Physikalisches Kolloquium

Universität Konstanz

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Zoom-Meeting

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Error-protected quantum information processing with parametrically-driven nonlinear oscillators

Quantum two-level systems are now routinely used to encode qubits, but their inherent fragility can result in errors in the encoded information. For emerging quantum technologies such as quantum computing or quantum simulation to become feasible, these errors need to be mitigated, which generally comes at a heavy cost in terms of hardware overhead. In this talk, I will discuss how qubits that are instead encoded into quantum states of parametrically-driven nonlinear superconducting oscillators are intrinsically protected against certain quantum errors and can therefore significantly reduce this hardware overhead. In addition to presenting the experimental results of our recent demonstration of such an oscillator qubit, I will give an overview of future applications of this type of qubit in quantum information processing and in fundamental studies of out-of-equilibrium systems.