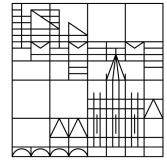


Physikalisches Kolloquium

Universität
Konstanz



Di 21.12.21
15:15 Uhr
A 701



Prof. Dr. Markus Müller
RWTH Aachen and Forschungszentrum Jülich

Fault-Tolerant Quantum Error Correction: From Theory to Experiments

To date, the construction of a scalable fault-tolerant quantum computer remains a fundamental scientific and technological challenge, due to the influence of unavoidable noise. In our talk, we introduce basic concepts of quantum error correction and topological quantum codes, which allow one to protect quantum information during storage and processing. When manipulating logical quantum states, it is imperative that errors caused by imperfect operations do not spread uncontrollably through the quantum register, requiring so-called fault-tolerant quantum circuit designs. We will discuss recent theory work from our group and experimental progress towards fault-tolerant quantum error correction on various physical platforms, including the first experimental realisation of a fault-tolerant universal logical gate set with trapped ions [arXiv:2111.12654 (2021)].

