

Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

A Cold-Strontium Laser in the Superradiant Crossover Regime

MATTHEW NORCIA, JAMES THOMPSON, JILA, University of Colorado at Boulder — We demonstrate and study a laser based on the 7.5 kHz linewidth dipole forbidden 3P_1 to 1S_0 transition in laser-cooled and tightly confined ^{88}Sr . We can operate this laser in the bad-cavity or superradiant regime, where coherence is primarily stored in the atoms, or continuously tune to the more conventional good-cavity regime, where coherence is primarily stored in the light field. We show that the cold-atom gain medium can be repumped to achieve quasi steady-state lasing. We also demonstrate up to an order of magnitude suppression in the sensitivity of laser frequency to changes in cavity length, verifying a key feature of proposed narrow linewidth lasers based on dipole-forbidden transitions in alkaline earth atoms.

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Date submitted: 28 Jan 2016

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