

Abstract Submitted
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Nonlinear Optics of Ultracold Atoms in an Optical Cavity.

KATER MURCH, UC Berkeley, KEVIN MOORE, SUBHADEEP GUPTA, DAN STAMPER-KURN — We report observations of non-linear optical phenomena in an ultracold atomic gas in a Fabry-Perot cavity in the single atom strong coupling regime. Up to 5×10^4 ^{87}Rb atoms are trapped at the antinodes of an in-cavity far-off resonance optical standing wave. We have observed significant Kerr non-linearity and dispersive optical bistability in the transmission of a probe beam through the cavity at our lowest detectable intensities corresponding to 10^{-2} photons in the cavity. The non-linear index of refraction responsible for these effects arises from the collective motion of atoms in the combined potential of the trap and probe.

Kater Murch
UC Berkeley

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