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Dissipation and Coherence; an example in Cavity QED[1]

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Dissipation destroys coherence in many quantum systems, but under particular circumstances, it can create and probe it. Our experiment in optical cavity QED where the rates of spontaneous emission and the escape of the light from the cavity are similar to the coherent coupling between the atom and the cavity mode shows how the detection of spontaneous emission with a particular polarization creates coherent superpositions of ground states. These superpositions are robust and through conditional measurements of the spontaneous emission show their evolution. We show experimental and theoretical studies of the system that works with a slow beam of cold ^{85}Rb atoms. We identify different contributions to the signal and show ways to control it and perform quantum feedback. Work done in collaboration with David G. Norris, Andres Cimmarusti, Howard J. Carmichael, and Pablo Barberis

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