Probe spectrum of alkali atoms in a weakly driven two mode cavity

JAMES CLEMENS, Miami University — We calculate the probe spectrum for alkali atoms in a damped, weakly driven cavity supporting two degenerate orthogonally polarized modes. One mode is weakly driven by a linearly polarized external field. The atoms, initially prepared in a single hyperfine ground state, couple to the driven mode as well as the orthogonally polarized mode by making transitions to other hyperfine sublevels. We compare probe spectra for three- and four-level models. In both cases the spectrum for the driven mode is a vacuum Rabi doublet familiar from the driven, damped Jaynes-Cummings model. The undriven mode spectrum is a triplet with the maximum on resonance for the three level model while the four level model has a four peaked spectrum. We discuss the role of strong coupling to the undriven mode in accounting for the qualitative difference between the models.