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Coherent optical spectroscopy of a strongly coupled semiconductor microcavity quantum-dot system KARTIK SRINIVASAN[1], OSKAR PAINTER, Dept. of Applied Physics, Caltech, Pasadena, CA 91125 — Chip-based systems involving a semiconductor microcavity coupled to an embedded quantum dot (QD) offer a scalable, stable platform for optical cavity quantum electrodynamics. To harness this potential in a manner consistent with many protocols for quantum information processing, the system must be coherently probed and manipulated. However, experiments in these systems have largely relied on incoherent excitation through photoluminescence (PL). Here, we describe recent experiments [1] in which a fiber taper waveguide is used to perform steady-state coherent linear and nonlinear optical spectroscopy of a strongly coupled microcavity-QD system, probing the system on its photonic channel (rather than its matter channel, as in PL). Under weak driving, vacuum Rabi splitting is observed, while increasing the drive strength reveals saturation for an average intracavity photon number of less than one. [1] K. Srinivasan and O. Painter (2007), to appear in Nature, Dec. 6, 2007 (preprint: physics/0707.3311).

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