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Quantum Dots in H1 Photonic Crystal Microcavities for Quantum Information JENNA HAGEMEIER, Physics Department, University of California Santa Barbara, USA, CRISTIAN BONATO, Huygens Laboratory, Leiden University, The Netherlands, TUAN-ANH TRUONG, Materials Department, University of California Santa Barbara, USA, HYOCHUL KIM, Physics Department, University of California Santa Barbara, USA, MORTEN BAKKER, GARETH J. BEIRNE, MARTIN P. VAN EXTER, Huygens Laboratory, Leiden University, The Netherlands, PIERRE PETROFF, ECE Department, University of California Santa Barbara, USA, DIRK BOUWMEESTER, Physics Department, University of California Santa Barbara, USA; Huygens Laboratory, Leiden University, The Netherlands — Coupling semiconductor quantum dots to optical microcavities is a promising technique for implementing quantum information processing protocols in the solid-state. By placing one or more emitters in a cavity, it is possible to create an efficient source of single photons or to explore collective interactions of few-emitter systems. Our devices consist of two layers of quantum dots, embedded in the cavity region of H1 photonic crystal microcavities. One of the quantum dot layers can be frequency-tuned deterministically, allowing two resonant quantum dots to be coupled to a single cavity mode. Because good mode-matching between the cavity mode and the input/output channel is necessary for many applications, we optimize the far-field profiles of our H1 cavities and demonstrate strong enhancement of the external mode matching properties. We will discuss our far-field optimization results as well as our ongoing work to study interactions of multiple emitters in a cavity.

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