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Novel approaches to optomechanical transduction ONDREJ CERNOTIK, KLEMENS HAMMERER, Leibniz University Hannover — In recent years, mechanical oscillators received attention as a promising tool for frequency conversion between microwaves and light. A general, bi-directional transducer with high efficiency is still far from reach of current technology; finding new strategies for optomechanical transduction allows us to relax the requirements and bring these systems closer to an experimental realization. An interesting example is generation of entanglement between two superconducting qubits using measurement and postselection. Here, the mechanical oscillators interacts directly with the superconducting transmon qubit in such a way that it feels a qubit-state dependent force. This force can then be read out using a cavity field; reading out two such systems sequentially realizes an effective total spin measurement. Starting from a suitable initial state and employing postselection, entanglement can be generated. Another interesting approach is to use an array of optomechanical transducers in which the output fields of one transducer are fed into the input of the next. The periodicity of the array results in a joint dispersion relation for the propagating microwave and optical fields. The resulting structure can be used to control the conversion bandwidth and forward and backward scattering.

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