



# INTERNATIONAL CONFERENCE ON SCIENTIFIC COMPUTING AND MACHINE LEARNING

March 19th

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## 13:50-14:00 Opening Remarks

## 14:00-15:00 Tutorial 1

Takashi Matsubara (Osaka University)

Deep Geometric Mechanics: From Hamiltonian Neural Networks to Discrete-Time Physics and Beyond

## 15:00-15:40 Oral Session 1

- Oded Ovadia (Tel Aviv University), Vivek Oommen (Brown University), Adar Kahana (Brown University), Ahmad Peyvan (Brown University), Eli Turkel (Tel Aviv University), George Em Karniadakis (Brown University)  
Real-time Inference and Extrapolation via a Diffusion-inspired Temporal Transformer Operator (DiTTO)
- Imran Nasim (IBM), Melanie Webber (Harvard University)  
Learning Reduced Order Dynamics via Geometric Representations

## 15:40-16:00 Coffee Break

## 16:00-17:00 Keynote Talk 1

Christopher J. Budd (Bath University)

Adaptivity and Expressivity in Neural Network Approximations and PINNs

March 20th

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## 9:30-10:30 Keynote Talk 2

Christopher Rackauckas (Massachusetts Institute of Technology)

SciML: Adding Scientific Models as Structure to Improve Machine Learning

## **10:40-11:20 Lightning Talk/Video**

## **11:30-12:30 Poster Session 1**

- Imran Nasim (IBM, University of Surrey), Adam Nasim (Merck Group, University of Surrey)  
Discovering Intrinsic Multi-Compartment Pharmacometric Models Using Physics Informed Neural Networks
- Imran Nasim (IBM), Joaõ Lucas de Sousa Almeida (IBM)  
Using Neural Implicit Flow To Represent Latent Dynamics Of Canonical Systems
- Maria Luisa Taccari (University of Leeds), He Wang (University College London), Somdatta Goswami (Johns Hopkins University), Mario De Florio (Brown University), Jonathan Nuttall (Deltares), Xiaohui Chen (University of Leeds), Peter K. Jimack (University of Leeds)  
Efficient Groundwater Flow Modeling Using Deep Neural Operators
- Zachary M. Miksis (Temple University), Gillian Queisser (Temple University)  
A physics-informed neural network for coupled calcium dynamics in a cable neuron
- Pavodi Maniamfu(University of Tsukuba), U A Md Ehsan Ali(University of Tsukuba), Keisuke Kameyama(University of Tsukuba)  
PINN with Antisymmetric RNN for Solving Nonlinear Partial Differential Equations
- Shujie Liu (University of Waterloo), Justin W.L. Wan (University of Waterloo)  
Synthetic Asset Price Paths Generation Using Denoising Diffusion Probabilistic Model

## **12:30-14:00 Lunch Break (on your own)**

## **14:00-14:50 Invited Talk 1**

Shun Sato (The University of Tokyo)

Convergence Rates of Optimization Methods in Continuous and Discrete Time

## **14:50-15:40 Invited Talk 2**

Nicolas Boullé (University of Cambridge)

Elliptic PDE Learning is Provably Data-Efficient

## **15:40-16:00 Coffee Break**

## **16:00-17:00 Keynote Talk 3**

Elena Celledoni (NTNU)

Deep Learning of Diffeomorphisms for Optimal Parametrization of Shapes

**March 21st**

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### **9:30-10:30 Tutorial 2**

Lu Lu (Yale University)

Accurate, Efficient, and Reliable Learning of Deep Neural Operators for Multiphysics and Multiscale Problems

### **10:40-11:20 Oral Session 2**

- Suchuan Dong (Purdue University)  
A Variable Projection Method for Computational PDEs with Artificial Neural Networks
- Mikhail Tsitsvero (Hokkaido University), Andrey Lyalin (National Institute for Materials Science, Hokkaido University), Mingoo Jin (Hokkaido University)  
Towards accurate modeling of dynamics for molecular crystals by scalable variational Gaussian processes

### **11:30-12:30 Keynote Talk 4**

Masaaki Imaizumi (University of Tokyo)

Statistics for Modern Data Science: Statistical Analysis on Overparameterized Models and In-Context Learning

### **12:30- Free Afternoon**

### **Evening: Banquet at Kyoto Research Park**

**March 22nd**

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### **9:30-10:30 Keynote Talk 5**

Yuji Nakatsukasa (Oxford University)

Randomized Methods for Matrix and Tensor Computations

### **10:40-11:20 Oral Session 3**

- Jun Sasaki (Japan Weather Association), Kenji Utsunomiya (Japan Weather Association), Maki Okada (Japan Weather Association), Koji Yamaguchi (Japan Weather Association)  
Hybrid Modeling Approach Using Cloud Dynamics and Deep Learning for Short-term Solar Forecasting
- Alvaro Fernandez (DESY, Universität Hamburg), Nicolás Mendoza (DESY), Armin Iske (Universität Hamburg), Andrey Yachmenev (DESY, Universität Hamburg), Jochen Küpper (DESY, Universität Hamburg)  
Learning phase-space flows using time-discrete implicit Runge-Kutta PINNs

## 11:30-12:30 Poster Session 2

- Yue Shen (The University of Tokyo), Chen Yu (The University of Tokyo)  
SPIGAN: A Generative Adversarial Network Supervised by Sparse Identification to Learn Governing Equations from Scarce Data
- Yuya Note (Kobe University), Takaharu Yaguchi (Kobe University), Toshiaki Omori (Kobe University)  
Sparse Representation of Koopman Operator
- Masataka Konishi (Kwansei Gakuin University), Keiji Miura (Kwansei Gakuin University)  
Biologically Plausible Local Synaptic Learning Rules Implement CNNs and Denoising Autoencoders
- Lionel Boillot (TotalEnergies), Frédéric Pivot (TotalEnergies), Félix Klein (TotalEnergies)  
Synthetic Label Masks Mapped on Ocean Satellite Background for Oil Seepage Detection
- Yusuke Tanaka (NTT)  
Learning Hamiltonian dynamics Under Uncertainty via Symplectic Gaussian Processes
- Aku Kammonen (KAUST), Lisi Liang (RWTH Aachen), Anamika Pandey (RWTH Aachen), Raúl Tempone (KAUST, RWTH Aachen)  
Comparing Spectral Bias and Robustness For Two-Layer Neural Networks: SGD vs Adaptive Random Fourier Features

## 12:30-14:00 Lunch Break (on your own)

## 14:00-15:00 Keynote Talk 6

Molei Tao (Georgia Institute of Technology)  
Optimization, Sampling, and Generative Modeling in Non-Euclidean Spaces

## 15:00-15:50 Invited Talk 3

Nathanael Bosch (University of Tübingen)  
Flexible and Efficient Probabilistic Numerical Solvers for Ordinary Differential Equations

## 15:50-16:10 Coffee Break

## 16:10-17:10 Keynote Talk 7

Brynjulf Owren (NTNU)  
Stability of Numerical Methods on Riemannian Manifolds and Applications to Neural Networks

### 9:40-10:30 Invited Talk 4

Lena Podina (University of Waterloo)

Universal Physics-Informed Neural Networks and Their Applications

### 10:40-11:20 Oral Session 4

- Identifying Dynamic Regulation with Adversarial Surrogates  
Ron Teichner (Technion, Israel Institute of Technology), Naama Brenner (Technion, Israel Institute of Technology) and Ron Meir (Technion, Israel Institute of Technology)
- Neural Networks are Integrable  
Yucong Liu (Georgia Institute of Technology)

### 11:30-12:20 Invited Talk 5

Ayano Kaneda (Waseda University)

Deep Learning Approach to Approximate the Solution for Poisson Matrix

### Poster (Online)

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- Naoya Takeishi (The University of Tokyo, RIKEN)  
Toward Bayesian Deep Grey-box Modeling
- Aryan Verma (The Ohio State University), Dineshkumar Harursampath (Indian Institute of Science), Rajnish Mallick (Thapar Institute of Engineering & Technology), Prasant Sahay (Indian Institute of Science), Krishna Kant Mishra (Indian Institute of Science)  
Physics Informed Neural Networks with Application in Computational Structural Mechanics
- Takashi Misaka (National Institute of Advanced Industrial Science and Technology (AIST)), Yusuke Mizuno (National Institute of Advanced Industrial Science and Technology (AIST)), Shogo Nakasumi (National Institute of Advanced Industrial Science and Technology (AIST)), Yoshiyuki Furukawa (National Institute of Advanced Industrial Science and Technology (AIST))  
Domain-Decomposed Physics-Informed Neural Network Prediction on Cartesian CFD Framework