



# International Conference on Physics of Reactors 2022 (PHYSOR 2022)

Making Virtual a Reality: Advancements in Reactor Physics to Leap Forward Reactor Operation and Deployment

May 15-20, 2022 | Pittsburgh, PA | Sheraton Pittsburgh

## CALL FOR PAPERS

### EXECUTIVE CHAIRS

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#### Technical Program Chair

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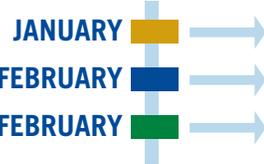
#### Assistant Technical Program Chairs:

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Andrew Godfrey Oak (Ridge National Laboratory)  
Patrick Blaise (Commissariat à l'Énergie Atomique et aux Énergies Alternatives)  
Deokjung Lee (Ulsan National Institute of Science and Technology)

#### Logistic Chair & Local Section:

Temí Adeyeye (Westinghouse)

## FULL PAPER DEADLINE: JANUARY 18, 2022



FULL PAPERS DUE: **January 18, 2022**

FULL PAPERS NOTIFICATION TO AUTHORS: **February 4, 2022**

FINAL FULL PAPERS DUE: **February 15, 2022**

### ABOUT THE MEETING

Following the success of the past meetings, the PHYSOR topical meeting is back in Pittsburgh. PHYSOR 2022 will focus on the future of reactor physics and related nuclear technologies. The meeting aims to provide a platform for international experts from vendors, utilities, research laboratories, and universities to exchange ideas and latest developments on a wide spectrum of topics. Technical sessions include standard topics of interest as well as special sessions including novel analysis methods, advanced reactor designs, machine learning and artificial intelligence applications, high enrichment/high burnup core design challenges, space nuclear technologies, and high-performance computing. The meeting will also include plenary sessions focusing on advanced reactor design development and demonstration programs, panel sessions, and several workshops on state-of-the-art reactor physics tools.

### GUIDELINES

Submit full papers describing work that is of value to the reactor physics community and the nuclear industry in general. Papers are presented orally at the meeting, and presenters are expected to register for the meeting. All accepted papers will be published in the Proceedings of the Topical. Published papers become the property of ANS. Under no circumstances should a paper be published in any other publication prior to presentation at the PHYSOR 2022 meeting. An ANS copyright form is required for all papers and posters.

### FORMAT

We are soliciting full papers with ten pages maximum. Word and LaTeX templates are available at <https://www.ans.org/meetings/physor2022>. Papers not formatted according to the template will be rejected. Papers exceeding 10 pages will be rejected. Accepted papers will be published in the Proceedings of the Topical.

### POSTERS

Authors desiring a poster presentation must also submit a full paper in the proper format as described above. A poster template is available at <https://www.ans.org/meetings/physor2022>.

### JOURNAL COLLABORATION

We will invite some authors to submit a full-length journal article for a special issue of Nuclear Science and Engineering.

### SUBMIT A FULL PAPER

<https://epsr.ans.org/meeting/?m=353>

### PROGRAM SPECIALIST

Janet Davis  
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## TOPICS OF INTEREST

TRACK 1: DETERMINISTIC TRANSPORT METHODS

TRACK 2: MONTE CARLO METHODS

TRACK 3: MULTI-PHYSICS REACTOR SIMULATIONS & VALIDATION (W/ OECD)

TRACK 4: CORE ANALYSIS METHODS

TRACK 5: LIGHT-WATER REACTORS DESIGN & CORE ANALYSIS

TRACK 6: ADVANCED REACTORS DESIGN & CORE ANALYSIS

TRACK 7: TRANSIENT SYSTEMS & ANALYSIS

TRACK 8: DATA, METHODS, CODE VALIDATION

TRACK 9: FUEL MANAGEMENT AND OPTIMIZATION

TRACK 10: FUEL-CYCLE PHYSICS AND SCENARIOS

TRACK 11: CORE MONITORING SYSTEMS

TRACK 12: NUCLEAR CRITICALITY & SAFETY

TRACK 13: ISOTOPES PRODUCTION

TRACK 14: NONPROLIFERATION AND SAFEGUARDS

## SPECIAL SESSIONS

### Track 15S: In Memory of Massimo Salvatores (invited)

A tribute to Massimo Salvatores with submissions from his colleagues and younger generation researchers, covering different reactor physics aspects, experimental techniques and integral experiments, methods, and analyses.

### Track 16S: PHYSOR 2020 Highlights (invited)

Select papers representing best research trends in PHYSOR2020 and update on accomplishments/developments in 2022

### Track 17S: Neutronics Benchmark of CEFR Start-up Tests (In cooperation with IAEA)

Session to present up-to-date research and results from key participants in the IAEA effort on CEFR Start-up benchmarks.

### Track 18S: High Enrichment/High Burnup Core Analysis

Core physics analyses and experiments to fulfill licensing needs for the nuclear industry.

### Track 19S: Micro-reactors Design & Core Analysis

Focus on multi-physics and higher order analyses along with challenges due to aggressive deployment plans of micro-reactor designs.

### Track 20S: Challenges and Improvements in Accident Dose Analysis; Regulatory and Industry Perspective

Focus on recent regulatory changes along with continued evolution of analysis methodologies to address both evolving regulatory and operational requirements.

### Track 21S: Challenges and Improvements in Vendor Independent Nuclear Analysis and Regulatory Approval

Session to share industry experience for process and method development, benchmarking, and topical report development for NRC approval. The session invites participants from utilities and other organizations to present their experiences and challenges in this area.

### Track 22S: VERA Industry Applications

(in cooperation with VERA User Group)

Most recent applications for VERA to solve PWR and BWR challenge problems.

### Track 23S: Trends in HPC/Exascale in Reactor Physics

Most recent reactor physics analysis applications using HPC/Exascale Computing using advanced computer platforms (e.g., GPUs) for "ultimate" fidelity analyses (e.g., CFD coupled with Monte Carlo)

### Track 24S: Advancements in UQ and Validation Methodologies

Latest progress in uncertainty quantification with particular focus on advanced reactor concept deployment.

### Track 25S: Machine Learning and Artificial Intelligence for Reactor Physics

Focus on applications of ML and AI in reactor physics analyses (e.g., loading pattern optimization, surrogate model developments, etc).

### Track 26S: Designing Reactors for Integrated Energy Systems

Focus on the analysis and design of advanced reactors to be operated as part of integrated energy systems on the path to deep decarbonization

### Track 27S: Advances on open-source software for nuclear reactor analysis (In cooperation with IAEA)

Most recent contributions from the participants of IAEA's initiative on the use of open-source code for nuclear reactor applications, as well as from the nuclear open-source community at large.

### Track 28S: Space Nuclear Program

Design and analysis of radioisotope systems and micro-reactors with heat pipes for propulsion and terrestrial power.

### Track 29S: Hybrid Methods in Reactor Physics Analyses

Research and applications combining deterministic and stochastic methods for solving reactor physics problems.

### Track 30S: Neutronics for Fusion Reactors

Deterministic or Monte Carlo neutronics simulations to support fusion reactor design and safety analyses, radioactive waste issues, neutron generator characterization, and other topics related to fusion reactor neutronics.

### Track 31S: Moose-Based Advanced Reactor Design & Technology

Session hosted by Idaho National Laboratory to demonstrate capabilities implemented within MOOSE for design, analysis, and development of advanced nuclear technology. The session invites submissions from other organizations and industry partners to present their work completed using MOOSE-based tools.

## PANEL SESSIONS

### Track 32P: Past, Present and Future Direction of Industry Core Simulators

A forum to discuss new developments in core simulators used routinely for LWR core design analyses.

### Track 33P: Current Issues in LWR Core Development and Design

A forum for the utilities to gather key stakeholders and discuss relevant industry issues in LWR core design development and operation

### Track 34P: Application and Development of Digital Twins for Nuclear Reactors

Panel on potential benefits of developing digital twins for nuclear reactors with focus on the most promising methodologies and challenges.

### Track 35P: Digital Collaboration in Reactor Physics

Discussion on new ways to collaborate across the universities, national laboratories, and vendors to develop the next generation analysis codes and tools

### Track 36P: Advanced Reactor Demonstration Program

Continuation of the high-level plenary discussions to allow for detailed technical discussions and presentations on advanced reactor design and developments.

### Track 37P: Research Reactors for Reactor Physics Analysis and Simulation

Panel discussion on the use of research reactors for high-fidelity validation of computer codes, especially in the area of neutronics.

## PLANNED WORKSHOPS

- Open MC (half-day)
- McCARD uncertainty analysis workshop (half-day)
- Kraken: a Serpent-based multi-physics framework (half-day)
- URANIE open source platform for uncertainty propagation, surrogate models, optimizations, code calibration (full-day)
- VERA training (full-day)

- OpenFOAM for the analysis of advanced nuclear reactors (full-day)
- Multi-physics analysis and UQ of REA with STREAM/RAST-K (half-day)
- RAPID (half day)
- FRENLY nuclear data processing system (full day)
- New physics, new capabilities, what's changing in ENDF/B (half day)
- NEAMS (Full Day)