

Multiscale Analysis and Methods for Quantum and Kinetic Problems (30 Jan 2023–10 Mar 2023)

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Name & Affiliation	Talk Title
Luca Alasio Sorbonne Université, France	Towards a new mathematical model of the visual cycle (Slides)
Clarissa Astuto King Abdullah University of Science and Technology, Saudi Arabia	Finite-differences scheme for a tensor PDE model of biological network formation and applications (Slides)
Weizhu Bao National University of Singapore, Singapore	Modeling, analysis and simulation for degenerate dipolar quantum gas (Slides)
Blair Blakie University of Otago, New Zealand	Supersolidity and crystallization of a dipolar Bose-Einstein condensate <u>Tutorial</u> Introduction to dipolar quantum gases
Sergio Blanes Zamora Universidad Politécnica de Valencia, Spain	Splitting methods with modified potentials for solving linear and nonlinear Schrödinger equations in the real and imaginary time propagation
Russel E. Caflisch Courant Institute of Mathematical Sciences, USA	An Adjoint Method for the Nonlinear Boltzmann Equation (Slides)
Yongyong Cai Beijing Normal University, China	An overarching framework for spectral methods and dispersive equations (Slides) <u>Tutorial</u> Numerical analysis for dispersive equations: from classical regime to oscillatory regime (Slides1) (Slides2) (Slides3)

Name & Affiliation	Talk Title
Zhenning Cai National University of Singapore, Singapore	Diagrammatic Monte Carlo method for open quantum systems
Fernando Casas Universitat Jaume, Spain	On a class of reversible splitting methods for unitary problems (Slides)
Young-Pil Choi Yonsei University, South Korea	Critical thresholds in pressureless Euler-Poisson equations: a new method based on Lyapunov functions
Michele Coti Zelati Imperial College London, UK,	Orientation mixing in active suspensions (Slides)
Ionut Danaila Université de Rouen Normandie, France	Numerical models for coupling Navier-Stokes and Gross-Pitaevskii solvers for two-fluid quantum flows (Slides)
Noemi David The Instituté Camille Jordan, France	Incompressible limit and rate of convergence for tumor growth models with drift
Yu Deng University of Southern California, USA	Mathematical theory of wave turbulence
Bruno Després Sorbonne Université, France	New results on the stability of thick spray equations (Slides)
Benjamin Dörich Karlsruher Institut für Technologie, Germany	Variational Gaussian approximation for the magnetic Schrödinger equation (Slides)
Gissell Estrada-Rodriguez University of Oxford, UK,	Macroscopic limit of kinetic equations for swarming and nonlocal diffusion (Slides)
Yue Feng Sorbonne Université, France	Error Estimates of Numerical Methods for the Long-time Dynamics of the Nonlinear Klein-Gordon Equation

Name & Affiliation	Talk Title
Francisco Gancedo Garcia Universidad de Sevilla, Spain	Global-in-time dynamics for Muskat and two-phase Stokes gravity waves
Diogo Aguiar Gomes King Abdullah University of Science and Technology, Saudi Arabia	Hessian Riemannian flows in mean-field games (Slides)
Javier Gómez-Serrano Brown University, USA	Asymptotic self-similar blow up profile for 3-D Euler via physics-informed neural networks
Patrick Henning Ruhr-Universität Bochum, Germany	On the efficient computation of ground states of the Gross-Pitaevskii equation (Slides)
Wen Wei Ho National University of Singapore, Singapore	Prethermalization and nonequilibrium quantum phases of matter in driven settings
Helge Holden Norwegian University of Science and Technology, Norway	On the stochastic Camassa–Holm and Hunter–Saxton equations with transport noise (Slides)
Arieh Iserles University of Cambridge, UK	An overarching framework for spectral methods and dispersive equations (Slides)
In-Jee Jeong Seoul National University, Korea	Instabilities in vortex ring dynamics (Slides)
Hui Ji National University of Singapore, Singapore	Data-free Deep learning for solving Inverse Imaging problems
Alexander A. Kiselev Duke University, USA	Suppression of chemotactic blow up by active scalar
Lisa Maria Kreusser University of Bath, UK	Generalised eikonal equations on graphs with applications to semi-supervised learning (Slides)

Name & Affiliation	Talk Title
Karolina Kropielnicka Polish Academy of Sciences, Poland	The review of computational approaches for the linear Klein-Gordon equations from low to high frequency regimes
Ching Hua Lee National University of Singapore, Singapore	Scale invariance of complex branching points in the energy manifold and their exceptional bound states (Slides)
Gabriel Lemarie National University of Singapore, Singapore	Critical properties of the Anderson transition in random graphs (Slides)
Qianxiao Li National University of Singapore, Singapore	Reduction and Closure of Dynamical Systems using Deep Learning
Yifei Li National University of Singapore, Singapore	A symmetrized parametric finite element method for anisotropic surface diffusion
Nadia Loy Politecnico di Torino, Italy	Kinetic models for multi-agent systems with multiple microscopic states (Slides)
Richard Di Liu Michigan State University, USA	Multiscale Modeling and Computation of Optically Manipulated Nano Devices
Wei Liu South China Normal University, China	Efficient and accurate gradient flow methods for computing ground states of spin-F BoseEinstein condensates (Slides)
Yong Lu Nanjing University, China	Optimal convergence rates in the nonrelativistic limit of the Klein-Gordon equations (Slides)
Christian Lubich Eberhard Karls Universität Tübingen, Germany	<i>Distinguished Visitor Lecture Series</i> Time integration of tree tensor networks <i>Distinguished Visitor Lecture Series</i> Convergent evolving surface finite element algorithms for geometric evolution equations
Chenyun Luo The Chinese University of Hong Kong, China	Unified Theory for Gravity-Capillary Water Waves with Vorticity (Slides)

Name & Affiliation	Talk Title
Peter A. Markowich King Abdullah University of Science and Technology, Saudi Arabia	On Wigner and Bohmian Measures in semi-classical Quantum Mechanics (Slides)
Alexander Ostermann Universität Innsbruck, Austria	Bourgain techniques for error estimates at low regularity (Slides) Tutorial Integration of NLS with low regularity initial data (Slides)
Lorenzo Pareschi University of Ferrara, Italy	Two tales of a rigorous derivation of the Hamiltonian structure (Slides)
Natasa Pavlovic The University of Texas, USA	Two tales of a rigorous derivation of the Hamiltonian structure (Slides)
Benoît Perthame Sorbonne Université, France	<i>Distinguished Visitor Lecture Series</i> PDEs for neural assemblies; analysis, simulations and behaviour (Slides) <i>Distinguished Visitor Lecture Series</i> Mathematical analysis of models for living tissues and free boundary problems (Slides)
Yulia Petrova Instituto de Matemática Pura e Aplicada- IMPA, Brazil	Two-tube model of miscible displacement: travelling waves and normal hyperbolicity (Slides)
Luigi Preziosi Politecnico di Torino, Italy,	Modelling Cell Reorientation under Stretch (Slides)
David N Reynolds Gran Sasso Science Institute, Italy	Coupled Schrödinger-Lohe Systems of Quantum Synchronization (Slides)
Zeev Rudnick Tel Aviv University, Israel	Robin vs Neumann spectra for planar domains (Slides)

Name & Affiliation	Talk Title
Lenya Ryzhik Stanford University, USA	Bounds for solutions to some thermodiffusive systems
Jesus Sanz-Serna Universidad Carlos III de Madrid, Spain	Vibrational resonance: a study with highorder word-series averaging (Slides)
Markus Schmidtchen Technische Universität Dresden, Germany	Excluded volume and order in systems of Brownian needles (Slides)
Zuowei Shen National University of Singapore, Singapore	Deep Approximation via Deep Learning (Slides)
Chunmei Su Tsing Hua University, China	<u>Tutorial</u> Error estimates of splitting methods for the nonlinear Schrödinger equation (Slides)
Masahiro Suzuki Nagoya Institute of Technology, Japan,	Excluded volume and order in systems of Brownian needles (Slides)
Eitan Tadmor University of Maryland, USA	<i><u>Distinguished Visitor Lecture Series</u></i> Multiscale Analysis in Active Matter <i><u>Distinguished Visitor Lecture Series</u></i> Swarm-Based Gradient Descent Method for Non-Convex Optimization
Cyril Tain University of Rouen, France	Influence of gauges in TDGL model (Slides)
Xin Tong National University of Singapore, Singapore	Sampling with constraints using variational methods (Slides)
Ariane Trescases Université de Toulouse, France	Models for chemotaxis with local sensing (Slides)
Oliver Tse Eindhoven University of Technology, Netherlands	Quantified overdamped limit for Kinetic Vlasov-Fokker-Planck equations (Slides)

Name & Affiliation	Talk Title
<p>Makoto Tsubota Osaka Metropolitan University, Japan</p>	<p>Numerical studies of quantum hydrodynamics and turbulence (Slides)</p>
<p>Athanasios Tzavaras King Abdullah University of Science and Technology, Saudi Arabia</p>	<p>Theory of the viscoelastic Korteweg systems and remarks on the Euler-Korteweg equations</p>
<p>Chiara Villa Sorbonne Université, France</p>	<p>Evolutionary dynamics of glucose-deprived cancer cells: insights from experimentally-informed mathematical modelling</p>
<p>Chushan Wang National University of Singapore, Singapore</p>	<p>Error estimates of numerical methods for the nonlinear Schrödinger equation with low regularity potential and nonlinearity (Slides)</p>
<p>Yao Yao National University of Singapore, Singapore</p>	<p>Small scale formation for the 2D Boussinesq equation (Slides) <u>Tutorial</u> Symmetry and uniqueness via a variational approach (Slides1) (Slides2)</p>
<p>Teng Zhang Beijing Computational Science Research Center, China</p>	<p>Numerical methods for the biharmonic nonlinear Schrödinger equation</p>
<p>Xiaofei Zhao Wuhan University, China</p>	<p>Some numerical integrators for KdV equations under rough data (Slides)</p>