

Workshop I: Tensor Methods and their Applications in the Physical and Data Sciences

Monday March 29, 2021

- 7:55 *SESSION CHAIR: Reinhold Schneider (Technische Universität Berlin)*
- 7:55–8:00 *Welcome & Opening Remarks: Dean Miguel García-Garibay (Dean of Physical Sciences, UCLA) and Dima Shlyakhtenko (Director, IPAM)*
- 8:00–8:30 **Markus Bachmayr** (Johannes Gutenberg-Universität Mainz)
Particle Number Conservation and Block-Sparse Matrix Product States
- 8:40–8:55 *Break*
- 8:55–9:25 **Laura Grigori** (Sorbonne Université)
Tensor compression through hierarchical tensor partitioning
- 9:35–9:50 *Break*
- 9:50–10:20 **Lars Grasedyck** (RWTH Aachen University)
Multigrid in Hierarchical Low Rank Tensor Formats
- 10:30–10:45 *Break*
- 10:45–11:15 **André Uschmajew** (Max-Planck-Institut für Mathematik in den Naturwissenschaften)
Dynamical low-rank approximation for parabolic problems
- 11:25–11:40 *Lightning Poster Round*
- 11:40–12:15 *Poster Session*

Tuesday March 30, 2021

- 8:00 *SESSION CHAIR: Miles Stoudenmire (Flatiron Institute)*
- 8:00–8:30 **Anthony Nouy** (Université de Nantes)
Approximation and learning with tree tensor networks
- 8:40–8:55 *Break*
- 8:55–9:25 **Vladimir Kazeev** (Universität Wien)
Data-driven discretization of PDEs via tensor refinement
- 9:35–9:50 *Break*
- 9:50–10:20 **Reinhold Schneider** (Technische Universität Berlin)
Solving Backward Stochastic Differential Equation and Hamilton Jacobi Bellmann (HJB) equations with Tree Based Tensor Networks (HT/TT)
- 10:30–10:45 *Break*

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- 10:45–11:15 **Ming Yuan** (Columbia University)
Low rank tensor completion
- 11:25–11:55 **Lei Wang** (Chinese Academy of Sciences)
Tropical Tensor Networks

Wednesday March 31, 2021

- 8:00 *SESSION CHAIR: André Uschmajew (Max-Planck-Institut für Mathematik in den Naturwissenschaften)*
- 8:00–8:30 **Nadav Cohen** (Tel Aviv University)
Implicit Regularization in Deep Learning: Lessons Learned from Matrix and Tensor Factorization
- 8:40–8:55 *Break*
- 8:55–9:25 **Virginie Ehrlicher** (École Nationale des Ponts-et-Chaussées (ENPC))
Tensorized Adaptive Biasing Force method for molecular dynamics simulations (joint work with Tony Lelièvre and Pierre Monmarché)
- 9:35–9:50 *Break*
- 9:50–10:20 **Peter Benner** (Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg)
Parallel Algorithms for Tensor Train Arithmetic
- 10:30–10:45 *Break*
- 10:45–11:15 **Miles Stoudenmire** (Flatiron Institute)
Tensor Networks for Machine Learning and Applications

Thursday April 1, 2021

- 8:00 *SESSION CHAIR: Micheline Soley (Yale University)*
- 8:00–8:30 **Ulrich Schollwöck** (University of Munich)
Matrix product states for real materials
- 8:40–8:55 *Break*
- 8:55–9:25 **Nithin Govindarajan** (KU Leuven)
Joint talk with Lieven De Lathauwer (Katholieke Universiteit Leuven): Spline-based separable expansions for approximation, regression and classification
- 9:35–9:50 *Break*
- 9:50–10:20 **Aram Harrow** (Massachusetts Institute of Technology)
Phase transitions in the complexity of simulating random shallow quantum circuits
- 10:30–10:45 *Break*

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10:45–11:15 **Nick Mayhall** (Virginia Polytechnic Institute and State University)
Selected Configuration Interaction in a Basis of Cluster State Tensor Products

11:25–11:40 *Break*

11:40–12:10 **Johnnie Gray** (California Institute of Technology)
Hyper-optimized tensor network contraction - simplifications, applications and approximations

