Colloquium Quantum Technologies

TECHNISCHE UNIVERSITÄT DARMSTADT

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Ort: Gebäude S2|15, Raum 51

Towards fault-tolerant quantum computing with neutral atoms

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Neutral atoms have emerged as a competitive platform for digital quantum simulations and computing. In this talk, after introducing some basics of quantum computing with neutral atoms, we discuss recent results on the design of time-optimal and robust multi-qubit gates for neutral atoms.

We present a family of Rydberg blockade gates that are robust against two common experimental imperfections – intensity inhomogeneity and Doppler shifts – and demonstrate that these gates outperform existing gates for moderate or large imperfections. We also consider the performance of these gates in the context of logical qubits and discuss how they may significantly reduce the laser stability and atomic temperature requirements to achieve fault-tolerant quantum computing for erasure-biased neutral atoms qubits. We conclude by presenting a new architecture for quantum error correction with neutral atoms.

Der Sprecher wird betreut von Herrn Professor G. Birkl