Workshop II: Learning Models from Data for Multi-Fidelity Fusion Plasma Physics

Monday April 13, 2026

8:00–8:55 *Check-In/Breakfast (Hosted by IPAM)*

8:55–9:00 *Welcome and Opening Remarks*

9:00 *Session Chair: Ionut-Gabriel Farcas*

9:00–9:45 **Steve Cowley** (Princeton Plasma Physics Lab)
Multi-scale Plasma Turbulence — the key to fusion power

10:00–10:15 *Break*

10:15–11:00 **Li Wang** (University of Minnesota, Twin Cities)
Suppressing Plasma Instability Through Constrained Optimization

11:15–11:30 *Break*

11:30–12:15 **Jingmei Qiu** (University of Delaware)
Sampling-Based Adaptive Rank Integrators for Multi-scale Kinetic Models

12:30–2:30 *Lunch (on your own)*

2:30 *Session Chair: Boris Kramer*

2:30–3:15 **Nikola Kovachki** (Nvidia Corporation)
Demystifying Data-Driven Probabilistic Medium-Range Weather Forecasting

3:30–4:15 *Break & Walk to CNSI*

4:30–5:30 **Karen Willcox** (University of Texas at Austin)
Green Family Lecture #1: The Important Role of Mathematics in the Digital Twin Revolution (at UCLA CNSI Auditorium)

5:45–6:30 *Reception (Location: IPAM Lobby)*

Tuesday April 14, 2026

8:00–9:00 *Check-In/Breakfast (Hosted by IPAM)*

9:00 *Session Chair: Jingmei Qiu*

9:00–9:45 **Peter Benner** (Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg)
Discovery and Model Reduction of Hamiltonian Systems

10:00–10:15 *Break*

(Tuesday schedule continued on next page)

(Tuesday schedule continued from previous page)

10:15–11:00 **Luis Chacon** (Los Alamos National Laboratory)
Data-driven closure learning for radiation transport and plasmas

11:15–11:30 *Break*

11:30–12:15 **Qin Li** (University of Wisconsin-Madison)
Stabilizing plasma instabilities cast as PDE-constrained optimization

12:30–2:30 *Lunch (on your own)*

2:30 *Session Chair: Cristina Rea*

2:30–3:15 **Jiequn Han** (Flatiron Institute)
Learning Evolution Operators Across PDE Systems: Meta-Learning and Test-Time Generalization

3:30–4:15 *Break & Walk to Royce Hall*

4:30–5:30 **Karen Willcox** (University of Texas at Austin)
Green Family Lecture #2: Learning Structure-exploiting Reduced Models with Operator Inference (at UCLA Royce Hall)

Wednesday April 15, 2026

8:00–9:00 *Check-In/Breakfast (Hosted by IPAM)*

9:00 *Session Chair: Qin Li*

9:00–9:45 **Karen Willcox** (University of Texas at Austin)
Multifidelity Proper Orthogonal Decomposition

10:00–10:15 *Break*

10:15–11:00 **Diego Del-Castillo-Negrete** (University of Texas at Austin)
Generative Artificial Intelligence methods for turbulence and kinetic computations

11:15–11:30 *Break*

11:30–12:15 **Cristina Rea** (Massachusetts Institute of Technology)
Data-driven learning for disruption prevention and performance optimization

12:30–12:35 *Group Photo*

12:35–2:30 *Lunch (on your own)*

2:30 *Session Chair: Ammar Hakim*

2:30–3:15 **Leonardo Zepeda-Núñez** (Google Inc.)
Learning Turbulent and Chaotic Dynamics via Data-Driven Probabilistic Models

3:30–3:45 *Lightning Poster Round*

3:45–5:00 *Poster Session & Reception (Hosted by IPAM)*

Thursday April 16, 2026

8:00–9:00	*Check-In/Breakfast (Hosted by IPAM)*
9:00	*Session Chair: Diego Del-Castillo Negrete*
9:00–9:45	**Ammar Hakim** (Princeton Plasma Physics Lab) *BEACONS and BEACONS-FM: Lighting a Path to Modular, Composable, Formally Verified Fusion Foundation Models*
10:00–10:15	*Break*
10:15–11:00	**Boris Kramer** (University of California San Diego) *Structure-preserving Lift & Learn: Scientific machine learning for nonlinear conservative partial differential equations*
11:15–11:30	*Break*
11:30–12:15	**Benjamin Sanderse** (Centrum Wiskunde & Informatica (CWI)) *Structure-preserving SciML for discovering ODEs and SDEs in fluid flows*
12:30–2:30	*Lunch (on your own)*
2:30	*Session Chair: Jingwei Hu*
2:30–3:15	**Luis Oliveira e Silva** (Instituto Superior Tecnico, University of Lisbon) *Ab initio PIC simulations and data-driven techniques for multi-fidelity or reduced plasma models*
3:30–4:00	*Break*
4:00–4:45	**Guannan Zhang** (Oak Ridge National Laboratory) *Generative diffusion models for learning stochastic flow maps in particle-based kinetic simulation*

Friday April 17, 2026

8:00–9:00	*Check-In/Breakfast (Hosted by IPAM)*
9:00	*Session Chair: Benjamin Peherstorfer*
9:00–9:45	**Jingwei Hu** (University of Washington) *A Neural Score-Based Particle Method for the Vlasov-Maxwell-Landau System*
10:00–10:15	*Break*
10:15–11:00	**Alexander Velberg** (Massachussetts Institute of Technology) *Data-driven discovery of sub-grid models for collisionless magnetic reconnection*
11:15–11:30	*Break*
11:30–12:15	**Shantenu Jha** (Princeton Plasma Physics Lab) *All (Foundation) Models are wrong. Some (Foundation) Models can be made useful*

IPAM strives to provide an inclusive environment free of harassment. IPAM does not tolerate sexual harassment, other forms of harassment, or sexual assault. Please familiarize yourself with our community agreement which includes instructions on reporting incidents by using the QR code to the right.