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Control of ground state quantum beats in Cavity QED^1 PABLO BARBERIS-BLOSTEIN, Universidad Nacional Autonoma de Mexico, HOWARD CARMICHAEL, University of Auckland, LUIS OROZCO, ANDRES CIMMARUSTI, PATTERSON BURKLEY, KULIN SIMONE, University of Maryland — Ground state quantum beats oberserved in the second order intensity correlation from a continuously driven atomic ensemble inside a two mode optical cavity are subject to decoherence. While driving the cavity with light of linear polarization $(\pi \text{ transitions})$ the second order autocorrelation function is measured in the undriven mode (orthogonal polarization): a first photon detection prepares a superposition of atomic ground-state Zeeman sublevels and the second measures the ground state beats. Between these two detections, the atoms can become excited and return to the ground state, emitting a photon back into the driven cavity mode or into modes other than the cavity modes. Depending on the drive strength this process can happen several times. Each time there is a relative phase advance between the Zeeman sublevels. It is possible to monitor this process by measurements on the driven mode. Here we propose a scheme to manipulate the loss of amplitude of the beats (decoherence) and the beat frequency shift, by controlling the driving field and postselecting on the basis of information gathered through measurement of the cavity modes.

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