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Photon-photon correlations from a resonantly driven quantum dot in a microcavity EDWARD FLAGG, The University of Texas at Austin, ANDREAS MULLER, NIST Gaithersburg, JOHN ROBERTSON, THAI TRAN, The University of Texas at Austin, DENNIS DEPPE, The University of Central Florida, WENQUAN MA, JAIYU ZHANG, GREGORY SALAMO, The University of Arkansas, CHIH-KANG SHIH, The University of Texas at Austin — We demonstrate strongly driven resonance fluorescence from a single InGaAs quantum dot in a planar microcavity by measuring the oscillatory second-order correlation function, $g^{(2)}(t)$, of the photoluminescence. Resonance fluorescence is emission from a coherently and resonantly excited two-level quantum system and under strong CW excitation the system undergoes one or more Rabi oscillations before emitting. These oscillations are observed in $g^{(2)}(t)$ rather than the simple anti-bunching dip caused by incoherent excitation. This behavior shows, along with other measurements, that the quantum dot is well-described by a simple two-level model even at high excitation intensities. The dot is resonantly excited with a laser via the waveguide mode of the microcavity and the emission couples into the Fabry-Perot mode where it is collected. The ability to perform coherent manipulations on a single quantum emitter is a critical step on the road to many quantum optical devices including high efficiency indistinguishable single photon sources.

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