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### Quantum measurement and control of optomechanical systems

The emerging field of quantum optomechanics combines quantum optics and new fabrication techniques to enable the quantum control of macroscopic mechanical resonators. This now provides a new approach for controlling the mutual interaction between light and mesoscopic structures, which enables new applications from sensing to memories, and also enables fundamental experiments at the quantum-classical boundary. I will give an overview of this new field and discuss some specific models. These include a scheme to conditionally prepare a macroscopic mechanical resonator in an energy eigenstate by measurement, single photon optomechanics, and quantum entanglement in optomechanical networks.

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