

Quantum experiments exploiting the radiation pressure interaction between light and matter

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Mechanical oscillators coupled to light via the radiation pressure force have attracted significant attention over the past years for allowing tests of quantum physics with massive objects and for their potential use in quantum information processing. Recently demonstrated quantum experiments include entanglement and squeezing of both the mechanical and the optical mode. So far these quantum experiments have almost exclusively operated in a regime where the light field oscillates at microwave frequencies. Here we would like to discuss recent experiments where we demonstrate non-classical mechanical states by coupling a mechanical oscillator to single optical photons. These results are a promising route towards using mechanical systems as quantum memories, for quantum communication purposes and as light-matter quantum interfaces.