



CRC 1227
Designed Quantum States of Matter



GUEST LECTURE

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(Guest of Prof. Piet O. Schmidt)

Leibniz Universität Hannover
DQ-mat Colloquium
03 June 2021, 3.00 pm
(via Zoom-Meeting)

"Beating classical heuristics for the binary paint shop problem with the QAOA"

The binary paint shop problem (BPSP) is an APX-hard optimization problem of the automotive industry. In this work, we show how to use the Quantum Approximate Optimization Algorithm (QAOA) to find solutions of the BPSP and demonstrate that QAOA with constant depth is able to beat classical heuristics on average in the infinite size limit $n \rightarrow \infty$. For the BPSP, it is known that no classical algorithm can exist which approximates the problem in polynomial runtime. We introduce a BPSP instance which is hard to solve with QAOA, and numerically investigate its performance and discuss QAOA's ability to generate approximate solutions. We complete our studies by running first experiments of small-sized instances on a trapped-ion quantum computer through AWS Braket.

All DQ-mat members and all interested are cordially invited to attend.