Meeting Program

Idaho Section
American Nuclear Society
60 Years - 1957-2017

M&C 2019

Bridging Theory and Applications

American Nuclear Society

Contents

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Jim Warsa, Los Alamos National Laboratory
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Akio Yamamoto, Nagoya University, Japan
Dingkang Zhang, Georgia Tech
Igor Zmijarevic, Commissariat à l'Énergie Atomique, France

M&C 2019

M&C 2019 Pre-Meeting Workshops (for Pre-Registered Attendees only)

Sunday, August 25, 2019

8:00 AM – 12:00 PM: Building Better Scientific Software
Medford Room

Presented by Kyle Niemeyer
Department of Mechanical, Industrial, and Manufacturing Engineering, Oregon State University

This workshop will dive into best practices for developing research software, and sharing artifacts of research openly. Topics include version control with Git, working collaboratively with GitHub, software testing and continuous integration, effectively documenting software, deploying and sharing software openly, software licenses and copyright, and writing and publishing about software, including software citation. Each topic will be fairly interactive and hands-on, and participants will follow along on their laptops.

1:00 PM – 5:00 PM: Response Matrix Theory of 1D Neutron Transport in Plane Geometry
Eugene Room

Presented by Barry D. Ganapol
Precision Benchmarks LLC

S. Chandrasekhar is widely credited with the development of the first solutions to the 1D radiative transfer equation falling into the category of response matrix or nodal-like methods. In particular, a set of ODEs at quadrature abscissae approximates the radiative or neutron transport equation. A solution in terms of exponential eigenfunctions then immediately follows. C. Siewert, R. Garcia, L. Barichello and co-workers have perfected the method by using modern day methods of numerical linear algebra. In addition, there have been many researchers including B. Carlson, E. Gelbard, J. Lenoble, S. Segatto, K. Stamnes and W. Wiscombe to name a few, who have modified Chandrasekhar's method and expanded the number of applications. In this Workshop, we explore a recently established alternative numerical solution called the Response Matrix/Discrete Ordinates Method (RM/DOM) which enables the generation of high precision 1D benchmarks. I will present the theory, based on the SN equations, along with its numerical implementation. Coupling RM/DOM to the method of doubling provides a range of highly precise solutions for both large and small slabs in heterogeneous media. During the presentation, several short specially prepared exercises in MATLAB are given to demonstrate the numerical methods used. Graduate students, professors and those generally interested in learning more about precision transport theory will find the Workshop helpful for code verification. Participants attending will receive a memento to remember their Workshop experience. The duration is four hours with refreshments provided.

Gelbard Scholarship Fundraising Event

Ely Gelbard was a distinguished long-time member of the American Nuclear Society's Mathematics and Computation Division (MCD). After his death in 2002, the MCD voted to establish a graduate scholarship in his honor. As Ely was a leader in developing radiation transport algorithms and high-performance computing applications, the Ely Gelbard scholarship is offered to full-time students pursuing graduate nuclear engineering studies with a focus on the development of mathematical and/or computational methods for nuclear applications. Educating and supporting the development of the future workforce is critical to the continued growth of nuclear science and technology. Each year, the American Nuclear Society awards numerous scholarships to college undergraduates and graduate students pursuing nuclear-related degrees. These scholarships are funded through generous donations from individuals and organizations and provide opportunities for nuclear science and technology students to fulfill their career aspirations. The MCD is committed to contributing approximately one-third of the money required to fund the Ely Gelbard scholarship from their operating funds, but we need your help raising the remaining two-thirds. We are seeking industrial, academic and government sponsorship, but we has hold regular fundraising events to (1) help augment that funding stream, and (2) celebrate the life and achievements of Ely Gelbard.

We would like to invite you to attend the Ely Gelbard Scholarship fundraising event on Tuesday evening, August 27, 2019. The event will be held aboard the Crystal Dolphin Vessel. Guests will enjoy a 2.5-hour yacht cruise down the Willamette River while enjoying amazing views and a locally sourced and freshly prepared northwestern cuisine. Your $60 donation include the cruise, a three-course meal, and beverages (alcoholic & non-alcoholic). Boarding will start at 5:00 p.m. at Caruther's Landing (110 SE. Caruthers). Parking is complimentary.

You can register online and buy tickets at https://www.mc2019.org/gelbard-scholarship-fundraiser. Register now! Space is limited to the first 50 registrants.

Meeting Schedule

Sunday, August 25, 2019

12:00 PM – 3:00 PM	Exhibit area setup
8:00 AM – 12:00 PM	Morning workshop
1:00 PM – 5:00 PM	Afternoon workshop
6:00 PM – 8:00 PM	Opening reception

Monday, August 26, 2019

8:00 AM – 9:50 AM	Opening plenary
9:50 AM – 10:20 AM	Morning break
10:20 AM – 12:15 PM	Opening plenary
1:30 PM – 3:00 PM	Afternoon technical sessions
3:00 PM – 3:30 PM	Afternoon break
3:30 PM – 4:45 PM	Afternoon technical sessions
5:00 PM – 7:00 PM	Poster session

Tuesday, August 27, 2019

8:00 AM – 9:50 AM	Morning technical sessions
9:50 AM – 10:20 AM	Morning break
10:20 AM – 11:55 AM	Morning technical sessions
1:30 PM – 3:00 PM	Afternoon technical sessions
3:00 PM – 3:30 PM	Afternoon break
3:30 PM – 4:45 PM	Afternoon technical sessions

Wednesday, August 28, 2019

8:00 AM – 9:50 AM	Morning technical sessions
9:50 AM – 10:20 AM	Morning break
10:20 AM – 11:55 AM	Morning technical sessions
1:30 PM – 3:00 PM	Afternoon technical sessions
3:00 PM – 3:30 PM	Afternoon break
3:30 PM – 4:45 PM	Afternoon technical sessions
5:30 PM – 8:00 PM	Conference Banquet

Thursday, August 29, 2019

8:00 AM – 9:50 AM	Morning technical sessions
9:50 AM – 10:20 AM	Morning break
10:20 AM – 11:55 AM	Morning technical sessions

Events and Sessions By Day

Sunday 8:00-12:00 AM

Workshop: Building Better Scientific Software *Registrants Only*	**Medford Room**

Sunday 1:00-5:00 PM

Workshop: Response Matrix Theory of 1D Neutron Transport in Plane Geometry *Registrants Only*	**Eugene Room**

Sunday 6:00-8:00 PM

Opening Reception	**Salons E and F**

Monday 8:00-12:15 PM

Opening Plenary	**Salons E and F**

Monday 1:20-4:45 PM

Advanced Discretization Techniques for Deterministic Transport I	**Salon G**
Monte Carlo Variance Reduction and Hybrid Methods	**Salon H**
Radiative Transfer and Radiation-Hydrodynamic Simulations and Methods	**Salon C**
Transport Theory I	**Salon D**
Advances in Reactor Analyses Methods I	**Portland Room**
Novel Approaches for Single and Multiphase Fluid Dynamics	**Eugene Room**

Monday 5:00-7:00 PM

Poster Session	**Salons A-B**

Tuesday 8:30 AM-12:05 PM

Advanced Discretization Techniques for Deterministic Transport II	**Salon G**
Advanced Monte Carlo Methods I	**Salon H**
Nuclear Data Evaluation and Assimilation of Integral Experiments	**Salon C**
Transport Theory II	**Salon D**
Advances in Reactor Analyses Methods II	**Portland Room**
Whole Core Modeling and Simulation I	**Eugene Room**

Tuesday 1:20-4:45 PM

Advanced Discretization Techniques for Deterministic Transport III	**Salon G**
Advanced Monte Carlo Methods II	**Salon H**
Deterministic and Stochastic Methods for Sensitivity Analysis I	**Salon C**
Multiphysics Coupling Methods and Approaches I	**Salon D**
Advances in Reactor Analyses Methods III	**Portland Room**
Whole Core Modeling and Simulation II	**Eugene Room**

Wednesday 8:30 AM-12:05 PM

Advanced Solution Techniques for Deterministic Transport	**Salon G**
Monte Carlo Simulation with Thermal Feedback	**Salon H**
Deterministic and Stochastic Methods for Sensitivity Analysis II	**Salon C**
Multiphysics Coupling Methods and Approaches II	**Salon D**
Advances in Reactor Analyses Methods IV	**Portland Room**
Transport Methods for Stochastic Media	**Eugene Room**

Wednesday 1:20-4:45 PM

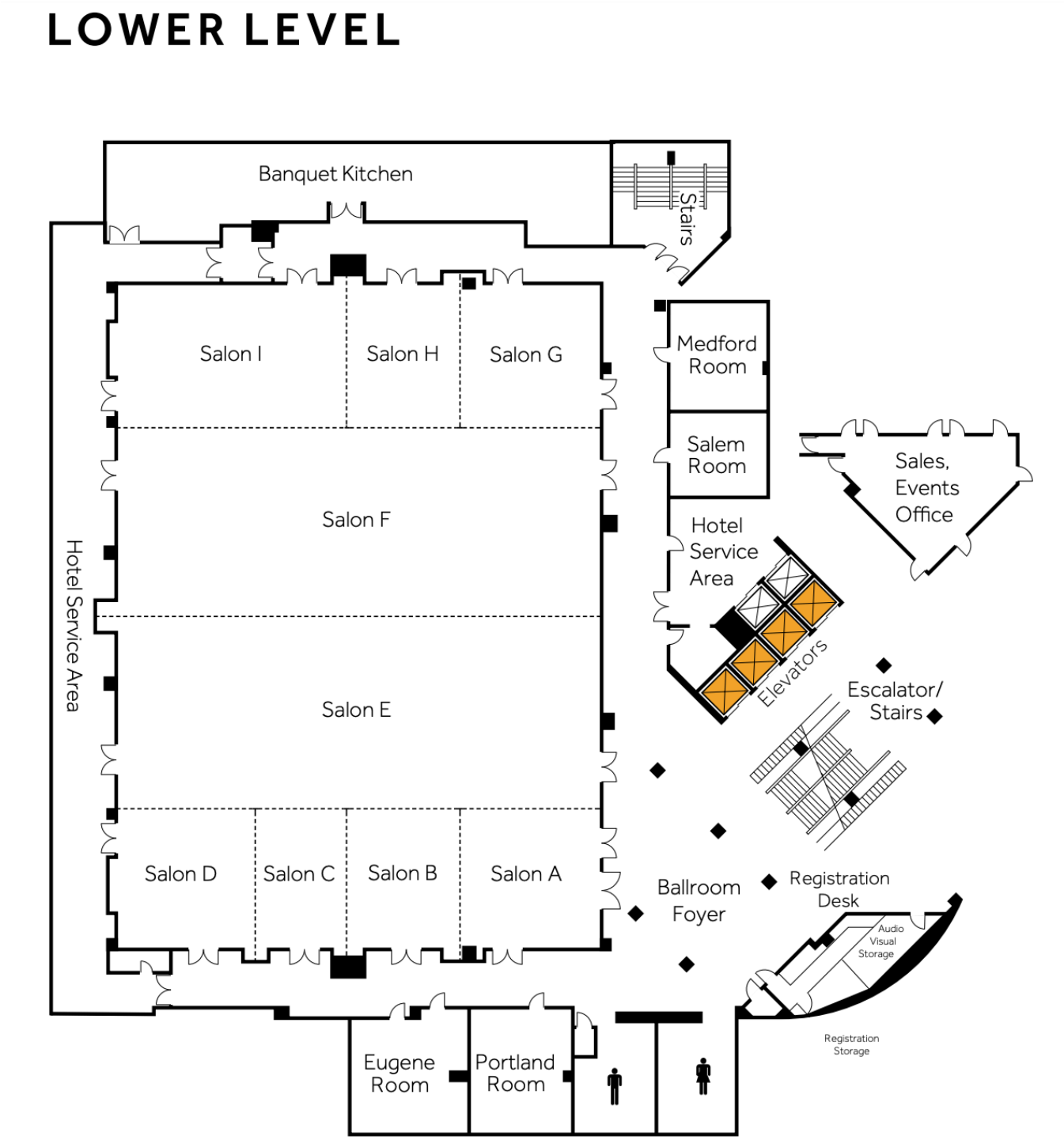
Advanced Transport Solution Algorithms I	**Salon G**
Hybrid Monte Carlo/Deterministic Methods	**Salon H**
Deterministic and Stochastic Methods for Sensitivity Analysis III	**Salon C**
Multiphysics Coupling Methods and Approaches III	**Salon D**
Advances in Reactor Analyses Methods V	**Portland Room**
Reduced-order Modeling in Nuclear Science and Engineering Applications	**Eugene Room**

Thursday 8:30 AM-12:05 PM

Advanced Transport Solution Algorithms II	**Salon G**
Reactor Physics Validation with Realistic Core Benchmarks	**Salon H**
Uncertainty Quantification in Multiphysics Simulations	**Salon C**
Validation and Regulatory Acceptance of Multiphysics Simulations	**Salon D**
Advances in Reactor Analyses Methods VI	**Portland Room**
Advanced Methods in Materials and Material Control	**Eugene Room**

Meeting Floor Plan

Registration and All Event are on the Marriott Lower Level



Technical Program

Monday 8:00-12:00 PM

Opening Plenary)

Speakers:

Marvin Adams, Professor, Texas A&M University

Recent Advances in Deterministic Transport

Marvin Adams is HTRI Professor, Associate Director of the Institute for National-Security and Cyber-Security Education & Research, and a member of the Computational Methods Development Group in the Department of Nuclear Engineering. He also helps Texas A&M fulfill its responsibilities in Triad National Security, the organization responsible for managing the Los Alamos National Laboratory. His research interests are focused on: 1) computational transport methods and theory; 2) efficient algorithms for massively parallel scientific and engineering calculations; and 3) quantification of uncertainties in predictive science and engineering. He has supervised 24 Ph.D. graduates and 19 M.S. graduates, and has served as PI or Co-PI on 38 externally funded research projects with total awards of $120 million. Despite Marv's obvious deficiencies in developing engaging titles for his presentations, he is widely recognized as an outstanding technical presenter and educator.

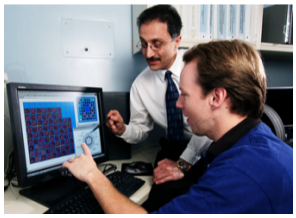
Tom Gibbs, NVIDIA

*Convergence of HPC*AI - The New Normal in Scientific Computing*

Tom is currently responsible for strategy and implementation of programs to enable and promote developers to take full advantage of NVIDIA technology. Tom brings over 30 years of experience in HPC, and has applications expertise in industries ranging from Physics, Aerospace, Healthcare, Life Sciences, Energy and Financial Services. Prior to NVIDIA Tom held senior management positions for early stage cloud startup companies in the healthcare market segment. He spent 15 years with the Intel Corporation, where he managed a global team responsible for leading innovation programs at CERN, NCSA, British Petroleum and Morgan Stanley as Director of Strategy and Architecture in the Solutions Group. During his time at Intel Tom was part of the HPC Business Unit responsible for ASCI RED and other large-scale computing systems. Tom was a past Chairman of the Open Grid Forum and a member of the Center for Excellence in Supply Chain Management at MIT.

Farzad Rahnema, Professor , Georgia Tech University

Recipient of the 2019 Gerald C. Pomraning Award
The COMET Method for Reactor Core, Detector, and Radiotherapy Calculations



Farzad Rahnema is a Georgia Power Company Distinguished Professor of Nuclear Engineering, Director of the Computational Reactor and Medical Physics Laboratory (CRMP). He received his PhD in nuclear engineering from the University of California–Los Angeles (UCLA). Prior to joining Georgia Tech, he was at General Electric Nuclear Energy for 11 years. His responsibility included maintenance and development of improvements/new versions of the GE's 3-D Neutronics/Thermal Hydraulics BWR Core Simulator PANACEA used for design, monitoring and prediction of BWR cores. He has published over 240 refereed technical papers.

Farzad is a Fellow of the American Nuclear Society (ANS), a member of the Advisory Editorial Board of Annals of Nuclear Energy and Nuclear Technology, and a member of the External Advisory Board of the Ohio State University Nuclear Engineering Program. He was the Chair of the Georgia Tech Nuclear & Radiological Engineering and Medical Physics Programs from 7/2002 to 6/2016. He also held an appointment as an Adjunct Professor of Radiation Oncology at the Emory University School of Medicine from 2005 to 2016. He chaired the Honors and Award Committee of the ANS Mathematics and Computation Division (MCD) from 7/2006 to 6/2017, served as the Chair of the MCD (2 times) and the Reactor Physics Division (RPD), and was the founding Chair of the Board of Directors of the Southeast Universities Nuclear Reactors Institute for Science and Education (SUNRISE). He is currently a member of the Honors and Award Committee of the ANS Reactor Physics Division.

Farzad's research interest is in the areas of reactor physics, theoretical and computational radiation transport methods and code development with applications to reactor core analysis and safety, nuclear security and detection, and computational medical physics.

Ryan McClarren, Associate Professor, Notre Dame University

Recipient of the 2019 Young Member Research Achievement Award

"That's an Interesting Idea:" Data Driven Models, Compressed Sensing, and Other Outré Tools for Nuclear Applications

Ryan McClarren has been active in technical fields for as long as he can remember. He is presently Associate Professor of Aerospace and Mechanical Engineering at the University of Notre Dame. He is also a involved with Buzzer Intelligence, a startup driven to improve the event going experience. Previously, he was Assistant Professor of Nuclear Engineering at Texas A&M University, as well as the Chief Science officer for Farsite. In his academic research, he has published over 45 articles in refereed journals plus many presentations at national and international conferences. For Google's take on his research, see their citations page. Ryan's research has been published in engineering, physics, mathematics, and statistics journals. His particular areas of interest are particle transport (neutrons, x-rays, and friends), uncertainty quantification, and high energy density physics. His data science work for Farsite spanned the industries of retail, gaming, healthcare, and private equity. In 2013 he was the lead scientist on a campaign to forecast the Academy Awards. Ryan correctly picked 5 out of 6 categories including the upset of Christoph Waltz in Django Unchained. This work was covered in The Wall Street Journal, Forbes, NPR, USA Today, and The Guardian. This only begins to scratch the surface of what it means to be a quantitatively savvy person in the ever increasing data dense world we live in. Beyond that world, Ryan relishes his time with his wife and four children in their home in South Bend and wherever else life takes them.

Advanced Discretization Techniques for Deterministic Transport I
Salon G
Michael W. Hackemack, *Naval Nuclear Laboratory - KAPL*
Mathieu Hursin, *Paul Scherrer Institut*

1:20	Arbitrary-Order Discontinuous Galerkin Discretization for S_N Transport Using Polygonal Bernstein-Bezier Functions	Michael W. HACKEMACK *(KAPL)*
1:45	High Order Mixed Finite Element Discretization for the Variable Eddington Factor Equations	Samuel OLIVIER *(Univ of California, Berkeley)*, Peter MAGINOT *(LANL)*, Terry Scot HAUT *(LLNL)*
2:10	Extension of the Discrete-Ordinates Transport Solver IDT to Regular Two-Dimensional Triangular Meshes	Giuseppe Francesco NALLO *(Politecnico di Torino-Italy)*, Emiliano MASIELLO *(CEA)*, Jean-Jacques LAUTARD *(CEA, Saclay)*, Piero RAVETTO *(Politecnico di Torino-Italy)*
2:35	Lumping the DFEM Sn Equations in X-Y Geometry	Peter G. MAGINOT *(LANL)*
3:00	**Break**	
3:30	The Quasidiffusion Method for Transport Problems on Adaptive-Like Arbitrary Quadrilateral Meshes in 2D R-Z Geometry	Jesse P. JONES, Dmitriy Y. ANISTRATOV *(NCSU)*, Jim E. MOREL *(Texas A&M University)*
3:55	Scalable Angular Adaptivity and Robust Error Metrics	Steven DARGAVILLE *(Imperial College London)*, R.P. SMEDLEY-STEVENSON *(AWE)*, Paul Nicholas SMITH *(Wood PLC)*, C.C. PAIN *(Imperial College London)*, A.G. BUCHAN *(Queen Mary University)*
4:20	Solving the SN Transport Equation Using High Order Lax-Friedrichs Weno Fast Sweeping Methods	Dean WANG, Tseelmaa BYAMBAAKHUU *(Ohio State)*, Sebastian SCHUNERT *(INL)*, Zeyun WU *(Virgina Commonwealth University)*

Monte Carlo Variance Reduction and Hybrid Methods
Salon H
Brian C. Franke, *Sandia National Laboratories*
Taro Ueki, *Japan Atomic Energy Commission*

1:20	Batched Monte Carlo and the Confidence Interval	Jason D. HAVERKAMP *(KAPL)*
1:45	Global Variance Reduction Scheme with Self-Adaptive Weight-Window Mesh in the Serpent 2 Monte Carlo Code	Jaakko LEPPÄNEN, Mika JOKIPII *(VTT Technical Research Centre of Finland, Ltd.)*
2:10	Development of A New Weight Window Generator Based on Markov Decision Process	Peng ZHANG, Hyunsuk LEE, Mai NGUYEN Trong NHAN, Matthieu LEMAIRE, Deokjung LEE *(UNIST)*
2:35	On the Use of Different Variance Reduction Techniques Within MCNP to Calculate the Flux on the Concrete Walls of a Pressurized Water Reactor	Mariya BROVCHENKO, Lea TILLARD *(IRSN)*, Kenneth BURN *(ENEA)*, Bertrand COCHET *(IRSN)*, Alexis JINAPHANH *(CEA, Saclay)*
3:00	**Break**	
3:30	Real Variance Estimation of Local Tallies using Spectral Analysis Method in p-CMFD assisted Monte Carlo Criticality Calculation	Hyeon Tae KIM *(KAIST)*, Yu Gwon JO *(KHNP-CRI)*, Yong Hee KIM *(KAIST)*
3:55	Variance-reduction Methods for Monte Carlo Kinetic Simulations	Margaux FAUCHER *(CEA)*, Davide MANCUSI, Andrea ZOIA *(CEA, Saclay)*
4:20	Calculating the covariance matrix of a neutron spectrum in the High Flux Reactor	Nicola ASQUITH, Steven C. VAN der MARCK *(Nuclear Research & Consultancy Group)*

Radiative Transfer and Radiation-Hydrodynamic Simulations and Methods
Salon C
Alex R. Long, *Los Alamos National Laboratory*
Richard Smedley-Stevenson, *AWE Plc*

1:20	A Fully Monte Carlo Solution of the Thermal Radiative Transfer Equations with Compton Scattering	Simon R. BOLDING, Alex R. LONG *(LANL)*, Kyle BEYER *(Univ of Michigan)*, Kendra P. KEADY *(LANL)*
1:45	Non-Equlibrium Radiative Transfer Solutions using a Two-Group Diffusion Model	Ryan G. McCLARREN *(Univ of Notre Dame)*
2:10	Towards Asymptotic Diffusion Limit Preserving High-Order, Low-Order Method	Hyeong Kae PARK *(LANL)*
2:35	Multilevel Methods with Multigrid in Energy for Thermal Radiative Transfer Problems	Dmitriy Y. ANISTRATOV *(NCSU)*
3:00	**Break**	
3:30	A Reduced-Order Model for Thermal Radiative Transfer Problems Based on Multilevel Quasidiffusion Method	Joseph M. COALE, Dmitriy Y. ANISTRATOV *(NCSU)*
3:55	Linear-Multifrequency-Grey Acceleration for Thermal Radiation Transport in the Presence of Compton Scattering	Andrew T. TILL *(LANL)*, Jim E. MOREL *(Texas A&M University)*

Transport Theory I
Salon D
Jeffery D. Densmore, *Naval Nuclear Laboratory*
Richard Sanchez, *Commissariat à l'Energie Atomique*

1:20	Continuous Energy Monte Carlo Criticality Calculation of Random Media under Power Law Spectrum	Taro UEKI *(JAEA–Japan)*
1:45	Detailed Analysis of the Asymptotic Convergence of the Angular Discretization Errror in the Uncollided Solution to the Discrete Ordinates Transport Equation	Xiaoyu HU, Yousry Y. AZMY *(NCSU)*
2:10	Deterministic Transport Solution of Multiplicity Counting Equations	Philippe HUMBERT *(CEA)*
2:35	Photonuclear Reactions in Serpent 2 Monte Carlo Code	Toni KALTIAISENAHO *(VTT Technical Research Centre of Finland Ltd)*
3:00	**Break**	
3:30	PyNE Sub-Voxel R2S for Shutdown Dose Rate Analysis	Xiaokang ZHANG *(Chinese Academy of Sciences)*, Patrick C. SHRIWISE *(Univ of Wisconsin, Madison)*, Songlin LIU *(Chinese Academy of Sciences)*, Paul P.H. WILSON *(Univ of Wisconsin, Madison)*
3:55	Photon Polarization and Doppler Broadening in Low Energy Monte Carlo Transport	Edmund CARO *(KAPL)*
4:20	A Stochastic Theory of Deposited Fission Energy in Neutron Chains	Anil K. PRINJA, Patrick F. O'ROURKE *(Univ of New Mexico)*

Advances in Reactor Analyses Methods I
Portland Room
Yaqi Wang, *Idaho National Laboratory*
Emil Fridman, *Helmholtz-Zentrum Dresden-Rossendorf*

1:20	Design of a Deep Learning Surrogate Model for Prediction of FHR Design Parameters	Andy WHYTE, Zhiyao XING, Eugene SHWAGERAUS Geoffrey Thomas PARKS *(University of Cambridge)*
1:45	A Study of the Bethe and Placzek Approximations	Guilherme GUEDES de ALMEIDA *(Centro Federal de Educação Tecnológica Celso Suckow da Fonseca)*, Daniel Artur PINHEIRO PALMA *(Brazilian Nuclear Energy Commission)*, Amir ZACARIAS MESQUITA *(Centro de Desenvolvimento de Energia Nuclear)*, Alessandro da CRUZ GONÇALVES *(Programa de Engenharia Nuclear - PEN/C)*
2:10	Development of a Spatially-Dependent Resonance Self-Shielding Method in CASMO5	Rodolfo M. FERRER, Joshua HYKES *(Studsvik Scandpower)*
2:35	The New Neutron Noise Solver of the Monte Carlo Code TRIPOLI-4	Amélie ROUCHON, Walid JARRAH, Andrea ZOIA *(CEA, Saclay)*
3:00	**Break**	
3:30	Fuel Cycle Performance of Fast Spectrum Molten Salt Reactor Designs	Andrei Rykhlevskii *(Univ of Illinois)*, Benjamin R. BETZLER, Andrew WORRALL *(ORNL)*, Kathryn D. HUFF *(Univ of Illinois)*
3:55	Hierarchical CMFD Preconditioning in Space and Energy	Michael W. HACKEMACK, Troy L. BECKER *(KAPL)*
4:20	Spatial Discretization Error Reduction in Axial MOC Solver of Three-Dimensional Heterogeneous Transport Calculation Code GALAXY-Z	Koichi IEYAMA, Kazuya YAMAJI, Hiroki KOIKE, Daisuke SATO *(Mitsubishi Heavy Industries Ltd.)*

Novel Approaches for Single and Multiphase Fluid Dynamics
Eugene Room
Emily R. Shemon, *Argonne National Laboratory*
Una Davies, *(University of Cambridge)*

1:20	Fully-Implicit, High-Order, Reconstructed Discontinuous Galerkin Method for Supercritical Fluid Flows	Rebecca BARNEY *(University of California Davis)*, Robert NOURGALIEV *(LLNL)*, Jean-Pierre DELPLANQUE *(UC Davis)*, Rose McCALLEN *(LLNL)*
1:45	Nonlinear Eddy Viscosity Models for the Turbulence Phenomena in Molten Salt Reactors	Mauricio Tano RETAMALES, Pablo R. RUBIOLO *(Grenoble Institute of Technology)*, Jean C. RAGUSA *(Texas A&M University)*
2:10	Multiscale Core Thermal-Hydraulics Analysis of the Pebble Bed Fluoride-Salt-Cooled High-Temperature Reactor	April J. NOVAK, Rachel N. SLAYBAUGH *(Univ of California, Berkeley)*, Richard C. MARTINEAU *(INL)*
2:35	Steady-State Thermal-Hydraulic Analysis of Fluoride Salt-Cooled Small Modular Advanced High-Temperature Reactor (SmAHTR)	Sriram CHANDRASEKARAN, Srinivas GARIMELLA *(Georgia Tech)*
3:00	**Break**	
3:30	Demonstration of a Coupled Simulation for Modelling Primary Pump Coastdown Transient for MSRE	Qi CHEN, Krishna PODILA, Yanfei RAO, Xianmin HUANG, Peter PFEIFFER *(Canadian Nuclear Laboratories)*
3:55	Direct Numerical Simulations of Turbulence in Molten Salts Coolants	Mauricio Tano RETAMALES Pablo R. RUBIOLO *(Grenoble Institute of Technology)*, Jean C. RAGUSA *(Texas A&M University)*

Monday 5:00-7:00 PM

Poster Session
Salons A and B

Todd S. Palmer, *Oregon State University*
Jean C. Ragusa, *Texas A&M University*

Assessing the Performance of Functional Expansion Tallies in the Serpent 2 Monte Carlo Code	Heikki MATTI, Eemeli SUIKKANEN, Ville RINTALA *(LUT University)*
Neutron Noise Simulations in a Heterogeneous System: A Comparison Between a Diffusion-Based and a Discrete Ordinates Solver	Antonios MYLONAKIS, Huaiqian YI, Paolo VINAI, Christophe DEMAZIERE *(Chalmers Univ of Techn)*
Highly Uniform Quadrature Sets for the Discrete Ordinates Method	Thomas CAMMINADY, Martin FRANK, Jonas KUSCH *(KIT)*
Ray-Effect Mitigation for the Discrete Ordinates Method Using Artificial Scattering	Thomas CAMMINADY, Martin FRANK *(KIT)*, Cory D. HAUCK *(ORNL)*, Jonas KUSCH *(KIT)*
Three-dimensional core shielding benchmark using AETIUS and DORT codes	Jong Woon KIM, Jae Hoon SONG, Seongho SONG, Jin Young CHO *(KAERI–Korea)*
Improving the Performance of Transport Sweeps with Thermal Upscattering Acceleration at Massively Parallel Scale	Milan HANUS, Jean C. RAGUSA *(Texas A&M University)*
APR-1400 Whole-core Depletion Analysis with MCS	Tung D.C. NGUYEN, Hyunsuk LEE, Jiwon CHOE, Matthieu LEMAIRE, Deokjung LEE *(UNIST)*
MONK11A: Status and Plans for the MONK Monte Carlo Code for Criticality Safety and Reactor Physics Analyses	Simon RICHARDS, Geoff DOBSON, David HANLON, Ray PERRY, Francesco TANTILLO, Tim WARE *(Wood)*
Pre-Collapsed Fluorescence Methodology for Monte Carlo Radiation Transport Simulations	Jason T. THOMPSON, David P. GRIESHEIMER, Edmund CARO *(NNL)*
Preliminary CEFR analysis by Monte Carlo codes	Tuan Quoc TRAN, Hyunsuk LEE, Jiwon CHOE, Alexey CHEREZOV, Xianan DU, Deokjung LEE *(UNIST)*
The Use of MCNP 6.2 KCODE for High Fidelity, Near Critical Benchmarks	Daniel H. TIMMONS *(Univ of New Mexico)*, Michael E. RISING *(LANL)*, Chrisopher M. PERFETTI *(Univ of New Mexico)*
Solver Recommendation for Transport Problems in Slabs Using Machine Learning	Jinzhao CHEN, Japan PATEL, Richard VASQUES *(Ohio State)*
A Case Study on the Use of Adjoint Particle Transport in Computationally Intensive Regions of a Transport Problem Conducted on a Passive Gamma Emission Tomography Geometry	Dylan HOAGLAND *(NCSU)*, Richard S. WITTMAN, Erin A. MILLER *(PNNL)*
DRF Methodology for Reactor Pressure Vessel Dosimetry	Meng-Jen WANG, Alireza HAGHIGHAT *(Virginia Tech)*

A New Implicit Monte Carlo Thermal Photon Transport Capability Developed Using Shared Monte Carlo Infrastructure	Patrick S. BRANTLEY, N. A. GENTILE, M. A. LAMBERT, M. S. MCKINLEY, M. J. O'BRIEN, J. A. WALSH *(LLNL)*
Application of the SuPer-Homogenization Method in Fast Reactor Analysis System SARAX	Linfang WEI, Youqi ZHENG, Bowen XIAO, Longfei XU, Hongchun WU *(Xi'an Jiaotong University)*
Validation of Coupled Neutron-Photon Transport Mode of Monte Carlo Code MCS	Matthieu LEMAIRE, Fathurrahman SETIAWAN, Hyunsuk LEE, Peng ZHANG, Deokjung LEE *(UNIST)*
Self-Shielding in PARTISN	Thomas G. SALLER *(LANL)*
Polaris-CASMO Verification with Burn-Up Dependence and Nemtab Library Generation with Uncertainties	Antonella LABARILE, Rafael MIRÓ HERRERO, Gumersindo VERDÚ MARTÍN *(Universitat Politècnica de València)*
Development of Generalized Response Sensitivity Analysis Capability in RMC Code	Guanlin SHI, Conglong JIA, Quan CHENG, Kan WANG *(Tsinghua University)*
Sensitivity and Uncertainty Analysis Capability in MCS for UAM Benchmark	Yunki JO, Chidong KONG, Alexey CHEREZOV, Deokjung LEE *(UNIST)*
A Comparison Between Time Domain and Frequency Domain Calculations of Stationary Neutron Fluctuations	Marco Viebach, Carsten Lange *(TU Dresden)*, Soeren KLIEM *(Helmholtz-Zentrum Dresden - Rossendorf)*, Christophe DEMAZIERE *(Chalmers Univ of Techn)*, Ulrich ROHDE *(HZDR-Innovation Rossendorf)*, Dieter HENNIG *(TU DResden)*, Antonio HURTADO *(Institute of Power Engineering)*
STRIGA: A Computer Tool for TRIGA Reactor Burnup Calculations	Anže PUNGERČIČ, Dušan ČALIČ, Luka SNOJ *(Jozef Stefan Institute)*
SERPENT-TOOLS: A Python Package for Expediting Analysis with Serpent Data	Andrew JOHNSON, Dan KOTLYAR *(Georgia Tech)*
Gamma Scan Validation of the ARTEMIS BWR Models	Nicolas P. MARTIN *(Framatome Inc.)*, Michael RIEDMANN *(Framatome GmbH)*, Alexander BENNETT *(Framatome Inc.)*
Calculation of DPA in the Main Components of a LBE-Cooled Fast Reactor *(BLESS-D)*	Eing Yee YEOH, Xiaosong CHEN, Linsen LI *(State Power Investment Corporation Research Institute)*
Verification of Asymmetric Fuel Assembly Treatment in STREAM/RAST-K 2.0	Jiwon CHOE, Sooyoung CHOI, Jinsu PARK, Hyunsuk LEE, Matthieu LEMAIRE, Ho Cheol SHIN *(UNIST)*, Hwan-Soo LEE *(KHNP Central Research Institute)*, Deokjung LEE *(UNIST)*
Overview of the Activities of the OECD Nuclear Energy Agency Data Bank Computer Program Services	Alice DUFRESNE, Elena POPLAVSKAIA, Kenya SUYAMA *(OECD Nuclear Energy Agency)*
A Collaborative Virtual Reality System *(VRS)* with X3D Visualization For RAPID	Valerio MASCOLINO, Alireza HAGHIGHAT, Nicholas POLYS, Meng-Jen WANG, Srijith RAJAMOHAN *(Virginia Tech)*
Comparative study of deterministic neutron transport solver nTRACER and nodal reactor core simulator PARCS on the basis of the VVER core	Marianna PAPADIONYSIOU, Mathieu HURSIN, Alexander VASILIEV, Hakim FERROUKHI *(PSI)*, Andreas PAUTZ *(École polytechnique fédérale de Lausanne))*, Han Gyu JOO, Seongchan KIM*(Seoul Natl Univ–Korea)*

Energy-dependent Fission Yields in Advanced Reactors	Toni KUNCHEV, Eugene SHWAGERAUS *(University of Cambridge)*, Jaakko LEPPÄNEN *(VTT Technical Research Centre of Finland)*
Preliminary Results for OPR1000/APR1400 Whole-Core Analysis with Neutron Transport Code STREAM	Sooyoung CHOI, Deokjung LEE *(UNIST)*
Preliminary Results of BEAVRS Whole-Core Multi-Cycle Analysis with Neutron Transport Code STREAM	Sooyoung CHOI, Deokjung LEE *(UNIST)*
PARAGON2 Validation Using High Enriched Evaluated Criticality Benchmark Experiments	Austin CARTER *(Westinghouse)*, Mohamed OUISLOUMEN *(Westinghouse Electric Co. LLC)*
Implementation of Gamma Transport Capability in MPACT	Xinyan WANG, Yuxuan LIU, William R. MARTIN *(Univ of Michigan)*, Shane G. STIMPSON *(ORNL)*
Improved Source Treatment for the Three-Temperature Implicit Monte Carlo Equations	Mathew A. CLEVELAND, R. M. RAUENZAHN *(LANL)*
KRAKEN – an Upcoming Finnish Reactor Analysis Framework	Ville VALTAVIRTA, Ville HOVI, Henri LOUKUSA, Antti RINTALA, Ville SAHLBERG, Riku TUOMINEN, Jaakko LEPPÄNEN *(VTT Technical Research Centre of Finland Ltd)*
Validation of Nuclide Depletion Capabilities in Monte Carlo Code MCS using Spent Fuel Isotopic Measurements	Bamidele EBIWONJUMI, Hyunsuk LEE, Wonkyeong KIM, Sooyoung CHOI, Deokjung LEE *(UNIST)*
Westinghouse 2-Loop Plant Loading Pattern Optimization for Last Few Cycles Before Shutdown	Jaerim JANG, Jiwon CHOE, Sooyoung CHOI, Jinsu PARK, Matthieu LEMAIRE, Deokjung LEE *(UNIST)*, Ho Cheol SHIN *(Korea Hydro and Nuclear Power Central Research Institute)*

Advanced Discretization Techniques for Deterministic Transport II

Salon G

Madicken Munk, *University of Illinois Urbana Champaign*
Philippe Humbert, *Commissariat à l'Energie Atomique*

8:30	A Quadratic Programming Based Flux Fixup Method for Arbitrarily High-Order Discontinuous Galerkin Discretizations of the SN Transport Equations	Ben C. YEE *(Univ of Michigan)*, Terry S. HAUT, Vladmir Z. TOMOV *(LLNL)*, Peter G. MAGINOT *(LANL)*
8:55	Linear Short Characteristics Applied to 3D Heterogeneous Cartesian Cells for Transport-Based Core Simulations	Emiliano MASIELLO, Wesley FORD, Roland LENAIN *(CEA)*
9:20	Improved Quasi-Static Method for Multi-Scheme Neutron Transport with Finite Element Methods	Yaqi WANG *(INL)*, Vincent M. LABOURÉ, Sebastian SCHUNERT, Mark D. DeHART, Richard C. MARTINEAU *(INL)*
9:45	Reduced-Order Modeling of Neutron Transport Separated in Space and Angle via Proper Generalized Decomposition	Kurt Andrew DOMINESEY, Wei JI *(RPI)*
10:10	**Break**	
10:40	Uncollided-Flux Treatment in Arbitrary Polyhedral Grids	Milan HANUS, Logan HARBOUR, Jean C. RAGUSA, Marvin L. ADAMS, Michael P. ADAMS *(Texas A&M University)*
11:05	Fourier Analysis of Inexact Parallel Block Jacobi with Source Iteration Preconditioning and Computational Experimentation with Parallel Block Jacobi / Source Iteration Hybrid Methods	Dylan HOAGLAND, Yousry Y. AZMY *(NCSU)*
11:30	1D Transport Using Neural Nets, SN, and MC	Michael POZULP *(LLNL)*

Advanced Monte Carlo Methods I

Salon H

Forrest B. Brown, *Los Alamos National Laboratory*
Matthieu Lemaire, *Ulsan National Institute of Science and Technology*

8:30	Simplified Method for Estimating the Effective Delayed Neutron Fraction with Monte Carlo Correlated Sampling	David P. GRIESHEIMER, Nathan A. GIBSON *(NNL)*
8:55	Discrete Ordinates Prediction of the Forced-Collision Variance Reduction Technique in Slab Geometry	Brian C. KIEDROWSKI *(Univ of Michigan)*, Joel A. KULESZA, Clell J. SOLOMON *(LANL)*
9:20	Development of the Universe Based Geometry Criticality Search Capability in RMC	Zeguang LI, Minggang LANG, Jing ZHAO, Kan WANG *(DEP, Tsinghua Univerisyt)*, Lei SHI, Jun SUN *(Tsinghua University)*
9:45	Efficient Dynamic Threadsafe Neighbor Lists for Monte Carlo Ray Tracing	Sterling M. HARPER *(MIT)*, Paul K. ROMANO *(ANL)*, Benoit FORGET, Kord S. SMITH *(MIT)*
10:10	**Break**	
10:40	Hybrid Tallies to Improve Performance in Depletion Monte Carlo Simulations	Jose Luis Salcedo PEREZ, Kord S. SMITH, Benoit FORGET *(MIT)*, Paul K. ROMANO *(ANL)*
11:05	Analysis of Fission Source Stationarity for a 3-D SMR Core Using Functional Expansion Tallies	Shikhar KUMAR, Benoit FORGET, Kord S. SMITH *(MIT)*
11:30	Progress in the Validation of MCShield Code	Ruiyao MA *(Tsinghua Univ)*, Zhen WU *(Tsinghua University & Nuctech Company Limited)*, Li REN *(Nuctech Company Limited)*, Shenshen GAO, Rui QIU *(Tsinghua University,)*, Chunyan LI *(Tsinghua University & Nuctech Company Limited)*, Wei LU, Hui ZHANG, Junli LI *(Tsinghua University,)*

Nuclear Data Evaluation and Assimilation of Integral Experiments

Salon C

Michael E. Rising, *Los Alamos National Laboratory*
Tomohiro Endo, *Nagoya University*

8:30	Identifying Sources of Bias from Nuclear Data in MCNP6 Calculations Using Machine Learning Algorithms	Pavel GRECHANUK *(Oregon State Univ)*, Michael E. RISING *(LANL)*, Todd S. PALMER *(Oregon State Univ)*
8:55	An Exact Mathematical Multipole Representation of the Microscopic Cross-Sections for the Multi-Level Breit-Wigner and Reich-Moore Formalisms	Thomas Samuel FREIMAN, Mireille COSTE-DELCLAUX *(CEA)*, Francois-Xavier HUGOT *(CEA, Saclay)*
9:20	Interrogation and Analysis of Complex Fusion Decay Heat Benchmark Simulations	Mark GILBERT *(UKAEA)*, Jean-Christophe C. SUBLET *(IAEA–Austria)*
9:45	Expanded COG Criticality Validation Suite	Soon Sam KIM, David P. HEINRICHS *(LLNL)*
10:10	**Break**	
10:40	Determination of Extensive Set Dosimetric Reaction Rates for Testing of the Neutron Spectrum Unfolding Codes	Evzen LOSA, Michal KOŠŤÁL, Czakoj TOMAS, Filip BRIJAR, Vlastimil JUŘÍČEK, Vojtěch RYPAR *(Research Centre Rez)*
11:05	Data Fusion Techniques for Improving Fission Neutron Multiplicity Data	Benjamin WHEWELL, Ryan G. McCLARREN *(Univ of Notre Dame)*, Simon R. BOLDING *(LANL)*
11:30	A Resonance Calculation Method using Energy Expansion Bases Based on a Reduced Order Model	Akio YAMAMOTO, Tomohiro ENDO *(Nagoya Univ)*, Satoshi TAKEDA *(Osaka Univ)*, Hiroki KOIKE, Kazuya YAMAJI, Koichi IEYAMA, Daisuke SATO *(Mitsubishi Heavy Industries, Ltd.)*

Transport Theory II

Salon D

Anil K. Prinja, *University of New Mexico*
Steven Dargaville, *Imperial College London*

8:30	Stabilizing the k-Alpha Iteration Algorithm in Very Subcritical Regimes	Colin J. JOSEY, Forrest B. BROWN *(LANL)*
8:55	A low-rank method for time-dependent transport calculations	Zhuogang PENG, Ryan G. McCLARREN *(Univ of Notre Dame)*, Martin FRANK *(KIT)*
9:20	Stability Characteristics of Multilevel Deterministic k-Eigenvalue Simulations	Kendra P. KEADY *(LANL)*
9:45	Theoretical Convergence Rate Analysis of a Unified CMFD Formulation with Various Diffusion Coefficients	Brendan M. KOCHUNAS *(Univ of Michigan)*
10:10	**Break**	
10:40	Accuracy of the Reactor Core Simulations for Determination of the Antineutrino Spectrum for the SoLid Experiment at BR2 Reactor	Silva KALCHEVA, Geert VAN den BRANDEN *(SCK/CEN)*
11:05	Towards a Multiphysics Model for Tumor Response to Combined Hyperthermia-Radiotherapy Treatment	Japan PATEL, Richard VASQUES *(Ohio State)*, Barry D. GANAPOL *(Univ of Arizona)*
11:30	Neutron Kinetics Equations in APOLLO3® Code For Application to Noise Problems	Andrea GAMMICCHIA, Simone SANTANDREA, Igor ZMIJAREVIC, Zarko STANKOVSKI *(CEA Paris Saclay)*, Sandra DULLA *(Politecnico di Torino-Italy)*

Advances in Reactor Analyses Methods II
Portland Room
Gregory G. Davidson, *Oak Ridge National Laboratory*
Piero Ravetto, *Politecnico di Torino*

8:30	Improved Formulation of the Method of Characteristics with Linear Source for 2D/1D and Multiphysics Calculations	Andrew P. FITZGERALD, Brendan M. KOCHUNAS, Thomas J. DOWNAR *(Univ of Michigan)*
8:55	Verification of Adjoint Functions of Natural Mode Equation by Generalized Iterated Fission Probability Method and by Analog Monte Carlo	Yasushi NAUCHI *(Central Research Inst of Elec Pwr Industry)*, Alexis JINAPHANH, Andrea ZOIA *(CEA, Saclay)*
9:20	Prediction of Spatial Flux Through Depletion	Andrew JOHNSON, Dan KOTLYAR *(Georgia Tech)*
9:45	Assessment of the Neutron Noise Induced by Stationary Fuel Assembly Vibrations in a Light Water Reactor	Vasudha VERMA *(CEA, Cadarache)*, Christophe DEMAZIERE, Paolo VINAI *(Chalmers Univ of Techn)*, Robert P. JACQMIN, Guillaume RICCIARDI *(CEA)*
10:10	**Break**	
10:40	Analysis of Alpha Modes in Multigroup Transport	Richard SANCHEZ *(CEA)*, Daniele TOMATIS *(CEA, Saclay)*
11:05	Development of Simplified Methods for Ex-core Detector Response in MPACT	Yuxuan LIU *(Univ of Michigan)*
11:30	Stability diagnosis of high-fidelity transport-depletion problems with Monte Carlo perturbation theory	Paul COSGROVE, Eugene SHWAGERAUS, Geoff Thomas PARKS *(University of Cambridge)*

Whole Core Modeling and Simulation I
Eugene Room
Benjamin S. Collins, *Oak Ridge National Laboratory*
Koichi Ieyama, *Mitsubishi Heavy Industries, Ltd.*

8:30	MCNP and CFD Modeling of a Sodium Fast Reactor Sub-Assembly Channel to Capture Localized Temperature Peaking	Abdalla ABOU-JAOUDE, Su-Jong YOON, Samuel E. BAYS *(INL)*
8:55	Neutronic Simulation of Fuel Assembly Vibrations in a Nuclear Reactor	Antoni VIDAL-FERRÀNDIZ, Amanda CARREÑO, Damian Ginestar *(Universitat Politècnica de València)*, Christophe DEMAZIERE *(Chalmers Univ of Techn)*, Gumersindo J. VERDU *(Universitat Politècnica de València)*
9:20	Validation of an Advanced APOLLO3® Deterministic Scheme for Characterizing of the Jules Horowitz Irradiation Reactor Core	Matthieu LEBRETON, Julien POLITELLO, Gerald RIMPAULT *(CEA, Cadarache)*, Jean-François VIDAL *(CEA)*
9:45	Whole-core Validation of the Superphénix Reactor Using WIMS11 and an Investigation Into a Hybrid RZ-HEX SP3 Calculation Route	Una DAVIES *(University of Cambridge)*, Ben LINDLEY, Brendan TOLLIT *(Wood)*, Eugene SHWAGERAUS *(University of Cambridge)*
10:10	**Break**	
10:40	Two-Level Multigrid Preconditioning of a Neutron Noise Diffusion Solver	Antonios MYLONAKIS, Paolo VINAI, Christophe DEMAZIERE *(Chalmers Univ of Techn)*
11:05	Upgrade of APOLLO3® Inner Thermohydraulic Feedback Model with THEDI, and Application to a Control-Rod Ejection Accident	Cyril PATRICOT, Roland LENAIN, Dominic CARON *(CEA)*
11:30	Serpent-based Few-Group Cross Section Data for NESTLE-C	Dumitru SERGHIUTA *(Canadian Nucl Safety Comm)*, Alexandre TROTTIER *(Canadian Nuclear Laboratory)*

Advanced Discretization Techniques for Deterministic Transport III

Salon G

Jean Ragusa *Texas A&M University*
Liangzhi Cao *Xi'an Jiaotong University*

1:20	Comparison of Meshless and High-Order Polynomial Functions for Neutron Transport with Streamline-Upwind Petrov-Galerkin Stabilization	Brody BASSETT *(LLNL)*, Brian C. KIEDROWSKI *(Univ of Michigan)*
1:45	Estimation of Energy Multigroup Neutron Source Distribution for Driving a Subcritical System at a Prescribed Power Density Level	Leonardo R. C. MORAES, Hermes ALVES FILHO, Ricardo C. BARROS *(Universidade do Estado do Rio de Janiero)*
2:10	Nodal Integral Method for Arbitrary Hexahedral Elements Applied to 3D Convection-Diffusion Equation	Ibrahim JARRAH, Rizwan UDDIN *(Univ of Illinois)*
2:35	Rigorous Derivation for P2 Anisotropic Scattering Source for Hexagonal Core Analysis	Jin Young CHO, Kyunghoon LEE *(KAERI–Korea)*
3:00	**Break**	
3:30	Spatial Domain Decomposition for Transport Problems with Two-Level Acceleration Algorithms	Dmitriy Y. ANISTRATOV *(NCSU)*, James S. WARSA, Robert B. LOWRIE *(LANL)*
3:55	Separated Representation of Spatial Dimensions in SN Neutron Transport using the Proper Generalized Decomposition	Zachary M. PRINCE, Jean C. RAGUSA *(Texas A&M University)*
4:20	Sweep-Free Deterministic Transport	Richard P. SMEDLEY-STEVENSON *(AWE Plc)*

Advanced Monte Carlo Methods II
Salon H
Thomas M. Evans, *Oak Ridge National Laboratory*
Hyunsuk Lee, *Ulsan National Institute of Science and Technology*

1:20	Automated Acceleration and Convergence Testing for Monte Carlo Criticality Calculations	Forrest B. BROWN, Colin J. JOSEY *(LANL)*, Shawn J. HENDERSON *(SNL)*, William R. MARTIN *(Univ of Michigan)*
1:45	Geometry and Performance Improvement of P++ Single Event Proton Scattering Algorithms on GPUs	Kristofer ZIEB *(LLNL)*, X. George XU *(RPI)*
2:10	Experimental and Computational Benchmarking of RAPID Using The JSI TRIGA Mark-Ii Reactor	Valerio MASCOLINO *(Virginia Tech)*, Anže PUNGERČIČ *(Jozef Stefan Inst)*, Alireza HAGHIGHAT *(Virginia Tech)*, Luka SNOJ *(Jozef Stefan Inst)*
2:35	Validation of the Transient Fission Matrix Code TRAPID Against the FLATTOP-Pu Benchmark	Valerio MASCOLINO, Alireza HAGHIGHAT *(Virginia Tech)*
3:00	**Break**	
3:30	Study of the Interaction of Regions with Multi-Group and Continuous Energy Representation in Monte Carlo Calculations	Mikolaj Adam KOWALSKI, Eugene SHWAGERAUS *(University of Cambridge)*
3:55	Fission Matrix Methods for Nuclear Thermal Propulsion Applications	Adam J. RAU, William J. WALTERS *(Penn State)*
4:20	Alpha-weighted Transition Rate Matrix Method	Ilham VARIANSYAH *(Univ of Michigan)*, Benjamin R. BETZLER *(ORNL)*, William R. MARTIN *(Univ of Michigan)*

Deterministic and Stochastic Methods for Sensitivity Analysis I
Salon C
Paolo Balestra, *Idaho National Laboratory*
Sandra Dulla, *Politecnico di Torino*

1:20	Shapley and Johnson Values for Sensitivity Analysis of PWR Power Distribution in Fast Fluence Calculation	Laura CLOUVEL, Pietro MOSCA, Jean-Marc MARTINEZ, Gregory DELIPEI *(CEA)*
1:45	Perturbation and Sensitivity of the Time Eigenvalue by a Generalized Iterated Fission Probability method	Alexis Jinaphanh, Andrea Zoia *(CEA, Saclay)*
2:10	Computing Adjoint-Weighted Tallies with TRIPOLI-4 using the Wielandt Method	Alexis JINAPHANH, Andrea ZOIA *(CEA, Saclay)*
2:35	Uncertainty Quantification on Feedback and Safety Parameters of Lead-Cooled Fast Reactors	Ishita TRIVEDI, Jason HOU *(NCSU)*, Giacomo GRASSO *(ENEA)*, Kostadin N. IVANOV *(NCSU)*
3:00	**Break**	
3:30	Implementation of Random Sampling for ACE-format Cross Sections Using FRENDY and Application to Uncertainty Reduction	Ryoichi KONDO, Tomohiro ENDO, Akio YAMAMOTO *(Nagoya Univ)*, Kenichi TADA *(JAEA)*
3:55	Uncertainty In The DPA Of A B&B Core Due to Uncertainty in the Neutron Spectrum	Chris KECKLER, Massimiliano FRATONI, Ehud GREENSPAN *(Univ of California, Berkeley)*
4:20	Higher Order Accurate k-eigenvalue Sensitivity Estimation Using the Complex-step Derivative Method	Zeyun WU *(Virginia Commonwealth University)*, James C. NEWMAN *(University of Tennessee Chattanooga)*, Arthur C. TAYLOR *(Old Dominion University,)*

Multiphysics Coupling Methods and Approaches I

Salon D

Nicholas A. Gentile, *Lawrence Livermore National Laboratory*
Deokjung Lee, *Ulsan National Institute of Science and Technology*

1:20	Simulation of BEAVRS Cycle 2 with MCS Based Multi-phyisics Coupling Code	Jiankai YU *(MIT)*, Hyunsuk LEE, Alexey CHEREZOV, Hanjoo KIM, Peng ZHANG *(UNIST)*, Benoit FORGET *(MIT)*, Deokjung LEE *(UNIST)*
1:45	Integration of the MONK Monte Carlo Neutronics Code in the NURESIM Platform	Francesco TANTILLO, Simon RICHARDS, Andy SMETHURST, David LONG *(Wood)*
2:10	Investigations into High-Fidelity Coupled Neutronics and Thermal-Hydraulics Using MC21 and CFX	Kyle E. REMLEY, David P. GRIESHEIMER, Kevin J. HOGAN, John R. BUCHANAN *(NNL)*
2:35	High Fidelity Multiphysics Strategies with PROTEUS and NEK5000 for Fast Reactor Applications	Emily R. SHEMON, Yiqi YU, Taek Kyum KIM *(ANL)*
3:00	**Break**	
3:30	Development of an Object-oriented Serpent2-SUBCHANFLOW Coupling and Verification with Problem 6 of the VERA Core Physics Benchmark	Manuel GARCIA, Diego FERRARO *(KIT)*, Ville VALTAVIRTA *(VTT Technical Research Centre of Finland, LTD)*, Uwe IMKE *(KIT)*, Riku TUOMINEN *(VTT Technical Research Centre of Finland, LTD)*, Victor Hugo SANCHEZ-ESPINOZA, Luigi MERCATALI *(KIT)*
3:55	Detailed Modelling of the Expansion Reactivity Feedback in Fast Reactors Using OpenFOAM	Carlo FIORINA *(EPFL)*, Stefan RADMAN, Muhammed-Zahid KOC *(École polytechnique fédérale de Lausanne)*, Andreas PAUTZ *(PSI)*
4:20	3-D Coupled PARCS/ATHLET Transient Simulation of SFR Using Detailed Expansion Modeling	Jeremy BOUSQUET, Armin SEUBERT, Romain HENRY *(GRS gGmbH)*

Advances in Reactor Analyses Methods III

Portland Room

Kang Seog Kim, *Oak Ridge National Laboratory*
Igor Zmijarevic, *Commissariat à l'Energie Atomique*

1:20	Kinetics Parameter Estimation for Initially Subcritical Systems in the Monte Carlo Fixed Source Calculations	Hyung Jin SHIM, Donghun KIM *(Seoul Natl Univ–Korea)*
1:45	Application of Various SPH Methods for Method of Characteristics	Kento SAWADA, Tomohiro ENDO, Akio YAMAMOTO *(Nagoya Univ)*
2:10	Modal Analysis of 3D Full-Core Inhomogeneous Adjoint Nodal Equations and Associated Iterative Solution Processes	Rene VAN GEEMERT *(Framatome Inc.)*
2:35	Impact of Control Rod History on Physics Parameters in a Soluble-Boron-Free Small-Sized Pressurized Water Reactor	Maxime GUYOT, Vincent GAUTIER-OTTOU *(CEA Cadarache)*
3:00	**Break**	
3:30	Performance Analysis of Zernike-based FETs on a 2D PWR Pin Cell	Zhuoran HAN, Benoit FORGET, Kord S. SMITH *(MIT)*
3:55	Transient Fission Matrix Analysis of Rod Drop Experiments in Coupled Cores for Addressing High Dominance Ratio Configurations	Kornilios ROUTSONIS, Patrick BLAISE, Jean TOMMASI, Giorgio VALOCCHI *(CEA, Cadarache)*
4:20	2D Core Calculation Based on the Method Of Dynamic Homogenization	Antonio GALIA, Igor ZMIJAREVIC, Richard SANCHEZ *(CEA)*

Whole Core Modeling and Simulation II
Eugene Room
Benoit Forget, *Massachusetts Institute of Technolgy*
Jeremy Bousquet, *Gesellschaft für Anlagen- und Reaktorsicherheit*

1:20	On the Prompt Eigenvalue Reconstruction from Subcritical Experiments: an Application to KUCA reactor	Nicholas CHENTRE *(Istituto Nazionale di Fisica Nucleare, Sezione Di Genova)*, Paolo SARACCO *(National Institute for Nuclear Physics)*, Sandra DULLA, Piero RAVETTO *(Politecnico di Torino-Italy)*
1:45	Burnup Adaptation Model in STREAM/RASTK Code System	Peng ZHANG *(UNIST)*, Jiwon CHOE, Sooyoung CHOI, Deokjung LEE *(UNIST)*
2:10	Application of the Coordinate Transformation in Nodal Diffusion Calculations of Radially Expanding SFR Cores	Evgeny NIKITIN, Emil FRIDMAN *(Helmholtz-Zentrum Dresden-Rossendorf)*
2:35	Application of the SuperHomogenization Method in the STREAM/RASTK Code System for Pin-By-Pin Core Analysis	Peng ZHANG, Jinsu PARK, Jiwon CHOE, Sooyoung CHOI, Deokjung LEE *(UNIST)*
3:00	**Break**	
3:30	EPR Fuel Cycle Depletion with Pin-By-Pin Code TORTIN and Nodal Code SIMULATE5	Petra MALA, Andreas PAUTZ, Hakim FERROUKHI *(PSI)*
3:55	Coupled Deterministic and Monte Carlo Neutronics for Vessel Fluence Calculations	Shane HENDERSON *(NCSU)*, Tara M. PANDYA, Shane G. STIMPSON, Benjamin S. COLLINS *(ORNL)*
4:20	Verification and Validation of McCARD code for VHTR Application	Sung Hoon CHOI, Chang Keun JO, Tae Young HAN *(KAERI)*

Advanced Solution Techniques for Deterministic Transport
Salon G
Dmitriy Y. Anistratov, *North Carolina State University*
Han Gyu Joo, *Seoul National University*

8:30	Application of Preconditioned Conjugate Gradient Method to Fine Mesh Rebalance for Accelerating DSA Equation on Tetrahedral Meshes	Muhammad HABIB, Ser Gi HONG *(Kyung Hee University)*
8:55	A Modified Least-Squares Finite Element Method for Solving the Boltzmann Transport Equation	Liangzhi CAO, Chao FANG, Hongchun WU *(Xi'an Jiaotong University)*
9:20	Acceleration of Source Iteration using the Dynamic Mode Decomposition	Ryan G. McCLARREN *(Univ of Notre Dame)*, Terry HAUT *(LLNL)*
9:45	3D Whole-Core Adjoint Neutron Flux Calculation using 2D/1D Method via Multi-Level CMFD Acceleration	Chen HAO, Kaijie ZHU, Le KANG, Ji MA *(Harbin Engineering Univ)*, Yunlin XU *(Purdue Univ)*
10:10	**Break**	
10:40	Nonlinear Elimination Applied to Radiation Transport	Thomas A. BRUNNER, Paul F. NOWAK *(LLNL)*
11:05	SDA: A Semilinear CMFD-Like Transport Acceleration Scheme Without D-Hat	Zackary Glen DODSON, Nickolas J. ADAMOWICZ, Brendan M. KOCHUNAS, Edward W. LARSEN *(Univ of Michigan)*
11:30	Performance Analysis of The Spatially Variant Rebalancing Method for Discrete-Ordinates Transport Equation	Wesley James FORD *(CEA)*, Emiliano MASIELLO, Christophe CALVIN *(CEA, Saclay)*, Bruno LATHUILIERE, François FEVOTTE *(EdF)*

Monte Carlo Simulation with Thermal Feedback
Salon H
David P. Griesheimer, *Naval Nuclear Laboratory*
Jaakko Leppänen, *VTT Technical Research Centre of Finland*

8:30	Serpent And TRIPOLI4® Transient Calculations Comparisons for Several Reactivity Insertion Scenarios in a 3D PWR Minicore Benchmark	Diego FERRARO *(KIT)*, Margaux FAUCHER, Davide MANCUSI, Andrea ZOIA *(CEA)*, Ville VALTAVIRTA, Jaakko LEPPÄNEN *(VTT - Finland)*, Victor Hugo SANCHEZ-ESPINOZA *(KIT - Germany)*
8:55	A Fully Analytic Coupled Thermal-Neutronics Benchmark and its Application to Monte Carlo Simulation	Kyle E. REMLEY, David P. GRIESHEIMER *(NNL)*
9:20	BWR Spacer Grid Modeling Using Serpent 2 / STAR-CCM+ Coupling	Alexander S. BENNETT *(Framatome Inc.)*, George BACHE *(Framatome)*, Nicolas P. MARTIN *(AREVA NP Inc)*, Jaron P. SENECAL *(Framatome Inc.)*
9:45	Development Of Monte Carlo Multi-Physics Code MCS For Power Reactor Analysis at UNIST	Hyunsuk LEE, Wonkyeong KIM, Peng ZHANG, Azamat KHASSENOV, Yunki JO, Jinsu PARK *(UNIST)*, Jiankai YU *(Tsinghua Univ)*, Matthieu LEMAIRE, Deokjung LEE *(UNIST)*
10:10	**Break**	
10:40	Variance Overestimation in Monte Carlo Multi-Physics Simulation	Hyunsuk LEE, Peng ZHANG, Deokjung LEE *(UNIST)*
11:05	Single-Batch Monte Carlo Multiphysics Coupling	Miriam A. KREHER, Benoit FORGET, Kord S. SMITH *(MIT)*
11:30	The Application of High-Fidelity Reactor Simulation on Cobalt-59 Activiation Calculation	Dunfu SHI *(CAEP-SCNS)*

Deterministic and Stochastic Methods for Sensitivity Analysis II

Salon C

Zeyun Wu, *Virginia Commonwealth University*
Hyung Jin Shim, *Seoul National University*

8:30	Data Assimilation Using Subcritical Measurement of Prompt Neutron Decay Constant	Tomohiro ENDO, Akio YAMAMOTO *(Nagoya Univ)*
8:55	Calculation Method of Estimated Criticality Lower-Limit Multiplication Factor Using the Bootstrap Method	Takuto HAYASHI, Tomohiro ENDO, Akio YAMAMOTO *(Nagoya Univ)*
9:20	Small Sample Reactivity Worths Calculation: Exact Perturbation Theory and Monte Carlo Transport	Guillaume TRUCHET, Pierre LECONTE *(CEA, Cadarache)*
9:45	Eigenvalue Sensitivity in Monte Carlo Simulations to Nuclear Data Parameters using the Multipole Formalism	Abdulla ALHAJRI, Benoit FORGET *(MIT)*
10:10	**Break**	
10:40	Monte Carlo Estimates of Alpha-Eigenvalue Sensitivities via Differential Operator Sampling	Timothy P. BURKE, Colin J. JOSEY *(LANL)*, Brian C. KIEDROWSKI *(Univ of Michigan)*
11:05	Intrusive Uncertainty Quantification for Applications in Fluid Dynamics	Jonas KUSCH, Jannick WOLTERS, Martin FRANK *(KIT)*
11:30	Application of Markov Chain Monte Carlo for Uncertainty Quantification in Quantitative Imaging Problems	Keith C. BLEDSOE, Matthew A. JESSEE, Matthew BLACKSTON *(ORNL)*, Justin R. KNOWLES *(Y-12 NSC)*, Klaus ZIOCK, Jordan LEFEBVRE *(ORNL)*

Multiphysics Coupling Methods and Approaches II

Salon D

Matthew Cleveland, *Los Alamos National Laboratory*
Abdelhamid Dokhane, *Paul Scherrer Institut*

8:30	Multiphysics Steady-State Simulation the High Temperature Test Reactor with MAMMOTH, BISON and RELAP-7	Vincent LABOURÉ, Javier ORTENSI, Yaqi WANG, Sebastian SCHUNERT, Frederick N. GLEICHER, Mark D. DeHART, Richard C. MARTINEAU *(INL)*
8:55	Reduced-Order Modeling of Parametrized Multi-Physics Computations for the Molten Salt Fast Reactor	Peter GERMAN, Jean C. RAGUSA *(Texas A&M University)*, Carlo FIORINA *(Ecole Polytechnique Federale de Lausanne)*, Mauricio TANO RETAMALES *(Laboratory of Subatomic Physics & Cosmology)*
9:20	A Discontinuous Galerkin FEM Multi-Physics Solver for the Molten Salt Fast Reactor	Marco TIBERGA, Danny LATHOUWERS, Jan Leen KLOOSTERMAN *(Delft University of Technology)*
9:45	Impact of Neutronic Parameters in a Loss-Of-Flow Transient Simulation of a Low-Void Reactivity Sodium-Cooled Nuclear Reactor	Bastien FAURE, Valocchi GIORGIO *(CEA)*, Pascal ARCHIER *(CEA, Cadarache)*, Laurent BUIRON *(CEA, Cadarache)*, Jean-Baptiste DROIN *(CEA, Saclay)*, Vincent PASCAL, Pierre SCIORA *(CEA, Cadarache)*
10:10	**Break**	
10:40	Analysis of Methodologies for the Coupling of Multi-Physics Phenomena in the Quasi-Static Approach to Nuclear Reactor Dynamics	Dominic CARON, Ansar CALLOO, Jean-Charles Le PALLEC, Cyril PATRICOT *(CEA)*
11:05	Development of regulatory compliant coupled neutronics-thermohydraulics models for Molten Salt Reactors	Claire HENRIROUX, Esben Bryndt KLINKBY, Bent LAURITZEN *(Techl Univ of Denmark)*, Andreas Vigand PEDERSEN *(Seaborg Technologies)*
11:30	CAPP/GAMMA+ Coupled Code System for Transient Analysis of a Block-type HTGR Core	Seungsu YUK, Nam-il TAK, Jeong-Hun LEE, Hong Sik LIM, Jin Young CHO, Chang Keun JO *(KAERI)*

Advances in Reactor Analyses Methods IV
Portland Room
Troy L. Becker, *Naval Nuclear Laboratory - KAPL*
Yong Hee Kim, *Korea Advanced Institute of Science & Technology*

8:30	Development of Quasi-Static Capabilities for CORPUS-APOLLO3®	Dominic CARON, Ansar CALLOO, Jean-Charles Le PALLEC, Cyril PATRICOT *(CEA)*
8:55	Monte Carlo Calculations of the Burst Wait Time of Fast Burst Reactors Using MCATK	Travis J. TRAHAN *(LANL)*
9:20	Spatial Localization of Perturbation Propagation in LWRs Using Causality and Connectivity Analysis	Dionysios A. CHIONIS, Abdelhamid DOKHANE, Hakim FERROUKHI, Andreas PAUTZ *(PSI)*
9:45	Leakage Feedback Method for Spectral Correction in Pin-Homogenized Multi-Group Core Calculations	Hyunsik HONG, Han Gyu JOO *(Seoul Natl University)*
10:10	**Break**	
10:40	Frequency-Domain Stability Analysis of Reactivity Feedback Mechanisms	Doron SIVAN, Erez GILAD *(Ben-Gurion University of the Negev)*, Shai KINAST *(NRCN)*
11:05	Improvements of CMFD Acceleration Capability of OpenMOC	Wenbin WU, Guillaume GIUDICELLI, Kord S. SMITH, Benoit FORGET *(MIT)*, Dong YAO, Qi LUO *(Nuclear Power Institute of China)*
11:30	Estimation of corner flux in rectangular geometry	Pavel M. BOKOV, Danniell BOTES, Djordje I. TOMASEVIC *(NESCA)*

Transport Methods for Stochastic Media
Eugene Room
Kendra P. Long, *Los Alamos National Laboratory*
Andrea Zoia, *Commissariat à l'Énergie Atomique Saclay*

8:30	The Residual Source Estimator for DGFEM-1 SN Neutron Transport Spatial Discretization Error Estimation	Nathan H. HART, Yousry Y. AZMY *(NCSU)*
8:55	A Discrete Ordinates Solver with Diffusion Synthetic Acceleration for Simulations Of 2-D And 2-Energy Group Neutron Noise Problems	Huaiqian YI, Paolo VINAI, Christophe DEMAZIÈRE *(Chalmers Univ of Techn)*
9:20	Analysis Of Material Fluxes in Markov Mixtures	Andrea ZOIA *(CEA, Saclay)*, Coline LARMIER, Emiliano MASIELLO *(CEA/Saclay)*, David RIZ, Sébastien LEMAIRE *(CEA)*
9:45	An Extension of Conditional Point Sampling to Quantify Uncertainty Due to Material Mixing Randomness	Emily H. VU *(Univ of California, Berkeley)*, Aaron J. OLSON *(SNL)*
10:10	**Break**	
10:40	An Extention of Conditional Point Sampling to Multi-dimensional Transport	Aaron J. OLSON *(SNL)*, Emily H. VU *(Univ of California, Berkeley)*
11:05	Verification of a Monte Carlo Levermore-Pomraning Algorithm for Spatially-Inhomogeneous Binary Stochastic Media	Patrick S. BRANTLEY *(LLNL)*, Patrick F. O'ROURKE, Anil K. PRINJA *(Univ of New Mexico)*
11:30	Uncollided-Flux Treatment for Discrete-Ordinate Radiation Transport Solutions in the Rattlesnake Code System	Logan H. HARBOUR, Jean C. RAGUSA, Yaqi WANG, Sebastian SCHUNERT, Derek R. GASTON, Mark D. DeHART *(INL)*

Advanced Transport Solution Algorithms I
Salon G
Teresa Bailey, *Lawrence Livermore National Laboratory*
Vincent Labouré, *Idaho National Laboratory*

1:20	Porting 3D Discrete Ordinates Sweep Algorithm in Ardra to CUDA	Adam KUNEN, John LOFFELD, Aaron BLACK, Robert CHEN, Paul NOWAK, Terry S. HAUT, Teresa S. BAILEY, Peter BROWN *(LLNL)*, Steve RENNICH *(NVIDIA Corportation)*, Peter G. MAGINOT *(LANL)*, Bujar TAGANI *(LLNL)*
1:45	A Sweep-Based Domain Decomposition and Task Schedule for Discrete Ordinates Transport	Troy L. Becker *(NNL)*
2:10	Mitigation of CommunicationLatency Based Slowdowns in the PIDOTS Massively Parallel Sn Transport Code	Raffi A. YESSAYAN, Yousry Y. AZMY *(NCSU)*, Joe ZERR *(LANL)*, Sebastian SCHUNERT *(INL)*
2:35	SN Transport on GPUs with PARTISN	Randal S. BAKER, Robert Joseph ZERR, Daniel J. MAGEE *(LANL)*
3:00	**Break**	
3:30	Adding a Third Level of Parallelism to OpenMOC, an Open Source Deterministic Neutron Transport Solver	Guillaume GIUDICELLI , Wenbin WU *(MIT)*, Colin J. JOSEY *(LANL)*, Benoit FORGET, Kord S. SMITH *(MIT)*
3:55	Approaches to Load Balancing Massively Parallel Transport Sweeps on Unstructured Grids	Tarek GHADDAR, Jean C. RAGUSA, Jan Izak Cornelius VERMAAK, Marvin L. ADAMS *(Texas A&M University)*
4:20	Status of LLNL Monte Carlo Transport Codes on Sierra GPUs	Michael S. MCKINLEY, Patrick S. BRANTLEY, Matthew J. O'BRIEN, Shawn A. DAWSON, Mike POZULP, Dave RICHARDS *(LLNL)*

Hybrid Monte Carlo/Deterministic Methods
Salon H
Farzad Rahnema, *Georgia Institute of Technology*
Christophe Sublet, *United Kingdom Atomic Energy Authority*

1:20	Development And Test of a Hybrid Probabilistic-Deterministic Framework Based on the Interface Current Method	Huaiqian YI, Christophe DEMAZIERE, Paolo VINAI *(Chalmers Univ of Techn)*, Jaakko LEPPÄNEN *(VTT Technical Research Centre of Finland)*
1:45	Beam Calculation Method for a Neutron Camera	Uri STEINITZ, Alexander KRAKOVICH, Izhar NEDER *(Soreq NRC)*
2:10	Predicting Monte Carlo Tally Variance and Calculation Time when using Forced-flight Variance Reduction-Theory	Joel A. KULESZA, Clell J. SOLOMON *(LANL)*, Brian C. KIEDROWSKI *(Univ of Michigan)*
2:35	Predicting Monte Carlo Tally Variance and Calculation Time when using Forced-flight Variance Reduction-Verification	Joel A. KULESZA, Clell J. SOLOMON *(LANL)*, Brian C. KIEDROWSKI *(Univ of Michigan)*
3:00	**Break**	
3:30	Computing Alpha Eigenvalues Using the Fission Matrix	Colin J. JOSEY, Forrest B. BROWN *(LANL)*
3:55	Verification of the Fission Matrix Decomposition Method Against Two Axially Heterogeneous Problems	Stefano TERLIZZI, Dan KOTLYAR *(Georgia Tech)*
4:20	Ray Effect Mitigation through Monte Carlo Coupling for Detector Problems	Nicholas F. HERRING *(Univ of Michigan)*, Raffi A. YESSAYAN *(NCSU)*, Kyle BEYER, Robert FONTI, Evan Sebastian GONZALEZ, Evan LEPPINK, Blake RUCINSKI *(Univ of Michigan)*, Sebastian SCHUNERT *(INL)*, Yousry Y. AZMY *(NCSU)*, Brian C. KIEDROWSKI *(Univ of Michigan)*

Deterministic and Stochastic Methods for Sensitivity Analysis III

Salon C

Brian C. Kiedrowski, *University of Michigan*
Imre Pázsit, *Chalmers University of Technology*

1:20	Safety Parameters Uncertainty and Sensitivity Analysis for High Flux Reactor at Institut Laue Langevin	Davide PORTINARI *(Politecnico di Milano)*, Manuele AUFIERO *(Milano Multiphysics)*, Yoann CALZAVARA *(Inst Laue-Langevin)*, Antonio CAMMI, Stefano LORENZI *(Politecnico di Milano)*, Adrien BIDAUD *(LPSC-IN2P3-CNRS)*
1:45	Development and Verification of Perturbative Methods in the APOLLO3 code. Sensitivity Analysis and Uncertainty Quantification Applied to Pressurized-Water and Sodium Fast Reactors	Pascal ARCHIER *(CEA, Cadarache)*, Ansar CALLOO *(CEA, Saclay)*, Giorgio VALOCCHI, Bastien FAURE *(CEA)*, Jean-Marc PALAU *(CEA, Saclay)*
2:10	Geometric Uncertainty Quantification and Robust Design For 2D Satellite Shielding	Shawn D. Pautz, Brian M. Adams, Don E. Bruss *(SNL)*
2:35	Second Derivative of an *(α,n)* Neutron Source with Respect to Constituent Isotope Densities	Jeffrey A. FAVORITE *(LANL)*
3:00	**Break**	
3:30	Nuclear Data Uncertainty Quantification in Molten Salt Reactors with xGPT	Nicolò ABRATE *(Politecnico di Torino-Italy)*, Manuele AUFIERO *(Univ of California, Berkeley)*, Sandra DULLA *(Politecnico di Torino-Italy)*, Luca FIORITO *(SCK/CEN)*
3:55	Embedded Cross Section Uncertainty in Nuclear Transport Monte Carlo Solvers	Pablo P. DUCRU, Jingang LIANG *(MIT)*, Vladimir SOBES *(ORNL)*, Abdulla ALHAJRI, Benoit FORGET, Kord S. SMITH *(MIT)*
4:20	SCALE/Sampler Sensitivity Indices	Friederike BOSTELMANN *(Oak Ridge Associated Universities)*, Dorothea WIARDA, William WIESELQUIST, Bradley T. REARDEN *(ORNL)*

Multiphysics Coupling Methods and Approaches III

Salon D

Hongbin Zhang, *Idaho National Laboratory*
Rene van Geemert, *Framatome Inc.*

1:20	X-CMFD: A Robust Iteration Scheme for CMFD-Based Acceleration with Nonlinear Feedback	Qicang SHEN, Nick J. ADAMOWICZ, Brendan M. KOCHUNAS, Edward W. LARSEN *(Univ of Michigan)*
1:45	Relationship Between Relaxation and Partial Convergence of Nonlinear Diffusion Acceleration for Problems with Feedback	Qicang SHEN, Nick J. ADAMOWICZ, Brendan M. KOCHUNAS *(Univ of Michigan)*
2:10	Challenging Test Problems for Coupled Transient Simulations of Pressurized Heavy Water Reactors	Matthias KRAUSE *(International Atomic Energy Agency, Vienna, Austria)*, Alexandre TROTTIER, Nusret Ugurhan AYDEMIR *(Canadian Nuclear Laboratories, Chalk River, Ontario, Canada)*, Mohamed DAHMANI *(SNC-Lavalin Nuclear)*, Dumitru SERGHIUTA *(Canadian Nuclear Safety Commission)*
2:35	Noble Metal Mass Transport Model for Molten Salt Reactor Analysis in VERA-CS	Samuel WALKER *(RPI)*, Zachary TAYLOR *(Univ of Tennessee)*, Robert K. SALKO, Benjamin S. COLLINS *(ORNL)*, Wei JI *(RPI)*
3:00	**Break**	
3:30	A Projective Method for Solving the Single-Group Space-Time Neutron Kinetics Equations with Precursor Advection	Aaron REYNOLDS, Todd S. PALMER *(Oregon State Univ)*
3:55	A Three Temperature, Multi-Dimensional, Multi-Frequency, Nonlinearly Coupled Thermal Radiation Transport Solver Using the Deterministic Particle Scheme	Hans R. HAMMER, HyeongKae PARK, Luis CHACON *(LANL)*
4:20	Verification & Validation of MCS Multi-Physics Analysis Capability For OPR-1000 Multi-Cycle Operation	Vutheam DOS, Hyunsuk LEE, Jiwon CHOE, Matthieu LEMAIRE *(UNIST)*, Ho Cheol SHIN *(KHNP Central Research Institute)*, Hwan Soo LEE *(KHNP)*, Deokjung LEE *(UNIST)*

Advances in Reactor Analyses Methods V
Portland Room
Brendan M. Kochunas, *University of Michigan*
Rodolfo M. Ferrer, *Studsvik Scandpower*

1:20	Convergence limits in Perturbation Theory	Nicolò ABRATE, Sandra DULLA, Piero RAVETTO *(Politecnico di Torino-Italy)*, Giovanni BRUNA *(NINE engineering)*
1:45	Multilevel Algorithms with Projection and Prolongation Over Elements of the Phase Space for K-Eigenvalue Transport Problems	Luke R. CORNEJO, Dmitriy Y. ANISTRATOV *(NCSU)*
2:10	Revisiting Mini-Max Polynomial Approximation Method for Nuclear Fuel Depletion Calculation	Go CHIBA *(Hokkaido Univ)*, Yasunori OHOKA, Kento YAMAMOTO, Hiroaki NAGANO *(Nuclear fuel industry)*
2:35	A Linear Diffusion-Acceleration Method for k-Eigenvalue Transport	Anthony P. BARBU, Marvin L. ADAMS
3:00	**Break**	
3:30	Derivation of Multigroup Diffusion Coefficients to Preserve Moments of Neutron Migration	Eshed MAGALI, Edward W. LARSEN *(Univ of Michigan)*
3:55	Continuous Energy Comet Solution to Advanced Burner Test Reactor Benchmark Problem	Farzad RAHNEMA, Dingkang ZHANG *(Georgia Tech)*
4:20	Generalized Equivalence Theory used with Linear Source in the Method of Characteristics for Neutron Transport	Guillaume GIUDICELLI, Kord S. SMITH, Benoit FORGET *(MIT)*

Reduced-Order Modeling in Nuclear Science and Engineering Applications I

Eugene Room

Wei Ji, *Rensselaer Polytechnic Institute*
Sabrina Kelbij Star, *University of Ghent*

1:20	POD-Galerkin Reduced Order Model of the Boussinesq Approximation for Buoyancy-Driven Enclosed Flows	Sabrina Kelbij STAR*(Institute of Advanced Nuclear Systems, SCK•CEN)*, Giovanni STABILE *(SISSA, International School for Advanced Studies, mathLab)*, Sokratia GEORGAKA *(Imperial College London, Department of Mechanical Engineering)*, Francesco BELLONI *(SCK•CEN)*, Gianluigi ROZZA *(SISSA)*, Joris DEGROOTE *(Ghent University)*
1:45	Application of Reduced Order Model for Uncertainty Quantification of PWR LOCA Analysis	Ikuo KINOSHITA *(Institute of Nuclear Safety System, Inc)*
2:10	Dynamic Mode Decomposition for Subcritical Metal Systems	Zachary K. HARDY, Jim E. MOREL *(Texas A&M University)*, Cory D. AHRENS *(LANL)*
2:35	Model Order Reduction for Sn Radiation Transport	Patrick BEHNE, Jean C. RAGUSA, Jim E. MOREL *(Texas A&M University)*
3:00	**Break**	
3:30	Reduced Order Modeling of the TWIGL Problem Using Proper Generalized Decomposition	Anthony L. ALBERTI, Todd S. PALMER *(Oregon State Univ)*
3:55	Investigative Study on Impact of Modeling Uncertainties in Uncertainty Quantification of Neutronics Core Simulation	Dongli HUANG, Hany S. ABDEL-KHALIK *(Purdue Univ)*
4:20	Proper Generalized Decomposition of Multigroup Neutron Diffusion with Separated Space-Energy Representation	Zachary M. PRINCE, Jean C. RAGUSA *(Texas A&M University)*

Advanced Transport Solution Algorithms II
Salon G
Dean Wang, *Ohio State University*
Christophe Demaziere, *Chalmers University of Technology*

8:30	Memory footprint reduction of a multi-group DPN transport operator for 3D MOC acceleration	Daniele SCIANNANDRONE *(CEA)*, Laurent GRAZIANO *(FRAMATOME)*, Simone SANTANDREA *(CEA)*
8:55	Performance of Parallel Approximate Ideal Restriction Multigrid for Transport Applications	Joshua T. HANOPHY *(Texas A&M University)*, Ben SOUTHWORTH, Tom MANTEUFFEL *(University of Colorado Boulder)*, Jim E. MOREL *(Texas A&M University)*, Ruipeng LI *(LLNL)*
9:20	Impact of Load Balancing on Parallel Performance with Haar Wavelets Angular Adaptivity	Ioannis NIKITEAS, Steven DARGAVILLE, Christopher PAIN *(Imperial College London)*, Richard P. SMEDLEY-STEVENSON *(Imperial College London & Atomic Weapons Establishment)*, Paul N. SMITH *(Imperial College London & Wood PLC)*
9:45	An Event-Based Algorithm for Random Ray Neutral Particle Transport on GPUs	John R. TRAMM, Andrew R. SIEGEL, Paul K. ROMANO *(ANL)*
10:10	**Break**	
10:40	Developing a Mini-App for Exploring Algorithms for Unstructured Mesh Deterministic Discrete Ordinates Transport on Many-Core Architectures	Tom DEAKIN, Simon McINTOSH-SMITH *(University of Bristol)*, Justin LOVEGROVE, Richard P. SMEDLEY-STEVENSON, Andrew W. HAGUES *(Atomic Weapons Establishment)*
11:05	VEXS, An Open Platform for the Study of Continuous-Energy Cross-Section Lookup Algorithms on GPU's	Forrest W. SHRIVER *(Univ of Florida)*, Seyong LEE, Steven P. HAMILTON *(ORNL)*, Justin K. WATSON *(Univ of Florida)*, Jeffrey VETTER *(ORNL)*
11:30	Porting TETON, a Discrete-Ordinates Thermal Radiative Transfer Code, to SIERRA	Paul NOWAK, Aaron BLACK *(LLNL)*, Steve RENNICH *(NVIDIA)*, David APPELHANS *(IBM)*, Robert CHEN, Terry Scot HAUT *(LLNL)*, Pete MAGINOT *(LANL)*, Teresa S. BAILEY, Peter BROWN, Adam KUNEN, John LOFFELD, Bujar TAGANI *(LLNL)*

Reactor Physics Validation with Realistic Core Benchmarks
Salon H
Kord S. Smith, *Massachusetts Institute of Technology*
Paul Cosgrove, *University of Cambridge*

8:30	Towards the Validation of Neutron Noise Simulators: Qualification of Data Acquisition Systems	Adolfo RAIS *(Swiss Federal Institute of Technology (EPFL))*, Vincent LAMIRAND *(Scherrer Inst)*, Oskari PAKARI, Axel LAUREAU *(École polytechnique fédérale de Lausanne)*, Joachim POHLUS, Christoph POHL *(TÜV Rheinland ISTec GmbH)*, Sebastian HUEBNER *(Technische Universität Dresden)*, Mathieu HURSIN, Andreas PAUTZ *(PSI)*, Christophe DEMAZIÈRE *(Chalmers Univ of Techn)*
8:55	Multi-Cycle Depletion with the GRS core simulator KMACS: BEAVRS Cycles 1 and 2	Matias ZILLY, Jeremy BOUSQUET *(GRS gGmbH)*
9:20	SPERT III E-Core Critical Experiment Benchmarks Calculation with NECP-X and KENO-VI	Chen ZHAO *(Xi'an Jiaotong University)*, Qicang SHEN *(Univ of Michigan)*, Zhouyu LIU, Lu CAO *(Xi'an Jiaotong University)*, Thomas J. DOWNAR *(Univ of Michigan)*, Liangzhi CAO *(Xi'an Jiaotong University)*
9:45	Detailed Neutronic Modelling of the Crocus Research Reactor Using APOLLO3 Transport Code	Igor ZMIJAREVIC *(CEA, Saclay)*, Mereke TONTAYEVA *(IMT Atlantique)*, Daniele TOMATIS, Zarko STANKOVSKI *(CEA)*
10:10	**Break**	
10:40	Validation of APOLLO2-A Against Serpent2 on BWR Lattices	Alexander S. BENNETT *(Framatome Inc.)*, Nicolas P. MARTIN *(AREVA NP Inc)*, Martin SCHNEIDER *(Framatome)*
11:05	Implementation of Dynamic Control Rod Reactivity Masurement Method to STREAM/RAST-K 2.0	Eun JEONG *(UNIST)*, Eunki LEE, Ho Cheol SHIN *(KHNP-CRI)*, Deokjung LEE *(UNIST)*
11:30	Serpent Validation with the GIACINT Facility Experimental Data from a Control Rod Insertion Transient	Alberto TALAMO, Yousry GOHAR *(ANL)*, Ville H. VALTAVIRTA, Jaakko LEPPÄNEN *(VTT Technical Research Centre of Finland)*, S. N. SIKORIN, S. MANDZIK, S. POLAZAU, T. K. HRYHAROVICH *(Joint Institute for Power and Nuclear Research - Sosny)*

Uncertainty Quantification in Multiphysics Simulations

Salon C

Ryan G. McClarren, *University of Notre Dame*
Go Chiba, *Hokkaido University*

8:30	Uncertainty Analysis Methodology for Multi-Physics Coupled Rod Ejection Accident	Gregory Kyriakos DELIPEI *(CEA, Saclay)*, Josselin GARNIER *(Centre de Mathématiques Appliquées, Ecole Polytechnique)*, Jean-Charles Le PALLEC *(Commissariat à l'énergie atomique et aux énergies alternatives (CEA))*, Benoit NORMAND *(CEA)*
8:55	Comparative Analysis of Solutions of Neutronics Exercises of the LWR UAM Benchmark	Jason HOU *(NC State University)*, Cameron MARAS, Chris GOZUM, Maria N. AVRAMOVA, Kostadin N. IVANOV *(NCSU)*
9:20	Characterization of Spent PWR Fuel for Decay Heat, Neutron and Gamma-Ray Emission: Code Comparison	Gašper ŽEROVNIK *(EC-JRC Geel)*, Klemen AMBROŽIČ, Dušan ČALIČ *(Jožef Stefan Institute)*, Luca FIORITO, Kevin GOVERS, Augusto Hernandez SOLIS *(SCK•CEN)*, Bor KOS, Marjan KROMAR *(Jožef Stefan Institute)*, Peter SCHILLEBEECKX *(EC-JRC Geel)*, Alexey STANKOVSKIY *(SCK•CEN)*
9:45	Uncertainty Quantification of LWR-PROTEUS Phase Ii Experiments Using CASMO-5	Mathieu HURSIN *(PSI)*, Jinsu PARK *(UNIST)*, Wonkyeong KIM *(UNIST)*, Siefman DANIEL *(Ecole Polytechnique Federale de Lausanne)*, Gregory PERRET *(PSI)*, Alexander VASILIEV *(PSI)*, Dimitri ROCHMAN *(Nuclear Research & Consultancy Group)*, Andreas PAUTZ *(Ecole Polytechnique Federale de Lausanne)*, Hakim FERROUKHI *(PSI)*, Deokjung LEE *(UNIST)*
10:10	**Break**	
10:40	Impact of Spatial Coupling Schemes and Perturbation Options on Uncertainty Quantification of PWR Core Simulation	Kaiyue ZENG, Jason HOU, Kostadin N. IVANOV *(NCSU)*
11:05	Impact of Implicit Effects on Uncertainties in SPERT-III Rod Ejection Accident Experiments	Abdelhamid DOKHANE, Mathieu HURSIN, Alexander VASILIEV, Hakim FERROUKHI *(PSI)*, Gerardo M. GRANDI *(Studsvik Scandpower)*
11:30	Uncertainty Quantification of Model-Form and Predictive Uncertainties in Nuclear Codes Using Bayesian Framework	Majdi I. RADAIDEH, Katarzyna BOROWIEC, Tomasz KOZLOWSKI *(Univ of Illinois)*

Validation and Regulatory Acceptance of Multiphysics Simulations

Salon D

Mark D. DeHart, *Idado National Laboratory*
Alice Dufresne, *OECD Nuclear Energy Agency*

This session starts at 8:55

8:55	3-D Modelling of a Superphénix Benchmark with Serpent and PARCS for coupled simulation with PARCS/ATHLET	Romain HENRY, Armin SEUBERT *(GRS)*
9:20	BEAVRS Benchmark Analysis by DeCART Standalone and DeCART/MATRA Multi-physics Code Coupling Calculations	Ho JIN Park, Seong Jin KIM, Hyuk KWON, Jin Young CHO *(KAERI)*
9:45	An Advanced Experimental Validation Methodology of Multiphysics Calculation Tools on CABRI Transients	Jean-Marc LABIT *(CEA)*, Nathalie MARIE *(CEA, Saclay)*, Jean-Pascal HUDELOT *(CEA, Cadarache)*, Elsa MERLE *(CNRS)*
10:10	**Break**	
10:40	Measurement of the Gas Velocity in a Water-Air Mixture in CROCUS by Neutron Noise Technique	Mathieu HURSIN *(PSI)*, Oskari PAKARI *(Ecole Polytechnique Federale de Lausanne)*, Gregory PERRET *(PSI)*, Pavel FRAJTAG, Vincent LAMIRAND *(Ecole Polytechnique Federale de Lausanne)*, Imre PÁZSIT, Victor DYKIN *(Chalmers Univ of Techn)*, Gabor POR *(BME Institute for Nuclear Techniques)*, Henrik NYLEN *(Ringhals AB)*, Andreas PAUTZ *(Ecole Polytechnique Federale de Lausanne)*
11:05	Plant Data Based Cross-Sections Bayesian Calibration: Watts Bar Unit I Cycle I	Bassam A. KHUWAILEH *(University of Sharjah)*, Paul J. TURINSKY *(NCSU)*

Advances in Reactor Analyses Methods VI

Portland Room

Brandon Haugh, *Kairos Power*
Mark Gilbert, *United Kingdom Atomic Energy Authority*

8:30	Native MOOSE Meshing Capability for Light Water Reactor Analysis	Jieun LEE, Sebastian SCHUNERT, Derek R. GASTON, Yaqi WANG, Javier ORTENSI, Mark D. DeHART *(INL)*, Yassin A. HASSAN *(Texas A&M University)*
8:55	A Metaheuristic Optimization Tool for High Flux Isotope Reactor Low-Enriched Uranium Design	Ilham VARIANSYAH *(Univ of Michigan)*, Benjamin R. BETZLER, David CHANDLER, Germina ILAS *(ORNL)*, William R. MARTIN *(Univ of Michigan)*
9:20	Implementation of Depletion Architecture in the MAMMOTH Reactor Physics Application	Olin W. CALVIN *(Univ of Florida)*, Mark D. DeHART, Javier ORTENSI, Sebastian SCHUNERT *(INL)*, Sedat GOLUOGLU *(Univ of Florida)*, Yaqi WANG *(INL)*
9:45	Performance Improvements to the 2D/1D Subplane Method in MPACT	Shane G. STIMPSON, Aaron M. GRAHAM, Benjamin S. COLLINS *(ORNL)*
10:10	**Break**	
10:40	Subgrid Treatment Of Spacer Grids in the 2D/1D Subplane Approach	Shane G. STIMPSON, Aaron M. GRAHAM, Benjamin S. COLLINS *(ORNL)*
11:05	Application of The Method of Manufactured Solutions to the C5G7 Problem to Verify a Two-Dimensional Multi-Group Neutron Transport Solver	Jipu WANG, William R. MARTIN *(Univ of Michigan)*, Benjamin S. COLLINS *(ORNL)*
11:05	Verification of the ENDF/B-VII.1 and VIII.0 AMPX 1597-Group Libraries for Advanced Reactor Analysis	Kang-Seog KIM, Friederike BOSTELMANN, Andrew M. HOLCOMB, Germina ILAS, William A. WIESELQUIST *(ORNL)*

Advanced Methods in Materials and Material Control
Eugene Room
Todd S. Palmer, *Oregon State University*
Abdalla Abou Jaoude, *Idaho National Laboratory*

8:30	Böhnel Multiplicity Formulae Beyond the Point Model	Imre PÁZSIT *(Chalmers Univ of Techn)*
8:55	Multiplicity Counting Using the Two- and Three Point Statistics of Fission Chamber Signals - Theory and Experimental Demonstration	Lajos NAGY, Imre PÁZSIT *(Chalmers Univ of Techn)*, Lénárd PÁL *(Hungarian Academy of Sciences)*, Gergely KLUJBER, Máté SZIEBERTH *(Budapest University of Technology and Economics)*
9:20	Neutron-Induced Damage Simulations: Novel Nuclear Data Forms and Metrics for Material Sciences	Jean-Christophe C. SUBLET *(IAEA)*, Mark GILBERT *(United Kingdom Atomic Energy Authority)*
9:45	Efficient Surrogate for Low Energy Damage Effects in Polyatomic Materials	Sebastian SCHUNERT, Daniel SCHWEN, Daniel VANWASSHENOVA *(INL)*
10:10	**Break**	

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