International Quantum Tensor Network: 3rd Plenary Meeting
TUM Raitenhaslach
Wed 26th – Fri 28th July 2023

Wednesday 26th July: *Transport from hotel-venue for 9.00am, arrival just before 9.15am*

9.30am   Frank Pollmann & Andrew Green *Welcome and opening remarks*

Open Quantum Systems

9.45am   Andrew Daley, Tensor networks and analogue quantum simulation: understanding, mitigating, and harnessing dissipation

10.30am   Coffee

11.15am   Eli Chertkov, *Characterizing a non-equilibrium phase transition on a quantum computer*

12.00pm   Dario Tamascelli, *Chain mappings, pseudomodes and clousures*

12.45pm   Lunch & Poster presentation session

2.45pm   Stephen Clark, *Giant rectification in strongly interacting tilted boundary driven systems*

3.30pm   Tea

Quantum Machine Learning

4.15pm   Eun-Ah Kim, *Data-centric learning of Quantum Many-body States with Classical Machines*

5.00pm   David Perez Garcia, *Privacy in machine learning via Tensor Networks*

5.45pm   *Wrap-up group discussion*

7.15pm   Dinner

9pm   Close, *transfer return to hotels*

Thursday 27th July: *Transport from hotel-venue for 9am, arrival just before 9.15am*

Mathematical Structure of Tensor Networks

9.30am   Simone Warzel, *Rigorous results on quantum lattice systems with dipole conservation*

Quantum Simulation and Algorithms

10.15am   Zlatko Papic, *Disorder-tunable entanglement at infinite temperature*

11am	Coffee
11.45am	Monika Aidelsburger, *Non-equilibrium dynamics of large bosonic quantum many-body systems under the microscope*
12.30pm	Sebastian Blatt, *Quantum simulation and quantum computing with neutral atoms*
1.15pm	Lunch
2.30pm	Hannes Pichler, *Quantum Optical Networks with Time Delays*
3.15pm	Barbara Kraus, *Using match gates to gain confidence in the correct realization of arbitrary quantum computations*
4.00pm	Tea

Tensor Network for Gauge Theories

4.45pm	Erez Zohar, *Gauged Gaussian Fermionic PEPS: a tool for studying lattice gauge theories in high dimensions*
5.30pm	Mari-Carmen Banuls, *Non-equilibrium TN simulations, entanglement and decoherence*
6.15pm	*Wrap-up group discussion*
7.00pm	Dinner
9.00pm	Close, *transfer return to hotels*

Friday 28th July: *Transport from hotel-venue for 8.30am, arrival just before 8.45am*

9.00am	Zohreh Davoudi*, Classical and quantum Hamiltonian simulation of non-Abelian gauge theories: theoretical and algorithmic considerations*
9.45am	Simone Montangero, *Tree tensor network simulations for high dimensional many body quantum systems*
10.30am	Coffee
11.15am	*Final discussion*
12.15pm	Closing remarks and lunch

*Transport to Munich airport to leave **1.15pm latest***
*Transport to Burghausen to leave **1.45-2pm***

Posters

Global optimization of MPS in quantum-inspired numerical analysis
Presenter: **Paula García-Molina, CSIC**
Collaborators: Luca Tagliacozzo, Juan José García-Ripoll Jakob Unfried

Fast Time Evolution of Matrix Product States using the QR decomposition
Presenter: **Jakob Unfried, TU Munich**
Collaborators: Johannes Hauschild, Frank Pollmann

Extended Reservoir Approach for Quantum Transport and non-Markovian Dynamics
Presenter: **Gabriela Wójtowic, Jagiellonian University**
Collaborators: Marek M. Rams, Michael Zwolak, Justin E. Elenewski, Jakub Zakrzewski, Bitan De

Isometric tensor network representations of two-dimensional thermal states
Presenter: **Wilhelm Kadow, TU Munich**
Collaborators: Frank Pollmann, Michael Knap

Hierarchy of Pure States and Tree Tensor Networks
Presenter: **Richard M. Milbradt, TU Munich**
Collaborators: Benjamin Sappler, Christian B. Mendl

Resource-Efficient Quantum Simulation of Lattice Gauge Theories in Arbitrary Dimension: Solving for Gauss' Law and Fermion Elimination
Presenter: **Guy Pardo, Hebrew University of Jerusalem**
Collaborators: Tomer Greenberg, Aryeh Fortinsky, Nadav Katz, and Erez Zohar

Efficient representation of classical data as compressed quantum states for quantum machine learning
Presenter: **Bernhard Jobst, TU Munich**
Collaborators: Carlos A. Riofrío, Elvira Shishenina and Frank Pollmann

Temporal Entanglement in Dual-Unitary Clifford Circuits with Projective Measurements
Presenter: **Jiangtian Yao, Max Planck Institute for the Physics of Complex Systems**
Collaborator: Pieter Claeys

Approximate tensor network contractions for problems with large unit cells on quasi-2D quantum processors
Presenter: **Anna M. Dziubyna, Jagiellonian University**
Collaborators: Tomasz Śmierzchalski, Bartłomiej Gardas, Marek M. Rams

Stochastic matrix product states on the energy manifold
Presenter: **Bojan Zunkovic, University of Ljubljana**

Discrete optimization in the MPS-MPO language
Presenter: **Aleksandr Berezutskii, Université de Sherbrooke**
Collaborators: Stefanos Kourtis, Christopher T Chubb

Noise-resilient ground state energy from real-time evolution on a quantum computer
NPresenter: **Aaron Szasz, Lawrence Berkeley National Laboratory**

Collaborators: Yizhi Shen, Daan Camps, Siva Darbha, Katherine Klymko, David Williams-Young, Norm Tubman, Roel Van Beeumen

Finite temperature investigation of the ferroJ1-J2 model
Presenter: **Olivier Gauthé, EPFL**

Theory of Photoinduced Excited State Proton Transfer with Matrix Product States
Presenter: **Brieuc Le Dé, INSP Sorbonne Université Paris**
Collaborators: Simon Huppert, Riccardo Spezia, Alex Chin

Entanglement aspects of Z_2 topological states and the Z_2 gauge theory
Presenter: **Wen-Tao Xu, TU Munich**
Collaborators: Michael Knap, Frank Pollmann

Signatures of Nontrivial Pairing in the Quantum Walk of Two-Component Bosons
Presenter: **Mrinal Kanti Giri, TCG CREST**
Collaborators: Suman Mondal, B. P. Das, Tapan Mishra

Kondo Non-Abelian Anyons
Presenter: **Matan Lotem, Tel-Aviv University**
Collaborators: Eran Sela, Moshe Goldstein

Simulating dynamical phase transitions on near-term quantum computers
Presenter: **Vinul Wimalaweera, UCL**
Collaborators: Lesley Gover, James Dborin, Fergus Barrat, Michael Foss-Feig, Matthew DeCross, Eric Ostby, Thomas E. O'Brien, Andrew G. Green

Sequence Modelling with Quantum Tensor Networks
Presenter: **Carys Harvey, University of Bristol**
Collaborators: Richie Yeung, Konstantinos Meichanetzidis

Tensor Network Investigation of the finite temperature behaviour of the J1-J2-J3 Kagome Ising antiferromagnet
Presenter: **Afonso Rufino, EPFL**
Collaborators: Frédéric Mila, Samuel Nyckees, Jeanne Colbois

Symmetry-Resolved Entanglement in Lattice Gauge Theories: A Tensor Network Approach
Presenter: **Noa Feldman, Tel-Aviv University**
Collaborator: Moshe Goldstein

Quantum Inspired Variational Algorithms for Non-Linear PDEs
Presenter: **Ryan Connor, University of Strathclyde**

Optimal compression of time evolution operators on quantum circuits
Presenter: **Dominik Hahn, Max Planck Institute for the Physics of Complex Systems**

Collaborators: Maurits Tepaske, David Luitz

Majorana edge modes in a spinful-particle conserving model
Presenter: **Franco Lisandrini, University of Bonn**
Collaborator: Corinna Kollath

AKLT spectral gaps: The method of angles between subspaces
Presenter: **Nicholas Pomata, University of Maryland**
Collaborator: Tzu-Chieh Wei

Adiabatic Tensor Network State Preparation using Parent Hamiltonian Optimization
Presenter: **Kshiti Sneh Rai, Leiden University**
Collaborators: Patrick Emonts, Jordi Tura

Tensor networks as an avenue to machine learning on homomorphically encrypted data
Presenter: **Laura Ball, Alan Turing Institute**

Superconductivity and stripes of strongly-correlated electrons in a magnetic field
Presenter: **Niccolo Baldelli, ICFO**
Collaborators: B. Kloss, M. Fishman, A. Wietek

Dynamics in coupled connected worlds
Presenter: **Tomohiro Hashizume, University of Hamburg**

Classical simulation of local observables with decoherent tensor networks
Presenter: **Carlos Ramos Marimón, Universitat de Barcelona**
Collaborators: Stefano Carignano, Luca Tagliacozzo