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Two-channel emission model for collective quantum jumps in Rydberg atoms LYNDON CAYAYAN, JAMES CLEMENS, Miami University — We consider a system of driven, damped Rydberg atoms with dipole-dipole energy shifts which can give rise to a Rydberg blockade when the atoms are driven on resonance and collective quantum jumps when the atoms are driven off resonance. For the damping we consider a two-channel emission model with competition between fully independent and fully collective spontaneous emission. For independent emission a quasiclassical model predicts a bistable steady state and quantum fluctuations drive collective jumps between the two bistable branches. We show that the collective emission is enhanced, relative to the independent emission, which shifts the total effective spontaneous emission rate and impacts the presence or absence of bistability predicted by the quasiclassical model.

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