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Dynamics of a "Nearly Lightless" Laser JOSHUA WEINER, JUSTIN BOHNET, KEVIN COX, MATTHEW NORCIA, JAMES THOMPSON, JILA and University of Colorado at Boulder — Bad-cavity (superradiant) lasers using highly forbidden atomic transitions are expected to achieve coherence lengths on the order of the earth-sun distance, potentially improving optical atomic clocks and other precision measurements. We have realized a proof-of-principle cold-atom Raman laser operating deep in the superradiant regime, where the effective atomic linewidth is much narrower than the cavity linewidth. Here we present experimental studies of active and passive sensing of external fields with a superradiant laser, relaxation oscillations, and phase synchronization between two spatially distinct ensembles emitting into a single optical cavity.

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