

Abstract Submitted
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Limit Cycles and Chaos via Quasi-periodicity in Two Coupled Ensembles of Ultra-cold Atoms.¹ ANIKET PATRA, EMIL YUZBASHYAN, Rutgers University, BORIS ALTSHULER, Columbia University — We study the dynamics of two mesoscopic ensembles of ultra-cold two level atoms, which are collectively coupled to an optical cavity and are being pumped incoherently to the excited state. Whereas the time independent steady states are well understood, little is known about the time dependent ones. We explore and categorize various time dependent steady states, e.g. limit cycles and chaotic behavior. We draw a non-equilibrium phase diagram indicating different steady-state behaviors in different parts of the parameter space. We discuss the synchronization of the two ensembles in the time dependent steady states. We also show the onset of chaos via quasi-periodicity. The rich time dependent steady-state behavior, especially the existence of chaos, opens up possibilities for several engineering applications.

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