

Quantum Engineering of Nanomechanical Systems

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In nanomechanical systems, we study tiny mechanical vibrations in sub-micrometer sized resonators. With frequency up to GHz and quality factor over 10 million, nanomechanical systems provide new prospects for the detection of weak forces and the testing of quantum and classical boundary in macroscopic objects. In recent experiments, it was shown that nanomechanical systems have demonstrated features approaching the quantum mechanical limit.

In this talk, I will present several aspects of quantum engineering of nanomechanical systems, including the coupling of nanomechanical mode with atomic systems, side band cooling of nanomechanical mode to the ground state, and quantum entanglement and quantum teleportation of nanomechanical modes. In addition, I will briefly review other directions of my research in the beginning of this talk.