FM 25: Plenary Talk: Ion Trap based Quantum Computing

Time: Tuesday 8:30–9:30 Location: Audi Max

Plenary Talk FM 25.1 Tue 8:30 Audi Max

Scalable quantum computing with trapped ion qubits — •Ferdinand Schmidt-Kaler — QUANTUM, Institut für Physik, Universität Mainz

I describe the approach of trapped ion qubits [1] for scalable quantum computing. This includes a discussion of different architectures [2], the required trap technologies and fabrication methods, control electronics for quantum register reconfigurations, and recent improvements of qubit coherence and gate performance. Using a segmented micro-ion trap for implementing a reconfigurable qubit register [3] we have realized multi-qubit entanglement [4]. Topological quantum error correction [5] is a current aim. I conclude with current challenges and an overall assessment of this platform for a future quantum computer.

[1] Blatt, Wineland, Nat. 453, 1008 (2008) [2] Kielpinski, Wineland, Nat. 417, 709 (2002), Schindler et al, NJP 15, 123012 (2013), Friis et al, Phys. Rev. X 8, 021012 (2018), Debenath et al, Nat. 536, 63 (2016) [3] Kaufmann et al, PRA 95, 052319 (2017) [4] Kaufmann et al, PRL 119, 150503 (2017) [5] Bermudez et al, PRX 7, 041061 (2017)