Coupling a Bose condensate to micromechanical oscillators\textsuperscript{1}

CHANDLER KEMP, ELI FOX, SCOTT FLANZ, MUKUND VENGALATTORE, Cornell University — We describe the construction of a compact apparatus to investigate the interaction of a spinor Bose-Einstein condensate and a micromechanical oscillator. The apparatus uses a double magneto-optical trap, Raman sideband cooling, and evaporative cooling to rapidly produce a $^{87}$Rb BEC in close proximity to a high Q membrane. The micromotion of the membrane results in small Zeeman shifts at the location of the BEC due to a magnetic domain attached to the oscillator. Detection of this micromotion by the condensate [1] results in a backaction on the membrane. We investigate prospects of using this backaction to generate nonclassical states of the mechanical oscillator [2].


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