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Studies of many atoms strongly coupled to a high finesse optical cavity. KATER MURCH, UC Berkeley, KEVIN MOORE, SUBHADEEP GUPTA, DAN STAMPER-KURN — We utilize a hybrid magnetic trap – cavity QED apparatus to conduct studies of ultracold atoms strongly coupled to a high finesse optical cavity. Up to 5 x 10^4 ^{87}Rb atoms are trapped at the antinodes of an in-cavity far-off resonance optical standing wave. Atoms can be either probed directly using absorption imaging, or indirectly from the shift of the cavity resonance. Using a combination of these probes, we conduct measurements of the heating in the system. For strongly coupled cavities, quantum-optical properties of the cavity system strongly influence the heating of the atomic sample. Cavity-induced heating becomes dominant for atomic systems with large single-atom cooperativity, and may limit cavity-based quantum non-demolition measurements such as those being pursued experimentally by our group and others.

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