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Steady-State Superradiance in a Beam Laser Configuration[1] HAONAN LIU, JOHN COOPER, ATHREYA SHANKAR, MURRAY HOLLAND, Univ of Colorado - Boulder — Previous studies of steady-state superradiance have involved atoms with ultranarrow linewidth pumped incoherently in the so-called bad-cavity regime where the cavity decay rate far exceeds that of the atoms. The light emitted in the superradiance regime promises to be coherent with a linewidth that for realistic experimental parameters is predicted to be as narrow as a few millihertz. However, in reality it can be difficult to realize the incoherent pumping process in experiments without suffering the adverse effects of radiative heating. Here we propose a straightforward experimental configuration of the superradiance laser, *i.e.*, the beam laser, which is "pumped" by introducing a continuous beam of excited atoms into a lossy cavity. Our numerical simulations give strong evidence for the development of macroscopic spin-spin correlations and thus the ability to enter the parameter space of steady-state superradiance. With the atom shot noise included, we show that in the limit of large atom number, it is still possible to recover similar results to those previously observed for the superradiant laser. The influence of Doppler effects and the new methods necessary due to the breakdown of permutation symmetry are discussed.

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Haonan Liu
Univ of Colorado - Boulder

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