Driving-induced population trapping and linewidth narrowing via the quantum Zeno effect - DTU Orbit (28/08/2019)

Driving-induced population trapping and linewidth narrowing via the quantum Zeno effect

We investigate the suppression of spontaneous emission from a driven three-level system embedded in an optical cavity via a manifestation of the quantum Zeno effect. Strong resonant coupling of the lower two levels to an external optical field results in a decrease of the decay rate of the third upper level. We show that this effect has observable consequences in the form of emission spectra with subnatural linewidths, which should be measurable using, for example, quantum dot-cavity systems in currently obtainable parameter regimes, and may find use in applications requiring the control of single-photon arrival times and wave-packet extent. These results suggest an underappreciated link between the Zeno effect, dressed states, and Purcell enhancement.

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