)

##### 1:25 pm

FM-BEM Simulation of 3-D Microvoid and Microcrack Graphite Models with Python and Abaqus/CAE Pre-Processing, Houdi Lu, Hongtao Wang, Haitao Wang, Lie Jin (Tsinghua Univ)

##### 1:50 pm

Emissivity Studies of Reactor Structural Alloys, J. L. King, H. Jo, G. Cao, K. Blomstrand (Univ of Wisconsin, Madison), S. K. Loyalka, R. V. Tompson (Univ of Missouri), K. Sridharan (Univ of Wisconsin, Madison)

## Embedded Topical: HTR 2016 Technical Sessions

## EMBEDDED TOPICAL: HTR 2016 | WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 1:00 PM

#### Fuel/Core Design—II

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Hans David Gougar (INL), Frederick Reitsma (IAEA)

**Location:** Octavius 19 **Time:** 1:00-2:15 pm

##### 1:00 pm

The Coupled Neutronics and Thermo-Fluid Dynamics Design Characteristics of the Xe-100 200 MWTH Reactor, Eben J. Mulder, Martin Van Staden (X-Energy LLC)

##### 1:25 pm

Study on OTTO Fueling Schemes of the HTR-PM with Boron Burnable Particles, Bing Xia, Ding She, Chunlin Wei, Jian Zhang, Fu Li, Xingqing Jing (Tsinghua Univ)

##### 1:50 pm

Nuclear Thermal Design of High Temperature Gas-Cooled Reactor with SiC/C Mixed Matrix Fuel Compacts, Jun Aihara, Minoru Goto, Yoshitomo Inaba, Shohei Ueta, Junya Sumita, Yukio Tachibana (JAEA)

#### System and Facility Design—I

**Session Organizer:** Lew J. Lommers (JAEA) **Cochairs:** Lew J. Lommers (AREVA), Xing Yan (JAEA)

**Location:** Octavius 21 **Time:** 1:00-2:15 pm

##### 1:00 pm

General Description of HTR-PM Emergency Power System, Chen Fan, Sun Weidong (Tsinghua Univ)

##### 1:25 pm

HTTR-GT/H<sub>2</sub> Test Plant—System Design, X. Yan, H. Sato, J. Sumita, Y. Nomoto, S. Horii, Y. Imai, S. Ksahara, K. Suzuki, J. Iwatsuki, A. Terada, Y. Tachibana (JAEA), M. Oono, S. Yamada, K. Suyama (MHI)

##### 1:50 pm

HTTR-GT/H<sub>2</sub> Test Plant—Design Study on Helium Gas Turbine for the Heat Utilization System Connected to JAEA's HTTR, H. Tsukamoto, S. Oyama, K. Suyama, Y. Mizokami, G. Totani (MHI), X. Yan, H. Sato, Y. Nomoto, S. Horri, J. Iwatsuki (JAEA)

### TECHNICAL SESSIONS - 2:50 PM

#### Fuel Modeling and Simulation

**Session Organizer:** John D. Hunn (INL) **Cochairs:** John D. Hunn (ORNL), Paul A. Demkowicz (INL)

**Location:** Neopolitan 1 **Time:** 2:50-4:05 pm

##### 2:50 pm

Effect of PyC Irradiation-Induced Creep on the Stress of TRISO-Coated Fuel Particles, Rong Li, Bing Liu, Chunhe Tang (Tsinghua Univ)

##### 3:15 pm

Comparison of Silver Predictions using PARFUME with Results from the AGR-2 Irradiation Experiment, Blaise P. Collin, Paul A. Demkowicz (INL), Charles A. Baldwin (ORNL), Jason M. Harp (INL), John D. Hunn (ORNL)

##### 3:40 pm

Modeling and Analysis of Fission Product Transport in the AGR-3/4 Experiment, Paul W. Humrickhouse, Blaise P. Collin, Grant L. Hawkes, Jason M. Harp, Paul A. Demkowicz, David A. Petti (INL)

## EMBEDDED TOPICAL: HTR 2016 | WEDNESDAY, NOVEMBER 9

### TECHNICAL SESSIONS - 2:50 PM

#### Transient and Accident Analysis Methods and Codes

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Hans David Gougar (INL), Frederick Reitsma (IAEA)

**Location:** Octavius 18 **Time:** 2:50-4:30 pm

##### 2:50 pm

Spectral Analysis of LDV Measurements Inside of the TAMU Air-Cooled Reactor Cavity Cooling System, Mark Silberberg, Saya Lee, John Budd, Yassin Hassan (Texas A&M)

##### 3:15 pm

Numerical Simulation of Break Flows Occuring in the Reactor Cavity Cooling System of a Very High Temperature Reactor using a System CFD Approach, C. G. Du Toit (North West Univ), P. G. Rousseau (Univ of Cape Town), J. S. Jun, M.-H. Kim (KAERI)

##### 3:40 pm

Plant-Wide Simulation Model for Transient Studies on the Xe-100, Herman van Antwerpen (North West Univ), Hans Chi, Yvotte Brits, Frikkie Botha (X-Energy LLC)

##### 4:05 pm

The ATWS Analysis of the HTR-10GT Core Induced by the Earthquake, Minggang Lang, Ximing Sun, Yujie Dong (Tsinghua Univ)

#### System and Facility Design—II

**Session Organizer:** Lew J. Lommers (AREVA) **Cochairs:** Lew J. Lommers (AREVA), Xing Yan (JAEA)

**Location:** Octavius 21 **Time:** 2:50-4:05 pm

##### 2:50 pm

Potential Applications of Industrial Wireless Technologies in the Future HTR, Yan Chen, Ni Mo, Guojun Yang, Yan Zhou, Zhengang Shi (Tsinghua Univ)

##### 3:15 pm

Performance Tests of Helium Circulator under Abnormal Cooling Conditions, Ping Ye, Gang Zhao, Hong Wang, Jie Wang (Tsinghua Univ)

##### 3:40 pm

Endurance Test of Helium Circulator for HTR-PM, Gang Zhao, Ping Ye, Hong Wang, Jie Wang (Tsinghua Univ)

Embedded  
Topical:  
HTR 2016  
Technical  
Sessions

## EMBEDDED TOPICAL: HTR 2016 | THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 8:00 AM

# Embedded Topical: HTR 2016 Technical Sessions

#### Thermal Hydraulics of Key Components—I

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M), W. David Pointer (ORNL)

**Location:** Neopolitan 1 **Time:** 8:00-9:15 am

##### 8:00 am

Thermal-Hydraulic Performance of Printed Circuit Heat Exchangers: CFD Analysis with Experimental Validation, Su-Jong Yoon, James O'Brien (INL), Kevin Wegman, Xiaodong Sun (Ohio State)

##### 8:25 am

Thermal-Hydraulic Performance of a High-Temperature Zigzag-Channel Printed Circuit Heat Exchanger, Minghui Chen (Ohio State), James E. O'Brien, Su-Jong Yoon (INL), Richard N. Christensen (Ohio State), Piyush Sabharwall (INL), Xiaodong Sun (Ohio State)

##### 8:50 am

Thermal Hydraulic Issues of HTGR Helical Tube Once Through Steam Generator: Methods and Applications, Xiaowei Li, Xinxin Wu, Xiaowei Luo, Jiaqing Zhao, Yiyang Zhang (Tsinghua Univ)

#### Industrial Process Heat

**Session Organizer:** Lew J. Lommers (AREVA) **Cochairs:** Michael Andreas Futterer (JRC), Lew L. Lommers (AREVA)

**Location:** Octavius 17 **Time:** 8:00-9:15 am

##### 8:00 am

The Process Heat Applications of HTGR in Petroleum Refining Industry: Adaptability and Economy, Chao Fang, Qi Min, Yanran Yang, Yuliang Sun (Tsinghua Univ)

##### 8:25 am

Non-Electrical Application of HTGR and Synergy with Non-Nuclear Energy Sources, E. A. Andrianova, A. L. Balanin, P. A. Fomichenko, V. N. Grebennik, D. A. Krylov, V. A. Nevinitisa, T. D. Shepetina (Kurchatov Inst)

##### 8:50 am

Cogeneration of Electricity and Liquid Fuels using an HTGR as the Heat Source, Michael W. Patterson (INL)

#### Multiphysics Methods and Codes—I

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Hans David Gougar (INL), Frederick Reitsma (IAEA)

**Location:** Octavius 19 **Time:** 8:00-8:50 am

##### 8:00 am

Helium Production Prediction in HTR Fuel using Monte Carlo MCB System, Jerzy Cetnar, Przemyslaw Stanisz, Grzegorz Kepisty, Mariusz Kopeć, (AGH-UST)

##### 8:25 am

Development of a Core Coolant Flow Distribution Calculation Code for HTGRs, Yoshitomo Inaba, Yuki Honda, Tetsuo Nishihara (JAEA)

## EMBEDDED TOPICAL: HTR 2016 | THURSDAY, NOVEMBER 10

### TECHNICAL SESSIONS - 8:00 AM

#### System and Facility Design—III

**Session Organizer:** Lew J. Lommers (AREVA) **Cochairs:** Xing Yan (JAEA), Lew J. Lommers (AREVA)

**Location:** Octavius 21 **Time:** 8:00-9:15 am

##### 8:00 am

Fuel Cycle Cost Analysis of Th/U MOX Fuel in a Block-Type HTR, Jie Huang, Ming Ding, Yongyong Yang (Harbin Engineering Univ)

##### 8:25 am

Research and Experiment on the Key Technologies of the Spent Fuel Storage in HTR-PM, Jinhua Wang, Yue Li, Bin Wu (Tsinghua Univ)

##### 8:50 am

Design of Dehumidification Test of HTR-PM, Hangbin Zhao, Huaqiang Yin, Yujie Dong, Tao Ma, Yanhua Zheng, Fu Li, Xiaoming Chen, Lihao Chen, Pengya Zhang (Tsinghua Univ)

### TECHNICAL SESSIONS - 9:50 AM

#### Thermal Hydraulics of Key Components—II

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M),

W. David Pointer (ORNL)

**Location:** Neopolitan 1 **Time:** 9:50-10:40 am

##### 9:50 am

Pressure Drop Measurements Across a Helical Coil Steam Generator Configuration, Marilyn Delgado, Samuel Lee, Saya Lee, Yassin A. Hassan (Texas A&M)

##### 10:15 am

Numerical Investigation of the Flow Inside the Helical Coil Steam Generator Test Section, Samuel J. Jongoh Lee, Saya Lee, Yassin A. Hassan (Texas A&M)

## Embedded Topical: HTR 2016 Technical Sessions

Embedded  
Topical:  
HTR 2016  
Technical  
Sessions

**EMBEDDED TOPICAL: HTR 2016 | THURSDAY, NOVEMBER 10**  
**TECHNICAL SESSIONS - 9:50 AM**

**Fission and Activation Product Transport**

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Yassin A. Hassan (Texas A&M), W. David Pointer (ORNL)

**Location:** Octavius 17 **Time:** 9:50-11:30 am

**9:50 am**

REACT\_COMPACT: A Computer Code for Modeling Graphite Corrosion and Fuel Hydrolysis, Matt Richards (Ultra Safe Nuclear Corp.)

**10:15 am**

Full Integration of the Fission Product Release Module STACY into the HTR Code Package (HCP), A. Xhonneux (FzJ), H.-J. Allelein, K. Verfondern (FzJ/Aachen Univ)

**10:40 am**

Graphite Dust Deposition on HTGR Steam Generator: Effect of Particle-Wall Impact, Yiyang Zhang, Mingzhe Wei, Xinxin Wu, Xiaowei Luo, Xiaowei Li (Tsinghua Univ)

**11:05 am**

Analysis of a Massive Air Ingress Accident of the High Temperature Gas Cooled Reactor Pebble-Bed Module (HTR-PM), Wei Xu, Yanhua Zheng, Lei Shi, Peng Liu (Tsinghua Univ)

**Multiphysics Methods and Codes—II**

**Session Organizer:** Hans David Gougar (INL) **Cochairs:** Hans David Gougar (INL), Frederick Reitsma (IAEA)

**Location:** Octavius 19 **Time:** 9:50-11:05 am

**9:50 am**

V&V of the HTR Code Package (HCP) as an Extensive HTR Steady State and Transient Safety Analysis Framework, S. Kasselmann, A. Xhonneux (FzJ), F. Tantillo, A. Trabadelo (FzJ/Aachen Univ), D. Lambertz (FzJ), H.-J. Allelein (FzJ/Aachen Univ)

**10:15 am**

The Enhanced Fuel Management Models of the HTR Code Package (HCP) Module SHUFLE, A. Xhonneux, D. Lambertz, Stefan Kasselmann (FzJ), H.-J. Allelein (FzJ/Aachen Univ)

**10:40 am**

The Development of 3D Physical Program with Integrated Control Rod Calculation for HTR, Jiong Guo, Xia Bing, Li Fu, Zhou Xiaofeng, Fan Kai, Lu Jianan, Niu Jinlin, Guo Jian (Tsinghua Univ)

**EMBEDDED TOPICAL: HTR 2016 | THURSDAY, NOVEMBER 10**  
**TECHNICAL SESSIONS - 10:45 AM**

**Hydrogen Production—II**

**Session Organizer:** Michael Andreas Fütterer (JRC) **Cochairs:** Michael Andreas Fütterer (AREVA),  
Lew J. Lomers (AREVA)

**Location:** Neopolitan 1 **Time:** 10:45-11:35 am

**10:45 am**

S Process Hydrogen Production Test for Components and System Made of Industrial Structural Material  
(I)—Bunsen and HI Concentration Section, Nobuyuki Tanaka, Hiroaki Takegami, Hiroki Noguchi, Yu Kamiji,  
Jin Iwatsuki, Hideki Aita, Seiji Kasahara, Shinji Kubo (JAEA)

**11:10 am**

IS Process Hydrogen Production Test for Components and System Made of Industrial Structural Material  
(II)— H<sub>2</sub>SO<sub>4</sub> Decomposition, HI Distillation, and HI Decomposition Section, Hiroki Noguchi, Hiroaki Takegami,  
Yu Kamiji, Nobuyuki Tanaka, Jin Iwatsuki, Seiji Kasahara, Shinji Kubo (JAEA)

Embedded  
Topical:  
HTR 2016  
Technical  
Sessions

# Committee Meetings

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## NATIONAL COMMITTEES

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### **Accreditation, Polices & Procedures**

SUNDAY, 11 AM - 12 PM | OCTAVIUS 15

### **Board of Directors**

#### ***Professional Division Reports***

WEDNESDAY, 4 PM - 7:15 PM | OCTAVIUS 4 & 5

#### ***ANS Board of Directors***

THURSDAY, 7:30 AM - 3:30 PM | OCTAVIUS 4 & 5

### **Bylaws & Rules**

SUNDAY, 4 PM - 5:30 PM | OCTAVIUS 16

### **Communications**

SUNDAY, 4 PM - 6:00 PM | NEOPOLITAN 1

### **Finance Meeting**

TUESDAY, 2:00 PM - 7 PM | OCTAVIUS 22

### **Honors & Awards**

MONDAY, 4 PM - 6 PM | OCTAVIUS 5

### **International**

SUNDAY, 11:30 AM - 2:30 PM | OCTAVIUS 5

### **Local Section Workshop**

SUNDAY, 9:00 AM - 12:00 PM | OCTAVIUS 20

### **Membership**

SUNDAY, 10 AM - 12 PM | OCTAVIUS 4

### **National Program**

#### ***NPC Screening & International***

SUNDAY, 10 AM - 12 PM | MILANO 5

#### ***NPC National Meeting Sub Committee***

WEDNESDAY, 11:30 AM - 1 PM | SIENA

#### ***NPC Program***

WEDNESDAY, 4 PM - 7 PM | MILANO 7

### **NEED**

SUNDAY, 7:30 PM - 9:30 PM | OCTAVIUS 19

### **Planning Committee**

SUNDAY, 2 PM - 4 PM | OCTAVIUS 19

### **President's Meeting w/Committee Chairs**

SUNDAY, 8 AM - 9 AM | MILANO 1

## NATIONAL COMMITTEES

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### **President's Meeting w/Division Chairs**

SUNDAY, 9 AM - 10 AM | MILANO 1

### **Professional Development Coordination**

TUESDAY, 4 PM - 5:00 PM | OCTAVIUS 5

### **Professional Divisions**

#### ***Training Workshop***

SATURDAY, 5:00 PM - 6:30 PM | OCTAVIUS 5

#### ***Committee Meeting***

TUESDAY, 4 PM - 5:30 PM | MILANO 6

### **Professional Engineering Exam**

#### ***PEEC Single Reference Development***

SUNDAY, 8 AM - 1 PM | OCTAVIUS 9

#### ***PEEC Item Writers Group***

SATURDAY, 5 PM - 10 PM | OCTAVIUS 6

#### ***PEEC Committee Meeting***

SUNDAY, 4 PM - 6 PM | OCTAVIUS 9

### **Professional Women In ANS**

MONDAY, 3 PM - 5 PM | OCTAVIUS 17

### **Public Policy**

WEDNESDAY, 11:30 AM - 1:30 PM | MILANO 7

### **Publications Steering**

#### ***Meetings, Proceedings & Transactions***

SUNDAY, 9 AM - 10 AM | OCTAVIUS 4

#### ***Book Publishing***

SUNDAY, 11 AM - 12:30 PM | OCTAVIUS 14

#### ***Nuclear News Editorial Advisory***

SUNDAY, 4 PM - 5:30 PM | OCTAVIUS 14

#### ***Technical Journals***

SUNDAY, 1 PM - 4 PM | OCTAVIUS 14

#### ***Nuclear Technology Editorial Advisory***

SUNDAY, 4:30 PM - 5:30 PM | OCTAVIUS 7

#### ***Publications Steering Committee***

MONDAY, 4:30 PM - 6:30 PM | OCTAVIUS 21

# Committee Meetings

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## NATIONAL COMMITTEES

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**Scholarship Policy & Coordination**  
MONDAY, 12 PM – 1 PM | TUSCANY

**Special Session on Change in ANS Incorporation**  
WEDNESDAY, 7:15 AM – 7:45 AM | OCTAVIUS 5

**Student Sections**  
*Executive*  
MONDAY, 6 PM – 7 PM | MILANO 5

*Reports*  
MONDAY, 7 PM – 8 PM | MILANO 5

## SPECIAL COMMITTEES

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**Special Committee on the Congressional Fellow Program**  
TUESDAY, 3:30 PM - 4:30 PM | MILANO 2

**Special Committee on ANS's Structure**  
MONDAY, 7:00 AM - 8:00 AM | OCTAVIUS 5

## OTHER COMMITTEES

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**Christian Nuclear Fellowship**  
MONDAY, 7 PM – 8:30 PM | OCTAVIUS 17

**Christian Nuclear Fellowship Breakfast**  
WEDNESDAY, 7:00 AM – 8:30 AM | MILANO 7

**KNS-US Chapter Meeting**  
MONDAY, 4:30 PM – 6:30 PM | OCTAVIUS 18

**NEDHO**  
SUNDAY, 4 PM – 6 PM | OCTAVIUS 5

**NURETH 17**  
MONDAY, 7 PM - 9 PM | MESSINA

**Pacific Nuclear Council**  
SUNDAY 9 AM – 4 PM | OCTAVIUS 10

**UWC Planning Committee**  
SUNDAY, 1 PM – 2 PM | NEOPOLITAN 4

**91C1 Organizing Committee**  
MONDAY, 5:30 PM – 7:30 PM | MESSINA

## DIVISION COMMITTEES

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**Accelerator Applications**  
*Executive*  
MONDAY, 11:30 AM – 1:30 PM | MESSINA

## DIVISION COMMITTEES

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**Aerospace Nuclear Science & Technology**  
TUESDAY, 4:30 PM – 6:30 PM | MILANO 2

**Biology & Medicine**  
*Executive*  
SUNDAY, 4 PM – 5:30 PM | OCTAVIUS 10

**Decommissioning and Environmental Sciences**  
*Program*  
SUNDAY, 3:30 PM – 4:30 PM | OCTAVIUS 3

*Executive*  
SUNDAY, 4:30 PM – 5:30 PM | OCTAVIUS 3

**Education, Training & Workforce Development**  
*Program*  
SUNDAY, 9:30 AM – 11 AM | NEOPOLITAN 3

**University/Industry/Government Relations**  
SUNDAY, 12:30 PM – 1:00 PM | NEOPOLITAN 3

**Alpha Nu Sigma National Honor Society**  
SUNDAY, 1 PM – 2 PM | OCTAVIUS 16

*Executive/Membership/Honors & Awards*  
SUNDAY, 1 PM - 4 PM | NEOPOLITAN 3

**Fuel Cycle & Waste Management**  
*Program*  
SUNDAY, 12 PM – 1 PM | NEOPOLITAN 1

*Executive*  
SUNDAY, 1 PM – 2:30 PM | NEOPOLITAN 1

**Fusion Energy**  
*Executive*  
TUESDAY, 6 PM – 8 PM | TUSCANY

**Human Factors, Instrumentation, and Controls**  
*Program*  
SUNDAY, 11 AM – 12 PM | NEOPOLITAN 2

*Executive*  
SUNDAY, 12:00 PM – 2:30 PM | NEOPOLITAN 2

**Isotopes and Radiation**  
*Joint Program Committee-I&R/BM*  
SUNDAY, 1:30 PM - 2:30 PM | OCTAVIUS 6

*Executive*  
SUNDAY, 2:30 PM – 6:00 PM | OCTAVIUS 6

**Materials Science & Technology**  
*Executive*  
MONDAY, 6 PM – 8 PM | OCTAVIUS 19

# Committee Meetings

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## DIVISION COMMITTEES

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### Mathematics & Computation

#### *Program*

SUNDAY, 1 PM – 2 PM | OCTAVIUS 8

#### *Executive*

SUNDAY, 2 PM – 4 PM | OCTAVIUS 8

### Nuclear Criticality Safety

#### Education Meeting

SUNDAY, 1 PM – 2 PM | MILANO 1

#### *Program*

SUNDAY, 2 PM – 3 PM | MILANO 1

#### *Executive*

SUNDAY, 3 PM – 4:30 PM | MILANO 1

### Nuclear Installations Safety

#### *Program*

SUNDAY, 4 PM – 5:30 PM | NEOPOLITAN 3

#### *Executive*

MONDAY, 6 PM – 8 PM | OCTAVIUS 5

### Nuclear Nonproliferation Policy

#### *Program*

SUNDAY, 2:30 PM – 3:30 PM | MILANO 5

#### *Executive*

SUNDAY, 3:30 PM – 4:30 PM | MILANO 5

### *NNTG/IRD/FC&UM Integration Meeting*

SUNDAY, 4:30 PM – 5 PM | MILANO 5

### Operations & Power

#### *Program*

SUNDAY, 2 PM – 3:30 PM | NEOPOLITAN 4

#### *Executive*

SUNDAY, 3:30 PM – 6:00 PM | NEOPOLITAN 4

### Radiation Protection & Shielding

#### *Program*

SUNDAY, 2 PM – 3 PM | OCTAVIUS 22

#### *Standards Committee*

SUNDAY, 3:00 PM - 4 PM | OCTAVIUS 22

## DIVISION COMMITTEES

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### Radiation Protection & Shielding (cont'd)

#### *Executive*

SUNDAY, 4 PM – 6 PM | OCTAVIUS 22

### Reactor Physics

#### *Honors & Awards*

SUNDAY, 10 AM – 11 AM | OCTAVIUS 1 & 2

#### *Goals & Planning*

SUNDAY, 1 PM – 2 PM | OCTAVIUS 1 & 2

#### *Program*

SUNDAY, 2 PM – 4 PM | OCTAVIUS 1 & 2

#### *Executive*

SUNDAY, 4 PM – 6 PM | OCTAVIUS 1 & 2

### Robotics & Remote Systems

#### *Executive*

SUNDAY, 12 PM – 4 PM | OCTAVIUS 7

### Thermal Hydraulics

#### *Program*

SUNDAY, 2:30 PM – 4:30 PM | NEOPOLITAN II

#### *Executive*

SUNDAY, 4:30 PM – 6 PM | NEOPOLITAN II

### Young Members Group (TG)

#### *Program*

MONDAY, 9 AM - 10 AM | OCTAVIUS 5

#### *Executive Committee*

MONDAY, 10:30 AM – 1 PM | OCTAVIUS 5

## STANDARDS COMMITTEES

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### ANS-10

MONDAY, 4 PM – 5 PM | TUSCANY

### ANS-19 Reactor Physics

MONDAY, 9 AM – 10:30 AM | MESSINA

### ANS-19.3

MONDAY, 8 AM – 9:00 AM | MESSINA

### ANS-19.6.1

SUNDAY, 10 AM – 5 PM | OCTAVIUS 21

### ANS-20.1

WEDNESDAY, 5 PM – 10 PM | TUSCANY

# Committee Meetings

## STANDARDS COMMITTEES

### ANS-20.2

WEDNESDAY, 8 AM – 5 PM | TUSCANY

### ANS-8.1

MONDAY, 3 PM – 5 PM | MESSINA

### ANS-8.20

SUNDAY, 10 AM – 12 PM | OCTAVIUS 6

### ANS-8.23

MONDAY, 7 AM – 11 AM | TUSCANY

### ANS-8.26

TUESDAY, 7 AM – 8:30 AM | TUSCANY

### ANS-8.28

TUESDAY, 3 PM – 5 PM | TUSCANY

### ESCC

WEDNESDAY, 9:00 AM – 12:00 PM | OCTAVIUS 22

### LLWRCC

MONDAY, 7:30 AM – 1 PM | OCTAVIUS 23

### NCSCC

MONDAY, 2:30 PM – 5:30 PM | OCTAVIUS 23

### RARCC

MONDAY, 11 AM – 12 PM | OCTAVIUS 22

### RP3C

MONDAY, 1:30 PM – 6:00 PM | OCTAVIUS 22

### SRACC

SUNDAY, 3 PM – 5 PM | OCTAVIUS 15

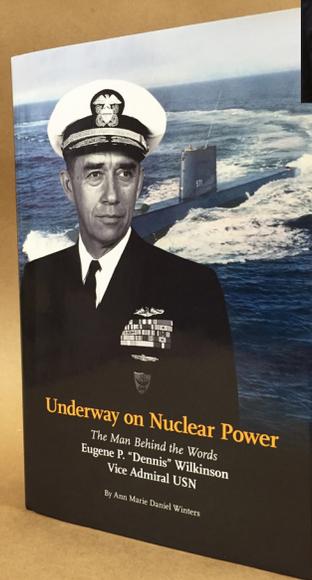
### Standards Board

TUESDAY, 8:30 AM – 6 PM | MILANO 5

## AUTHOR SIGNING

Meet author  
**Ann Marie  
Daniel Winters**

and get your signed copy!



### Dennis Wilkinson

- Vice Admiral USN
- First nuclear submarine commander
- First CEO of INPO
- Superb Leader
- Visionary
- and more

At the ANS Book Fair near Meeting Registration

Sunday 2:30 pm - 4:00 pm

Monday 11:00 am - 1:30 pm

## Attila4MC

Software for simplifying Monte Carlo

- CAD Integration
- GUI Setup
- Automated Variance Reduction

Visit us at booth #205

**VARIAN**  
medical systems

Imaging Components

# Committee/Division/Other Meetings Daily

## Saturday, November 5

5:00-10:00 pm	Professional Engineering Exam Committee Item Writers	Octavius 6
5:00-6:30 pm	Professional Divisions Committee-Workshop	Octavius 5

## Sunday, November 6

8:00-9:00 am	President's Meeting with Committee Chairs	Milano 1
8:00 am-1:00 pm	Professional Engineering Exam Committee-Single Reference Development	Octavius 9
9:00-10:00 am	President's Meeting w/Division Chairs	Milano 1
9:00-10:00 am	Publications Steering Committee-Meetings, Proceedings & Transactions	Octavius 4
9:00 am-12:00 pm	Local Section Workshop Committee	Octavius 20
9:00 am-4:00 pm	Pacific Nuclear Council	Octavius 10
9:30-11:00 am	Education, Training & Workforce Development Division-Program Committee	Neopolitan 3
10:00 am-5:00 pm	ANS-19.6.1	Octavius 21
10:00-11:00 am	Reactor Physics Division-Honors & Awards Committee	Octavius 1 & 2
10:00 am-12:00 pm	ANS-8.20	Octavius 6
10:00 am-12:00 pm	Membership Committee	Octavius 4
10:00 am-12:00 pm	National Program Committee-NPC Screening	Milano 5
11:00 am-12:00 pm	Accreditation Policies & Procedures Committee	Octavius 15
11:00 am-12:00 pm	Human Factors, Instrumentation & Controls Division-Program Committee	Neopolitan 2
11:00 am-12:30 pm	Publications Steering Committee-Book Publishing	Octavius 14
11:30 am-2:30 pm	International Committee	Octavius 5
12:00-1:00 pm	Fuel Cycle & Waste Management Division-Program Committee	Neopolitan 1
12:00-2:30 pm	Human Factors, Instrumentation & Controls Division-Executive Committee	Neopolitan 2
12:00-4:00 pm	Robotics & Remote Systems Division-Executive Committee	Octavius 7
12:30-1:00 pm	Education, Training & Workforce Development Division-University/Industry/ Government Relations Committee	Neopolitan 3
1:00-2:30 pm	Fuel Cycle & Waste Management Division-Executive Committee	Neopolitan 1
1:00-2:00 pm	Education, Training & Workforce Development Division-Alpha Nu Sigma National Honor Society	Octavius 16
1:00-2:00 pm	Mathematics & Computation Division-Program Committee	Octavius 8
1:00-2:00 pm	Nuclear Criticality Safety Division-Education Meeting	Milano 1
1:00-2:00 pm	Reactor Physics Division-Goals & Planning Committee	Octavius 1 & 2
1:00-2:00 pm	UWC Planning Committee	Neopolitan 5
1:00-4:00 pm	Education, Training & Workforce Development Division-Executive Committee	Neopolitan 3
1:00-4:00 pm	Publications Steering Committee-Technical Journals	Octavius 14
1:30-2:30 pm	Isotopes & Radiation Division-Joint Program Committee-I&R/BM	Octavius 6
2:00-3:00 pm	Nuclear Criticality Safety Division-Program Committee	Milano 1
2:00-3:00 pm	Radiation Protection & Shielding Division-Program Committee	Octavius 22
2:00-3:30 pm	Operations & Power Division-Program Committee	Neopolitan 4
2:00-4:00 pm	Mathematics & Computation Division-Executive Committee	Octavius 8
2:00-4:00 pm	Planning Committee	Octavius 19
2:00-4:00 pm	Reactor Physics Division-Program Committee	Octavius 1 & 2
2:30-3:30 pm	Nuclear Nonproliferation Policy Division-Program Committee	Milano 5
2:30-4:30 pm	Thermal Hydraulics Division-Program Committee	Neopolitan 2
2:30-6:00 pm	Isotopes & Radiation Division-Executive Committee	Octavius 6
3:00-4:30 pm	Nuclear Criticality Safety Division-Executive Committee	Milano 1
3:30-4:30 pm	Decommissioning and Environmental Sciences Division-Program Committee	Octavius 3
3:00-5:00 pm	SRACC	Octavius 15
3:30-4:30 pm	Nuclear Nonproliferation Policy Division-Executive Committee	Milano 5
3:30-6:00 pm	Operations & Power Division-Executive Committee	Neopolitan 4
4:00-5:30 pm	Biology & Medicine Committee	Octavius 10
4:00-5:30 pm	Bylaws & Rules Committee	Octavius 16
4:00-5:30 pm	Nuclear Installations Safety Division-Program Committee	Neopolitan 3
4:00-5:30 pm	Publications Steering Committee-Nuclear News Editorial Advisory	Octavius 14
4:00-6:00 pm	Communications Committee	Neopolitan 1
4:00-6:00 pm	NEDHO	Octavius 5
4:00-6:00 pm	Professional Engineering Exam Committee-Committee Meeting	Octavius 9

# Committee/Division/Other Meetings Daily

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## Sunday, November 6

4:00-6:00 pm	Radiation Protection & Shielding Division-Executive Committee	Octavius 22
4:00-6:00 pm	Reactor Physics Division-Executive Committee	Octavius 1& 2
4:30-5:00 pm	Nuclear Nonproliferation Policy Division-NNTG/IRD/FC&WM Integration Meeting	Milano 5
4:30-5:30 pm	Decommissioning and Environmental Sciences Division-Executive Committee	Octavius 3
4:30-5:30 pm	Publications Steering Committee-Nuclear Technology Advisory	Octavius 7
4:30-6:00 pm	Thermal Hydraulics Division-Executive Committee	Neopolitan 2
7:30-9:30 pm	NEED Committee	Octavius 19

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## Monday, November 7

7:00-8:00 am	Special Committee on ANS's Structure	Octavius 5
7:00-11:00 am	ANS-8.23	Tuscany
7:30 am-1:00 pm	LLWRCC	Octavius 23
8:00-9:00 am	ANS-19.3	Messina
9:00-10:00 am	Young Members Group-Program	Octavius 5
9:00-10:30 am	ANS-19 Reactor Physics	Messina
10:30 am-1:00 pm	Young Members Group-Executive	Octavius 5
11:00 am-12:00 pm	RARCC	Octavius 22
11:30 am-1:30 pm	Accelerator Applications Division-Executive Committee	Messina
12:00-1:00 pm	Scholarship Policy & Coordination Committee	Tuscany
1:30-6:00 pm	RP3C	Octavius 22
2:30-5:30 pm	NCSCC	Octavius 23
3:00-5:00 pm	ANS-8.1	Messina
3:00-5:00 pm	Professional Women In ANS Committee	Octavius 17
4:00-5:00 pm	ANS-10	Tuscany
4:00-6:00 pm	Honors & Awards Committee	Octavius 5
4:30-6:30 pm	KNS - US Chapter Meeting	Octavius 18
4:30-6:30 pm	Publications Steering Committee-Publications Steering Committee	Octavius 21
5:30-7:30 pm	9ICI Organizing Committee	Messina
6:00-7:00 pm	Student Sections Committee-Executive	Milano 5
6:00-8:00 pm	Materials Science & Technology Division-Executive Committee	Octavius 19
6:00-8:00 pm	Nuclear Installations Safety Division-Executive Committee	Octavius 5
7:00-8:00 pm	Student Sections Committee-Reports	Milano 5
7:00-8:30 pm	Christian Nuclear Fellowship	Octavius 17
7:00-9:00 pm	NURETH 2017 Planning Committee	Messina

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## Tuesday, November 8

7:00-8:30 am	ANS-8.26	Tuscany
8:30 am-6:00 pm	Standards Board	Milano 5
2:00-7:00 pm	Finance Committee	Octavius 22
3:00-5:00 pm	ANS-8.28	Tuscany
3:30-4:30 pm	Special Committee on the Congressional Fellow Program	Milano 2
4:00-5:00 pm	Professional Development Coordination Committee	Octavius 5
4:00-5:30 pm	Professional Divisions Committee-Committee Meeting	Milano 6
4:30-6:30 pm	Aerospace Nuclear Science & Technology Division	Milano 2
6:00-8:00 pm	Fusion Energy Division-Executive Committee	Tuscany

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## Wednesday, November 9

7:00-8:30 am	Christian Nuclear Fellowship Breakfast	Milano 7
7:15-7:45 am	Special Session on Change in ANS Corporation	Octavius 5
8:00 am-5:00 pm	ANS-20.2	Tuscany
8:00-11:30 am	ESCC	Octavius 22
11:30 am-1:00 pm	National Program Committee-NPC National Meeting Subcommittee	Siena
11:30 am-1:30 pm	Public Policy Committee	Milano 7
4:00-7:15 pm	Board of Directors-Professional Division Reports	Octavius 4 & 5
4:00-7:00 pm	National Program Committee-NPC Program	Milano 7
5:00-10:00 pm	ANS-20.1	

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## Thursday, November 10

7:30 am-3:30 pm	ANS Board of Directors	Octavius 4 & 5
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# 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.\*

AECOM	Energy Northwest	Nuclear-21.Net
AFO Research Inc.	Energy Steel	NuScale Power
Aggreko	Engineered Solutions, Inc.	Nutherm International, Inc.
Aaron Nuclear Services	EXCEL Services Corporation	Ontario Power Generation
All Girls Transportation & Logistics, Inc.	Exelon Generation Company	Otek Corporation
Allied Technical Resources Inc.	FirstEnergy Nuclear Operating Co.	Pacific Gas and Electric Company
Alphasource Inc.	Five Star Products	Phoenix Nuclear Labs, LLC
Alpiq Suisse SA	Fluor	Pipeline Software, Inc.
Ameren Missouri-Callaway Energy Center	Frham Safety Products, Inc.	Power System Sentinel Technologies, LLC
American Electric Power Service Corp.	Goodnight Consulting, Inc.	Procedure Solutions Management, LLC
American Nuclear Insurers	Hagley Museum & Library	PSC
Applied Technical Services	Idaho National Laboratory	Reef Industries, Inc.
AREVA	Indiana Michigan Power Co. D.C. Cook Nuclear Power Plant	RSCC Nuclear Cable
Argonne National Laboratory	James C. White Company	S&ME, Inc.
Arizona Public Service Co.	Kinectrics, Inc.	Sarens
ATC Nuclear	Kinemetrics Inc.	Sargent & Lundy
Barnhart Nuclear Services	King Abdulaziz University	Savannah River National Laboratory
Bechtel Nuclear, Security, & Environmental	KnightHawk Engineering	Schafer Livermore Labs
BEP	Korea Atomic Industrial Forum	Southern Nuclear Operating Co.
Black & Veatch	KSB, Inc.	Susquehanna Nuclear, LLC
Burns & McDonnell	L-3 Communications MAPPS Inc.	Techcellent Inspectorate
BWX Technologies, Inc.	Los Alamos National Laboratory	Teledyne Brown Engineering, Inc.
Canadian Nuclear Laboratories	Major Tool & Machine	Terrestrial Energy Inc.
CB & I	McCallum-Turner, Inc.	Thermo Fisher Scientific
Centrus Energy Corp.	Mega-Tech Services, LLC	Tobolski Watkins Engineering Inc
Ceradyne, Inc. - a 3M Company	Mitsubishi Nuclear Energy Systems, Inc.	TradeTech
ChemStaff	Navarro Research & Engineering	TransWare Enterprises Inc.
Cives Steel Co.	Nebraska Public Power District	Tri Tool, Inc.
Copperleaf Technologies	Newport News Shipbuilding	TW Metals
DataGlance	Nexus Technical Services Corporation	ValvTechnologies
Dominion Generation	NGNP Industry Alliance	Varian Security and Industrial Products
Duke Energy Corporation	Nuclear Electric Insurance Limited	Virginia Commonwealth University
Electric Power Research Institute	Nuclear Energy Institute (NEI)	Western Services Corporation
Electrical Builders, Inc.	Nuclear Plant Journal	Westinghouse Electric Company
Endeavor Robotics	Nuclear Three Inc.	Wolf Creek Nuclear Operating Corp.
Energy Future Holdings		Zuuk International Inc.

Learn more about Organization Membership and join at [ans.org/orgmembers](https://ans.org/orgmembers) • 800-323-3044 ext 217 • Email: [organization@ans.org](mailto:organization@ans.org)

\*Post-print roster updates at [ans.org/orgmembers/memberlist](https://ans.org/orgmembers/memberlist).

# Announcing *Varex Imaging Corporation!*

**VARIAN**  
medical systems

IMAGING COMPONENTS



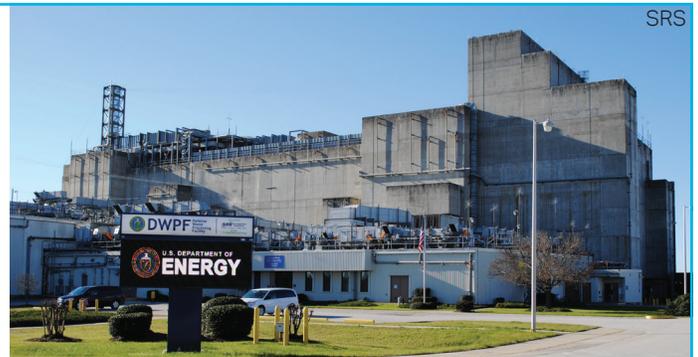
**VAREX**  
IMAGING

**Varian Medical Systems recently announced the spin-off of the Imaging Components business!  
Anticipated completion date is January 2, 2017**

## Restoring Our Environment to Deliver a Better World

AECOM is renowned for safe, innovative management of high-risk, technically complex projects and programs in nuclear and hazardous waste facilities. With services that include technical consulting, engineering, design, construction management, operations, maintenance, and decontamination and decommissioning (D&D), Nuclear & Environment has been at the forefront of nuclear and hazardous site management for decades.

[aecom.com](http://aecom.com)



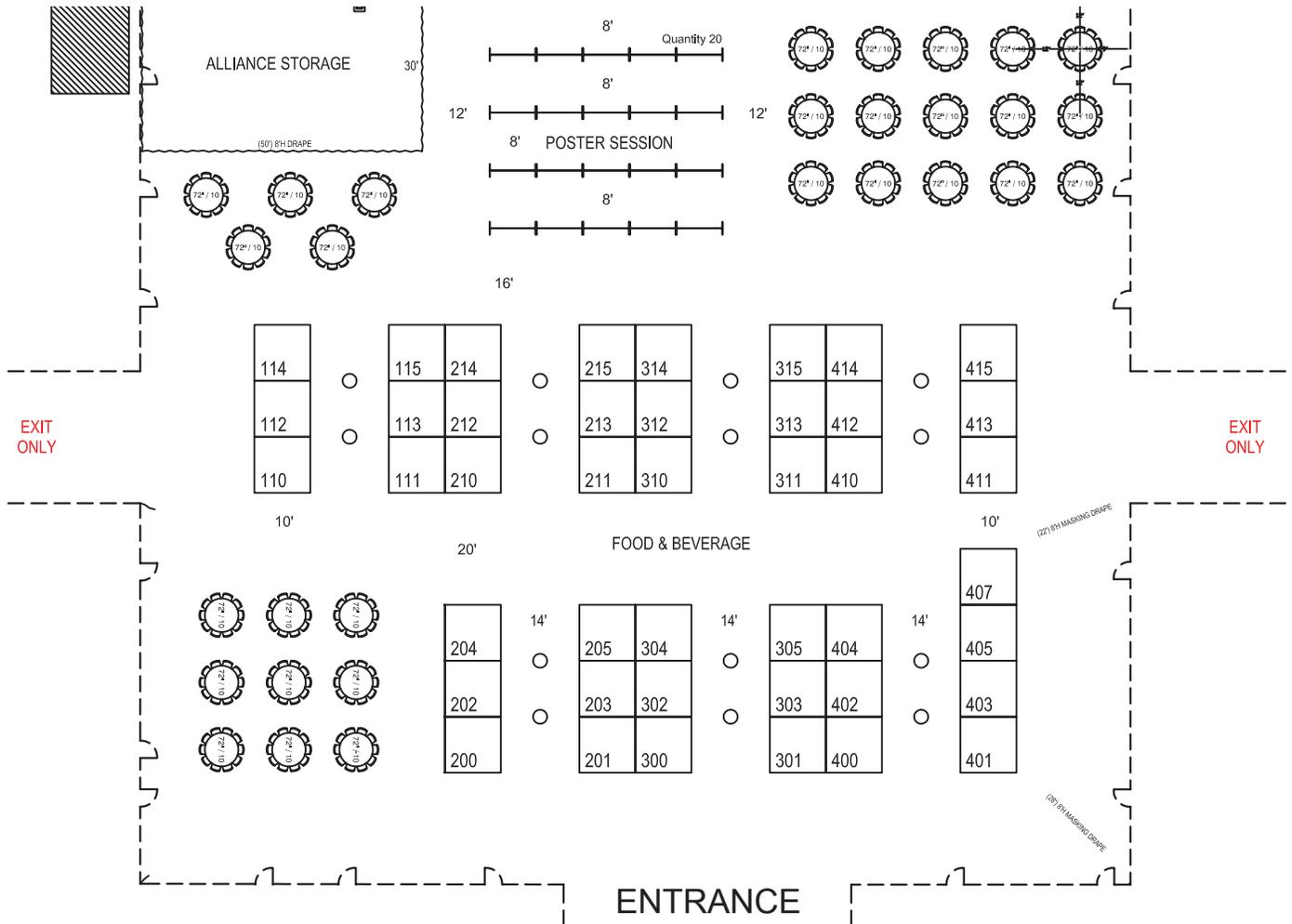
# Exhibitors List

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AFO Research Inc. **Booth 314**  
American Nuclear Society **Booths 401 & 403**  
Argonne National Laboratory **Booths 212 & 214**  
CeoTronics Inc. **Booth 407**  
Ceradyne, Inc., a 3M Company **Booth 204**  
CNEC-Consortium for Nonproliferation Enabling Capabilities **Booth 405**  
Doosan HF Controls Corp. **Booth 211**  
Flownex SE **Booth 213**  
General Atomics **Booth 310**  
HukariAscendent, Inc. **Booth 415**  
IAEA Careers **Booth 202**  
Institute of Nuclear Energy Safety Technology, CAS-FDS Team **Booth 315**  
INL - Gateway for Accelerated Innovation in Nuclear (GAIN) **Booth 113**  
INL Nuclear Science & Technology **Booth 115**  
Los Alamos National Laboratory **Booth 312**  
Luminant **Booth 111**  
Mirion (Canberra) **Booth 215**  
National Nuclear Laboratory (UK) **Booth 300**  
National Security Technologies, LLC (NSTEC) **Booth 304**  
Northrop Grumman Corporation **Booth 402**  
Nuclear Energy University Program (NEUP) **Booth 114**  
Nuclear Plant Journal **Booth 414**  
Nuclear Science User Facilities **Booth 112**  
Nuclear Three Inc. **Booth 305**  
Oak Ridge National Laboratory/UT Battelle, LLC **Booth 301 & 303**  
OTEK Corporation **Booth 210**  
Phoenix Nuclear Labs, LLC **Booth 201**  
Presray Corporation **Booth 203**  
REEL S.A.S. **Booth 411**  
RSCC Wire & Cable, LLC **Booth 313**  
Texas A&M Nuclear Engineering **Booth 404**  
Thermo Fisher Scientific - CIDTEC **Booth 311**  
UK Department for International Trade **Booth 302**  
University of Pittsburgh Swanson School of Engineering **Booth 200**  
University of Tennessee Department of Nuclear Engineering and Institute for Nuclear Security **Booth 410**  
Varian Security & Industrial - TRANSPIRE **Booth 205**  
Virginia Commonwealth University **Booth 400**

# Floorplan - Exhibit Hall

November 6–10, 2016 | Las Vegas, NV, USA | Caesars Palace | Octavius Ballroom



## Hours

Sunday, November 6: 6:00 pm - 8:00 pm

Monday, November 7: 10:00 am - 5:00 pm

Tuesday, November 8: 10:00 am - 5:00 pm

Join us at the Tuesday break (4-4:30 pm) for the Exhibitor Raffle.

**The following booths are participating:**

**American Nuclear Society (401 & 403)**

**Argonne National Laboratory (212 & 214)**

**Doosan HF Controls Corp. (211)**

**National Nuclear Laboratory (UK) (300)**

**OTEK Corporation (210)**

**RSCC Wire & Cable, LLC (313)**

# Exhibitors

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## **AFO Research Inc.**

### **Vero Beach, FL (Booth 314)**

AFO Research Inc. is a high technology R&D company specializing in the development of next generation optical materials. AFO offers the world's most radiation hard glasses that will revolutionize rapidly growing industries as nuclear, defense, aerospace, optical storage and healthcare by enabling end-users to overcome current limitations of existing materials.

## **American Nuclear Society**

### **LaGrange Park, IL (Booths 401 & 403)**

ANS, the premier international society serving nuclear professionals, promotes nuclear science and technology to benefit humanity. Visit our booth to learn what we offer individuals, organizations, vendors, and educators, including venues for collaboration and leadership, news and publications like Nuclear News and Radwaste Solutions, industry standards, outreach efforts, and more. Explore the Center for Nuclear Science and Technology Information and other ANS Outreach initiatives. Or just stop by for a friendly chat with ANS staff.

## **Argonne National Laboratory**

### **Lemont, IL (Booths 212 & 214)**

Argonne National Laboratory continues to advance the science and technology foundations of safe, secure, and sustainable nuclear energy systems. Stop by the Argonne booth to learn more and register to win a piece of history – a block of CP-1 graphite! [www.ne.anl.gov](http://www.ne.anl.gov).

## **CeoTronics Inc.**

### **Virginia Beach, VA (Booth 407)**

Personnel working in Nuclear Power Plants can protect their hearing AND still communicate clearly with a “Wireless, Hands Free” headset from CeoTronics (Booth 407). Our “CT-WireCom Digital” system permits continuous two-way conversation for “2” to “20” participants with superior speech transmission quality at levels of ambient noise approaching 110dB.

## **Ceradyne, Inc., a 3M Company**

### **Quapaw, OK (Booth 204)**

Ceradyne, Inc. (formerly Boron Products, LLC) is a leading manufacturer of enriched boron products. Our focus is on nuclear reactor sustainability by manufacturing optimized materials with emphasis on proprietary stable boron isotopes for criticality control in nuclear power operations, nuclear fuel management and control, and waste management technologies. [www.3m.com/boron](http://www.3m.com/boron)

## **CNEC-Consortium for Nonproliferation Enabling Capabilities Raleigh, NC (Booth 405)**

CNEC is a 5-year \$25M award by NNSA. CNEC aims to create a preeminent research and education hub dedicated the development of enabling technologies and technical talent for meeting the present and future grand challenges of nuclear non-proliferation. “Innovative R&D and education activities to enhance national capabilities in the detection and characterization of SNM and facilities processing SNM to enable the U.S. to meet its non-proliferation goals, as well as to investigate the replacement of radiological sources that my pose terrorist threats.

## **Doosan HF Controls Corp.**

### **Carrollton, TX (Booth 211)**

Doosan HF Controls is headquartered in Carrollton Texas USA is an I&C solutions provider that has supplied and serviced Instrumentation and Control (I&C) systems to American and International clients for over 50 years across the fossil and nuclear markets. Doosan HF Controls has become a major nuclear supplier as it expands its business portfolio. For more information: 1-866-501-9954 • [www.hfcontrols.com](http://www.hfcontrols.com)

## **Flownex SE**

### **Potchefstroom, South Africa (Booth 213)**

The Flownex Simulations Environment is for design, simulation and optimization of system and sub-system flow rates, temperatures, pressures, and heat transfer rates. Additionally, Flownex is able to solve any combination of gas, liquid, two-phase, slurry, and mixture flows in both 1D/2D steady state and transient cases. See: [www.flownex.com](http://www.flownex.com)

## **General Atomics**

### **San Diego, CA (Booth 310)**

General Atomics (GA), a San Diego innovation company, has more than half a century of developing successful solutions for energy, environmental and defense challenges.

GA's nuclear energy research led first to the TRIGA® reactor. More recently GA has developed Accident Tolerant Fuels to make current reactors safer, and the Energy Multiplier Module, an advanced reactor concept, which will drive down costs while addressing safety, nuclear waste and proliferation risks.

# Exhibitors

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## **HukariAscendent, Inc. Wheat Ridge, CO (415)**

HukariAscendent is a Service Disabled Vietnam Veteran-Owned small business providing engineering and technical services for the government and commercial nuclear industry, specializing in Nuclear Safety, Licensing, and Engineering. The HukariAscendent network provides access to over 11,000 engineers and professionals with nuclear related experience, making us a recognized leader in this industry.

4251 Kipling Street, Suite 400

Wheat Ridge, CO 80033

303-384-9079

www.hukari.com

## **IAEA Careers**

### **Lemont, IL (Booth 202)**

The International Atomic Energy Agency (IAEA) in Vienna, Austria is the world's center for cooperation in the nuclear field committed to promoting safe, secure and peaceful uses of nuclear technology. IAEA offers opportunities to engage current, meaningful issues of global peace, security and development while working in a multicultural workplace.

## **INL - Gateway for Accelerated Innovation in Nuclear (GAIN)**

### **Idaho Falls, ID (Booth113)**

DOE's Office of Nuclear Energy established the Gateway for Accelerated Innovation in Nuclear (GAIN), led by INL, to provide the nuclear community with access to technical, regulatory, and financial support necessary to move innovative nuclear energy technologies toward commercialization, while ensuring continued safe, reliable operation of the existing nuclear fleet.

## **INL Nuclear Science & Technology**

### **Idaho Falls, ID (Booth115)**

Idaho National Laboratory (INL) stands out as a distinctly capable science and technology resource. The lab serves as the nation's lead laboratory for advanced nuclear energy research, development, demonstration, and deployment. INL Nuclear Science & Technology staff work with unparalleled irradiation and post-irradiation examination, fuel fabrication and materials testing facilities.

## **Institute of Nuclear Energy Safety Technology, CAS-FDS Team**

### **Hefei, China (Booth 315)**

Institute of Nuclear Energy Safety Technology (INEST), Chinese Academy of Sciences (CAS) is the professional institute focusing on basic research of nuclear energy safety and the supporting institution of Key Laboratory of Neutronics and Radiation Safety, CAS. It is also the independent nuclear safety assessment and evaluation center with the aim of promoting the sustainable development of nuclear science and technology.

## **Los Alamos National Laboratory**

### **Los Alamos, NM (Booth 312)**

Los Alamos National Laboratory is a multi-disciplinary institution with over 10,000 employees located in Northern New Mexico. The Laboratory's mission is to solve national security challenges through scientific excellence. We have world-class capabilities in nuclear disciplines including theory, simulation, and experiments and are currently seeking qualified students, postdocs, and staff.

## **Luminant**

### **Dallas, TX (Booth 111)**

Our advanced monitoring and diagnostics platform delivers 24x7 real-time operational support, leveraging more than a decade of operating experience, proven software applications and well-defined processes and procedures, enabling our customers to increase efficiency and reliability of their assets to maximize MWs, minimize costs and deliver on the nuclear promise.

## **Mirion (Canberra)**

### **Meriden, CT (Booth 215)**

Canberra is the leading supplier of innovative and cost-effective nuclear measurement solutions and services used to maintain safety of personnel, assess the health of nuclear facilities and safeguard the public and the environment. Applications for Canberra offerings include health physics, nuclear power operations, Radiation Monitoring Systems (RMS), nuclear safeguards, nuclear waste management, environmental radiochemistry and other areas.

## **National Nuclear Laboratory (UK)**

### **Cheshire UK (Booth 300)**

We're the only UK organisation with the skills, facilities and expertise to provide technical support across the nuclear industry. What's more, we pride ourselves on offering quality, value and service to all of our customers. With over 10,000 person-years of nuclear industry experience across the whole fuel cycle, our core business is to provide the experts and technologies to ensure the UK nuclear industry operates safely and cost-effectively today and for the future.

# Exhibitors

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## **National Security Technologies, LLC (NSTec) Las Vegas, NV (Booth 304)**

National Security Technologies, LLC, manages and operates the Nevada National Security Site (NNSS) and related facilities; supports stewardship of the nation's nuclear deterrent; provides nuclear and radiological emergency response and training; supports nonproliferation and arms control initiatives; and provides long-term environmental stewardship of the NNSS and its Cold War legacy.

## **Northrop Grumman Corporation Linthicum, MD (Booth 402)**

Northrop Grumman is a leading global security company providing innovative systems, products and solutions in autonomous systems, cyber, C4ISR, strike, and logistics and modernization to customers worldwide. Please visit [www.northropgrumman.com](http://www.northropgrumman.com) for more information.

## **Nuclear Energy University Program (NEUP) Idaho Falls, ID (Booth 114)**

The Nuclear Energy University Program funds innovative nuclear research at U.S. colleges and universities, as well as student educational support. NEUP is helping the Department of Energy accomplish its mission of leading the Nation's investment in the development and exploration of advanced nuclear science and technology. [www.neup.gov](http://www.neup.gov)

## **Nuclear Plant Journal Downers Grove, IL (414)**

Nuclear Plant Journal, a US publication now in its 34th year, provides technical information exchange among managers and engineers in nuclear power industry worldwide. Circulation is 12,000 (BPA Worldwide audited). The Journal is published six-times per year and reaches every country in the world with a civilian nuclear energy program. The Journal is published in print and digital versions. The Products & Services Directory is published yearly in December. Online: [NuclearPlantJournal.com](http://NuclearPlantJournal.com); [facebook.com/nuclearplantjournal](https://facebook.com/nuclearplantjournal); [youtube.com/user/nuclearplantjournal](https://youtube.com/user/nuclearplantjournal); [twitter.com/npjtweet](https://twitter.com/npjtweet). Representative: Anu Agnihotri

## **Nuclear Science User Facilities Idaho Falls, ID (Booth 112)**

Nuclear Science User Facilities merges the national nuclear research infrastructure with intellectual capital to pair the best ideas with the needed capability. Users are provided no-cost access to world-class nuclear research facilities, technical expertise from experienced scientists and engineers, and assistance with experiment design, assembly, safety analysis and examination.

## **Nuclear Three Inc. Stoddard, WI (Booth 305)**

Nuclear Three Inc. has served nuclear energy since 1965. We offer reactor operations reviews, strategic planning, temporary executive support at CNO and CEO levels. Also we serve as an advisor to the financial industry on investment risk assessment for nuclear energy. Call: 608-386-3287

## **Oak Ridge National Laboratory/UT Battelle, LLC Oak Ridge, TN (Booths 301 & 303)**

Oak Ridge National Laboratory (ORNL) is a multi-program science and technology laboratory managed for the U.S. Department of Energy by UT-Battelle, LLC. Scientists and engineers at ORNL conduct basic and applied research and development to create scientific knowledge and technological solutions that strengthen the nation's leadership in key areas of science; increase the availability of clean, abundant energy; restore and protect the environment; and contribute to national security. [www.ornl.gov](http://www.ornl.gov)

## **OTEK Corporation Tucson, AZ (Booth 210)**

Otek Corporation provides a highly reliable New Technology Meter (NTM) which replaces old and obsolete analog instruments common throughout the Nuclear Fleet. The NTM features a bright, 4-digit LED display, programmable tri-color bar graph and is 100% FFF compatible with many popular analog meters without the need for external power.

OTEK Corporation  
4016 E. Tennessee Street  
Tucson, AZ 85714  
Phone: (520) 748-7900  
[Sales@otekcorp.com](mailto:Sales@otekcorp.com)

# Exhibitors

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## **Phoenix Nuclear Labs, LLC Monona, WI (Booth 201)**

Since its founding in 2005, Phoenix Nuclear Labs (PNL) has designed and manufactured the World's strongest commercial neutron generators. PNL's commitment to commercializing nuclear technologies has inspired our long-term goal of producing clean, fusion energy. PNL's technology is used across a variety of applications within the medicine, the defense, and the energy sectors.

## **Presray Corporation Wassaic, NY (Booth 203)**

Presray has designed, manufactured, tested and installed a full spectrum of Watertight, airtight and ballistic doors and flood barriers for over 60 years. Our Products are installed at thousands of facilities, including many Nuclear Power Plants. We are committed to quality, our QA program is NUPIC APPROVED 10CFR 50 APPENDIX B.  
[www.presray.com](http://www.presray.com)

## **REEL S.A.S. Saint-Cyr au-Mont d'Or, France (Booth 411)**

Designs, manufactures and services lifting & handling equipment needed for industrial activities in nuclear power, from uranium enrichment plant, fabrication of fuel, through power reactor construction & services to reprocessing plant and depository sites. REEL supplies fuel handling systems (FHS) for nuclear power plants, proposes all equipment as an integrated system dedicated to safe and efficient core loading/unloading operations.

## **RSCC Wire & Cable, LLC Granby, CT (Booth 313)**

RSCC Wire & Cable, LLC is the premier full line manufacturer of Nuclear Safety cables to the nuclear industry worldwide. Our flagship Firewall III Low Voltage Control, Power and Instrumentation Cables are the proven cables for the industry. RSCC has added Nuclear Qualified Medium Voltage cables to our product offering.

## **Texas A&M Nuclear Engineering College Station, TX (Booth 404)**

The Department of Nuclear Engineering at Texas A&M is the largest and one of the most diverse programs in the nation, with a long history of outstanding undergraduate and graduate education, strong research at the graduate level, and an unsurpassed commitment to professional and public service.

## **Thermo Fisher Scientific - CIDTEC Liverpool, NY (Booth 311)**

As the global leader in scientific and process instrumentation, Thermo Scientific offers an unmatched breadth of products and services which have served the nuclear power industry for decades including: radiation hardened Color and Monochrome CID cameras for inspection applications, radiation and personnel monitoring equipment, Class 1E nuclear instrumentation systems and related services. <http://www.thermofisher.com/cidtec>

## **UK Department for International Trade Los Angeles, CA (Booth 302)**

The Department for International Trade (DIT) is the UK Government's international business development agency. DIT USA, working closely with DIT and other agencies in the United Kingdom, is charged with transatlantic trade development between the UK and the US; and with assisting US companies looking to invest in the UK.

## **University of Pittsburgh Swanson School of Engineering Pittsburgh, PA (Booth 200)**

Consistently ranked as one of the top 25 public graduate engineering programs nationally by U.S. News and World Report, our live & online master's in engineering & certificate options offer you the ability to specialize in a number of areas critical to today's world including Nuclear Engineering. For information, please contact Stephanie Opalinski at [sto24@pitt.edu](mailto:sto24@pitt.edu).

# Exhibitors

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## **University of Tennessee Department of Nuclear Engineering and Institute for Nuclear Security Knoxville, TN (Booth 410)**

The University of Tennessee (UT) Nuclear Engineering is one of the most prestigious programs in the United States. The UT Institute for Nuclear Security, in collaboration with Oak Ridge National Laboratory, Y-12 National Security Complex, and Oak Ridge Associated Universities, is developing new multidisciplinary efforts for improving nuclear security globally.

## **Varian Security & Industrial - TRANSPIRE Las Vegas, NV (Booth 205)**

Varian, Security & Industrial Products is the market leader for the supply of high-energy X-ray devices for cargo security, industrial inspection and non-destructive testing (NDT) applications worldwide. The Attila product line, one of Varian's offerings, is a CAD integrated, state-of-the-art software suite developed to improve radiation transport analysis productivity.

## **Virginia Commonwealth University Richmond, VA (Booth 400)**

Virginia Commonwealth University (VCU) is Virginia's premier public research university, and currently the only university in Virginia to offer a full suite of graduate and ABET accredited undergraduate degrees in nuclear engineering, including BS, MS and PhD. VCU's nuclear engineering program, which will celebrate its 10th anniversary in 2017, currently enrolls 100 undergraduate students and 75 graduate students.

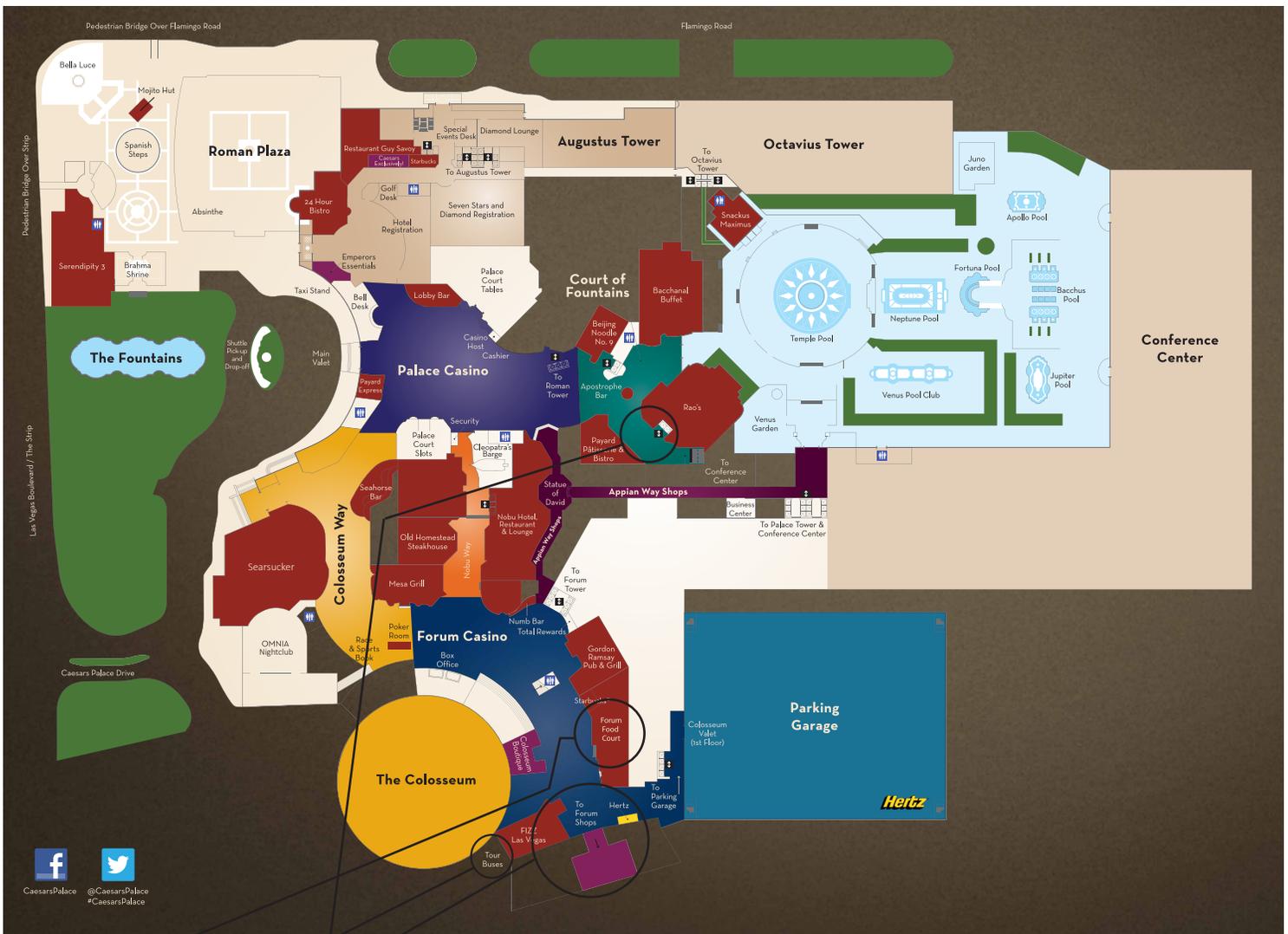
Contact:

Dr. Sama Bilbao y León

[sbilbao@vcu.edu](mailto:sbilbao@vcu.edu)

<http://mechanical-and-nuclear.egr.vcu.edu/>

# Caesars Palace



**Food Court**

**To Enter the Forum Shops**

**Escalator to the Conference Center**

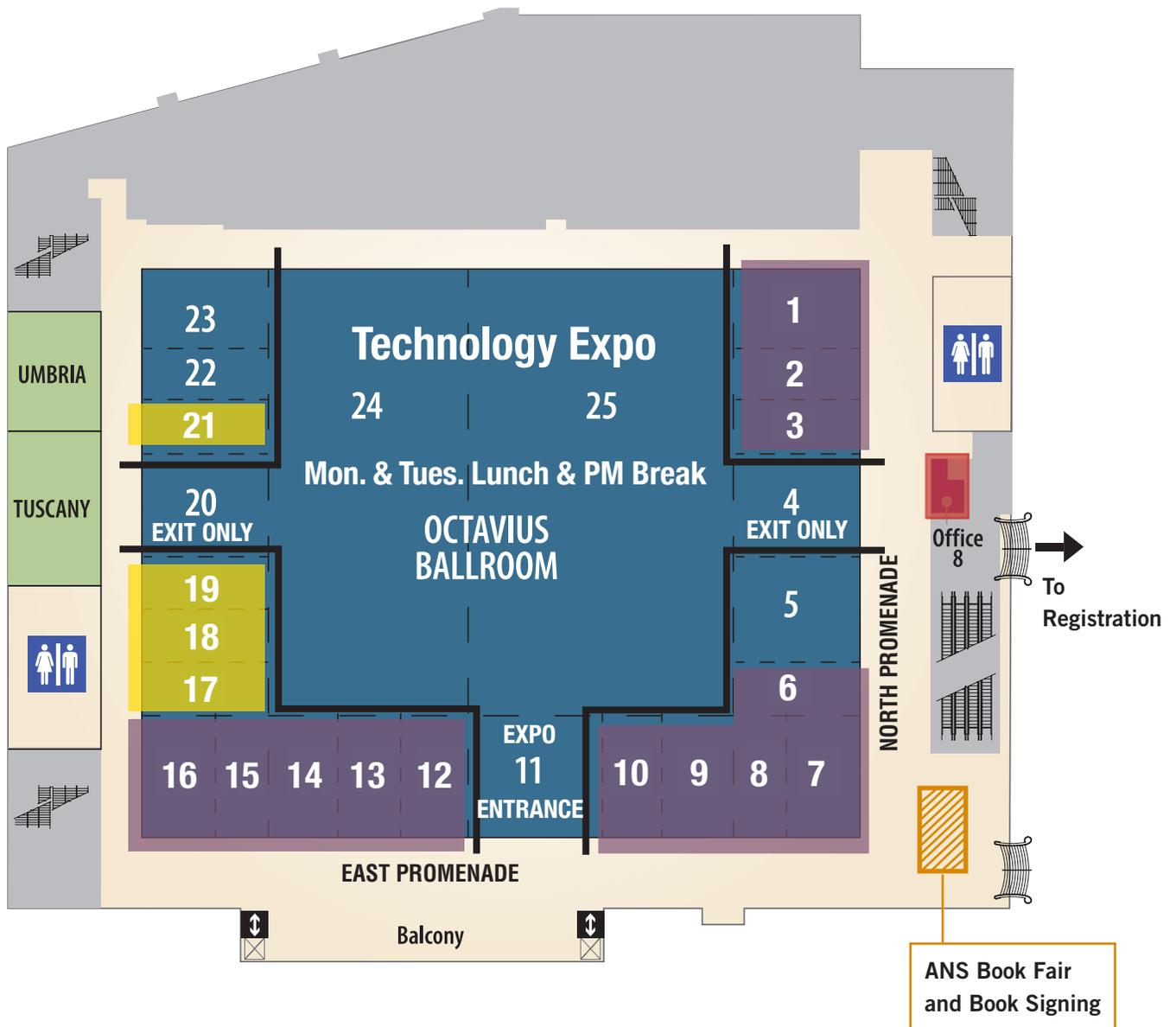
**Shuttle Bus Entrance**

- APPIAN WAY SHOPS**
  - Business Center
  - Carina
  - Colosseum Cigars
  - Emperors Essentials
  - Forever Flawless
  - Home
  - King Baby
  - Olive & Beauty
  - Optica
  - PIQ
- AUGUSTUS TOWER**
  - Caesars Exclusively!
  - Color A Salon By Michael Boychuck
  - Concierge Desk
  - Emperors Essentials
  - Fitness Center
  - Golf Desk
  - Hotel Registration
  - Qua Baths and Spa
  - Restaurant Guy Savoy
  - Seven Stars and Diamond Lounge
  - Special Events Desk
  - Starbucks
- COLOSSEUM WAY**
  - OMNIA Nightclub
  - Poker Room
  - Pussycat Dolls Pit
  - Race & Sports Book
  - Seahorse Bar
  - Searsucker
- COURT OF FOUNTAINS**
  - Apostrophe Bar
  - Bacchanal Buffet
  - Beijing Noodle No. 9
- FORUM CASINO**
  - Box Office
  - Colosseum Boutique
  - FIZZ Las Vegas
  - Forum Shops Entrance
- RESTAURANTS AND BAR**
- RETAIL**
- PALACE CASINO**
  - Bell Desk
  - Cashier
  - Casino Host
  - LobbyBar
  - Roman Tower
- NOBU WAY**
  - Cleopatra's Barge
  - **Nobu Hotel**
  - Nobu Restaurant & Lounge
  - Old Homestead Steakhouse
  - Security
- RESTROOMS**
- ELEVATORS**

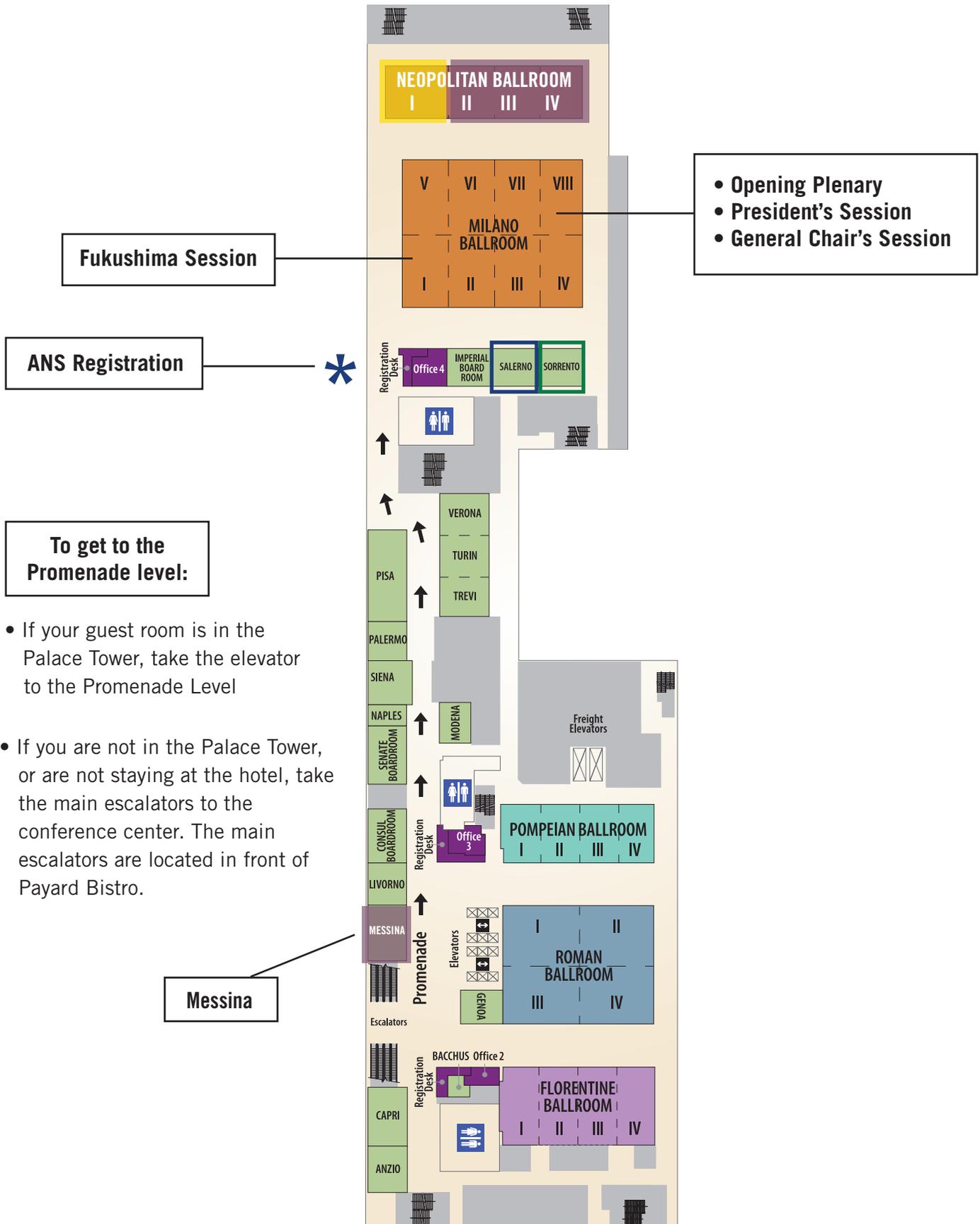
**115**

# Floorplan - Promenade South

-  Technology Expo
-  ANS Technical Session Rooms
-  HTR 2016 Technical Session Rooms
-  ANS Student Headquarters
-  ANS Book Fair
-  ANS Business Office
-  ANS Media Office
-  ANS Registration



# Floorplan - Promenade Level





# ANS Winter Meeting & Expo

## Nuclear Science + Technology

Imperatives for a Sustainable World

November 6-10, 2016

Caesars Palace

Las Vegas, NV



American Nuclear Society  
555 N. Kensington Ave.  
La Grange Park, IL 60526  
[www.ans.org](http://www.ans.org)