MP 16: Quantum Information

Time: Thursday 14:40–15:20 Location: H-HS VII

MP 16.1 Thu 14:40 H-HS VII

Quantum Simulation and Reachability: from Lie-Theory to Illustrative Examples — •Thomas Schulte-Herbrüggen[1], Frederik vom Ende[1], Karl Briegel[1], Gunther Dirr[2], and Robert Zeier[1,3] — [1]Dept. Chem., Technische Universität München (TUM) — [2]Mathematisches Institut, Universität Würzburg — [3]Forschungszentrum Jülich GmbH, Peter Grünberg Institute, Quantum Control (PGI-8)

Characterising closed and open (Markovian) quantum dynamics within a Lie-based systems theory provides a unified mathematically rigorous frame for answering quantum engineering problems. — Here we focus on two recent and illustrative examples:

First, for curiosity we show how algebraic grounds pave the way to simulate (classical) rotations in $d \geq 3$ dimensions efficiently via coherently controlled spin-1/2 chains.

Second, combining coherent control with tunable coupling to reservoirs of a given temperature T, our previous exact reachability results (for $T = 0$ amplitude damping as well as for bitflip noise) extend from n qu*b*its to qu*d*its. We illustrate how reachable sets of states relate to the more general concept of d-majorisation when moving to arbitrary $T > 0$.

MP 16.2 Thu 15:00 H-HS VII

Quantum information of a free fermion in 1+1 dimensions — •Christian Simon — Institut für Theoretische Physik und Astrophysik, Universität Würzburg, 97074 Würzburg, Germany

The free fermion in 1+1 dimensions provides a solvable yet non-trivial model for studying quantum information aspects in QFT. A key concept is the entanglement (or modular) Hamiltonian which gives the entanglement spectrum. We study the associated modular flow induced by it, focusing on the non-local part in different spin sectors. Non-locality in quantum physics has recently appeared to play an important role in the emergence of spacetime in the AdS/CFT correspondence which we seek to understand better.