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**Quantum-Opto-Mechanics: Towards quantum optical control of micromechanical resonators**

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Current experiments aim to achieve coherent quantum control over massive mechanical resonators. Quantum optics provides a rich toolbox to prepare and detect mechanical quantum states, in particular by combining nano- and micromechanical resonators with high-finesse cavities. To realize the full potential of mechanical systems for quantum experiments eventually requires the conjunction of strongly coupled mechanical resonators with the preparation of quantum ground states. I will report our latest progress in Vienna towards these goals. I will also discuss the prospect of generating optomechanical quantum entanglement, which is at the heart of Schrödinger's cat paradox, and the possibility of mechanical quantum transducers as a new technology for quantum information processing.

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