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Coherent Optical Phenomena in Quantum Dots

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The quantum confinement provided by a semiconductor quantum dot suppresses much of the many body physics associated with the coherent nonlinear optical response observed in higher dimensional systems. This makes them attractive for potential device applications where atomic like properties, such as high Q resonances, strong optical interactions, or long quantum coherence times, could be important. In this talk, we present recent results demonstrating high field effects beyond Rabi oscillations including the Mollow absorption spectrum showing gain without inversion, dark state formation in single electron doped dots, and suppression of nuclear fluctuations by the hyperfine interaction leading to longer electron spin coherence times.