

Workshop IV: Multi-Fidelity Methods to Enable Robust Optimization and Real-Time Control of Fusion Processes

Monday May 18, 2026

- 8:00–8:55 *Check-in/Breakfast (hosted by IPAM)*
- 8:55–9:00 *Welcome and Opening Remarks*
- 9:00 *SESSION CHAIR: Monday AM - Tim Wildey*
- 9:00–9:45 **Mark Kostuk** (General Atomics)
Mixed-Fidelity, Multi-Model Optimization within the DIII-D Digital Twin
- 10:00–10:15 *Break*
- 10:15–11:00 **Florian Schaefer** (New York University)
Information geometric regularization for sensitivities of flows with shocks
- 11:15–11:30 *Break*
- 11:30–12:15 **Pablo Rodriguez-Fernandez** (Massachusetts Institute of Technology)
Accelerating core plasma design and optimization with surrogate-assisted transport workflows
- 12:30–2:30 *Lunch (on your own)*
- 2:30 *SESSION CHAIR: Monday PM - Gianluca Geraci*
- 2:30–3:15 **Bethany Lusch** (Argonne National Laboratory)
Scalable graph-based surrogate models for unstructured meshes
- 3:30–3:45 *Lightning Poster Round*
- 3:45–5:00 *Poster Session & Reception (Hosted by IPAM)*

Tuesday May 19, 2026

- 8:00–9:00 *Check-in/Breakfast (hosted by IPAM)*
- 9:00 *SESSION CHAIR: TUESDAY AM - Sophia Henneberg*
- 9:00–9:45 **Jeff Schneider** (Carnegie Mellon University)
Reinforcement Learning and Bayesian Optimization for Nuclear Fusion
- 10:00–10:15 *Break*
- 10:15–11:00 **Michael Abdelmalik** (Technische Universiteit Eindhoven)
A Multi-Fidelity Framework for Rarefied Dynamics: Hierarchical Models, Multi-Scale Closures and Acceleration with Neural Green's Operators
- 11:15–11:30 *Break*

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- 11:30–12:15 **Cory Hauck** (Oak Ridge National Laboratory)
Approximate entropy-based moment closures
- 12:30–2:30 *Lunch (on your own)*
- 2:30 *SESSION CHAIR: TUESDAY PM - Cristina Rea*
- 2:30–3:30 *Discussion*
- 3:30–4:00 *Break*
- 4:00–5:00 *Discussion*

Wednesday May 20, 2026

- 8:00–9:00 *Check-in/Breakfast (hosted by IPAM)*
- 9:00 *SESSION CHAIR: WEDNESDAY AM - Cristina Rea*
- 9:00–9:45 **Brian Spears** (Lawrence Livermore National Laboratory)
Virtual Talk: The Genesis Mission : A nation-scale AI effort for Mission-Driven Science, National Security, and Applied Energy
- 10:00–10:15 *Break*
- 10:15–11:00 **Yunan Yang** (Cornell University)
Adjoint Direct Simulation Monte Carlo (DSMC) for Optimization and Control of Rarefied Flows
- 11:15–11:30 *Break*
- 11:30–12:15 **Rebekah White** (Sandia National Laboratories)
Surrogate-Based Optimization of Magnetized Liner Inertial Fusion (MagLIF) Target Design
- 12:30–12:40 *Group Photo*
- 12:40–2:30 *Lunch (on your own)*
- 2:30 *SESSION CHAIR: WEDNESDAY PM - Jonathan Citrin*
- 2:30–3:30 *Discussion*
- 3:30–4:00 *Break*
- 4:00–5:00 *Discussion*

Thursday May 21, 2026

- 8:00–9:00 *Check-in/Breakfast (hosted by IPAM)*
- 9:00 *SESSION CHAIR: THURSDAY AM - Jonathan Citrin*
- 9:00–9:45 **Gianluca Geraci** (Sandia National Laboratories)
Recent Advancements in Multi-Fidelity Approaches
- 10:00–10:15 *Break*
- 10:15–11:00 **Andy Rothstein** (Princeton University)
AI-Driven Event Prediction and Fault-Resilient Plasma Control on DIII-D
- 11:15–11:30 *Break*
- 11:30–12:15 **Sophia Henneberg** (Massachusetts Institute of Technology)
Optimization of Quasi-Axisymmetric Stellarator–Tokamak Hybrids
- 12:30–2:30 *Lunch (on your own)*
- 2:30 *SESSION CHAIR: THURSDAY PM - Tim Wildey*
- 2:30–3:15 **Cosmas Heiss** (École Polytechnique Fédérale de Lausanne (EPFL))
Developments in Magnetic Control at TCV and Achievement of Stabilized Doublet Plasmas
- 3:30–4:00 *Break*
- 4:00–5:00 *Discussion*

Friday May 22, 2026

- 8:00–9:00 *Check-in/Breakfast (hosted by IPAM)*
- 9:00 *SESSION CHAIR: FRIDAY AM - Cory Hauck*
- 9:00–9:45 **Stephen Becker** (University of Colorado Boulder)
Some new bi-fidelity methods for UQ and optimization
- 10:00–10:15 *Break*
- 10:15–11:00 **Simon Van Mulders** (EPFL (Ecole Polytechnique Fédérale de Lausanne))
Model-aided TCV operation through routine pre-shot, real-time and post-shot self-consistent transport and equilibrium simulations, towards reactor-relevant tokamak plasma scenario optimization and control
- 11:15–11:30 *Break*
- 11:30–12:15 **Shancong Mou** (University of Minnesota, Twin Cities)
Derivative-Informed Training of Neural Operators on the Fly

