MATTER AND TECHNOLOGIES

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RF Readout Systems for Quantum Applications

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Room-temperature data acquisition for upcoming superconducting cryogenic circuits often requires high-fidelity radio frequency signal generation and analysis. Integrated software-defined radio systems enable high throughput, low-latency interfacing, and readout capability to perform these tasks. These systems consist of FPGAs for real-time digital signal processing, AD/DA conversion, and a signal conditioning front-end for mixing the signals into the desired frequency range.
Modern converters with sampling rates in the GHz range enable higher signal bandwidth to increase frequency multiplex factors but necessitate multi-octave radio frequency engineering. Errors of various origins affect the signal at every stage of the readout chain, thus requiring careful management of their undesirable effects. This talk will give an introduction to commonly employed strategies to ensure quantum-limited readout for qubits and precision cryogenic sensor readout technology and give an insight into the lessons learned from past and ongoing developments within our group.

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