

Workshop 1 on
“Multilevel and multifidelity sampling methods in UQ for PDEs”

May 2 - 6, 2022

organized by

Kody Law (U of Manchester), Fabio Nobile (EPF Lausanne),
Robert Scheichl (U Heidelberg), Karen Willcox (U of Texas, Austin)

of the Thematic Programme on
“Computational Uncertainty Quantification: Mathematical Foundations, Methodology &
Data”(May 2 - June 24, 2022)

• Monday, May 2nd, 2022

08:45 – 09:15 **Registration & Welcome**

09:15 – 10:00 **Abdul-Lateef Haji-Ali (Heriot-Watt U, Edinburgh)**

Multilevel Path Branching for Digital Options

10:00 – 10:45 **Michael Feischl (TU Vienna)**

Multilevel methods for computational micromagnetism

10:45 – 11:15 **Coffee Break**

11:15 – 12:00 **Tiangang Cui (Monash U, Melbourne)**

Multi-Level Optimization based Monte-Carlo Samplers for Large-Scale Inverse Problems (- online)

12:00 – 12:45 **Neil Chada (KAUST, Thuwal)**

Improved efficiency of multilevel Monte Carlo for stochastic PDE through strong pairwise coupling (- online)

12:45 – 14:15 **Lunch Break**

14:15 – 15:00 **Lorenzo Tamellini (CNR-IMATI, Pavia)**

Comparing Multi-Index Stochastic Collocation and Multi-Fidelity Stochastic Radial Basis Functions for Forward Uncertainty Quantification of Ship Resistance (- online)

15:00 – 15:25 **Coffee Break**

15:25 – 15:40 **Robert Scheichl (U Heidelberg)**

Introduction to discussion & summary of results from 2020 ESI workshop

15:40 – 16:30 **Discuss Talks & Create Ideas**

16:30 – 16:55 **Robert Scheichl (U Heidelberg)**

Collect Ideas in Plenum

- **Tuesday, May 3rd, 2022**

09:00 – 09:30 **Andreas Stein (ETH Zürich)**

Multilevel Monte Carlo FEM for Elliptic PDEs with Besov Random Tree Priors

09:30 – 10:00 **Niklas Baumgarten (KIT, Karlsruhe)**

A Non-Intrusive Multilevel Uncertainty Quantification (UQ) Framework for Wave Equations with Random Input Data

10:00 – 10:30 **Linus Seelinger (U Heidelberg)**

UM-Bridge: Bridging the Gap Between UQ and Model Software

10:30 – 11:00 **Coffee Break**

11:00 – 11:30 **Paul Rohrbach (U Cambridge)**

Multilevel simulation of hard sphere mixtures

11:30 – 12:20 **Tim Dodwell (U of Exeter)**

Multilevel Delayed Acceptance MCMC - online

12:20 – 14:00 **Lunch Break**

14:00 – 14:45 **Alex Gorodetsky (U of Michigan, Ann Arbor)**

MFNETS: Multifidelity surrogate modeling of ensembles of information sources through directed acyclic graphs - online

14:45 – 15:15 **Coffee Break**

15:15 – 16:15 **Discuss Talks & Create Ideas**

16:15 – 16:45 **Fabio Nobile (EPFL Lausanne)**

Collect Ideas in Plenum

- **Wednesday, May 4th, 2022**

09:00 – 09:30 **Robert Scheichl (U Heidelberg)**

Cluster Ideas & Form Groups

09:30 – 10:30 **Work in Groups**

10:30 – 11:00 **Coffee Break**

11:00 – 12:30 **Work in Groups**

12:30 – 14:00 **Lunch Break**

14:00 – 14:30 **Juan Pablo Madrigal Cianci (EPFL Lausanne)**

Multi-level Markov Chain Monte Carlo Methods for Bayesian Inverse Problems

14:30 – 15:15 **Andrea Barth (U of Stuttgart)**

Uncertainty quantification and subordinated fields - online

15:15 – 15:45 **Coffee Break**

15:45 – 16:15 **Parisa Khodabakhshi (U of Texas, Austin)**

Multifidelity Uncertainty Quantification for Nonlocal Models - online

16:15 – 16:45 **Ionut-Gabriel Farcas (U of Texas, Austin)**

Learning hierarchies of reduced-dimension and context-aware low-fidelity models for multi-fidelity Monte Carlo sampling (- online)

18:30 – 22:00 **Workshop Dinner at Heuriger Weingut Wolff**

- **Thursday, May 5th, 2022**

09:00 – 10:30 **Work in Groups**

10:30 – 11:00 **Coffee Break**

11:00 – 12:30 **Work in Groups**

12:30 – 14:00 **Lunch Break**

14:00 – 14:45 **Benjamin Peherstorfer (CIMS, New York)**

Multilevel Stein variational gradient descent with applications to Bayesian inverse problems

14:45 – 15:15 **Coffee Break**

15:15 – 15:45 **Shangda Yang (U of Manchester)**

Multi-index Sequential Monte Carlo Ratio estimators for Bayesian Inverse problems (- online)

15:45 – 16:15 **Mikkel Lykkegaard (U of Exeter)**

Derivative-Free Thinning (DaFT) with Stochastic Kernel Embeddings (- online)

16:15 – 16:45 **Pieterjan Robbe (Sandia National Laboratories)**

Uncertainty Quantification in Computational Modeling of Plasma-Surface Interactions (- online)

- **Friday, May 6th, 2022**

09:00 – 10:30 **Group Presentations**

Theme C “Multilevel & Multifidelity for SPDEs”

Theme F “Beyond Gaussian Priors & Gaussian Random Fields”

Theme G “Extensions of Multilevel Delayed Acceptance”

10:30 – 11:00 **Coffee Break**

11:00 – 11:45 **Group Presentations**

Theme I “Software Benchmarking and Method Comparison”

Theme K “Beyond Plain-Vanilla MLMC & MIMC”

Summarising the Other Themes

11:45 – 12:30 **Hermann Matthies (TU Braunschweig)**

What is a Sample?

12:30 – 14:00 **Lunch Break**

14:00 – 14:45 **Elisabeth Ullmann (TU Munich)**

Rare event estimation with PDE-based models

14:45 – 15:00 **Robert Scheichl (U Heidelberg) & Fabio Nobile (EPFL Lausanne)**

Final Discussions & Concluding Remarks

The event takes place at the Erwin Schrödinger Institute - Boltzmann lecture hall! Online participation is possible via zoom. Zoom coordinates are available on request (secr@esi.ac.at) and after registration until April 29, 2022.