Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Design of Optical Microcavities for Coupling to Nitrogen-Vacancy Centers in Diamond JENNA HAGEMEIER, University of California Santa Barbara, California, USA, TOENO VAN DER SAR, Kavli Institute of Nanoscience, Delft University of Technology, The Netherlands, SUSANNA THON, HYOCHUL KIM, DUSTIN KLECKNER, University of California Santa Barbara, California, USA, WOLFGANG PFAFF, Kavli Institute of Nanoscience, Delft University of Technology, The Netherlands, ERWIN HEERES, TJERK OOSTERKAMP, Leiden Institute of Physics, Leiden University, The Netherlands, PIERRE PETROFF, Department of Materials and Department of ECE, University of California Santa Barbara, California, USA, RONALD HANSON, Kavli Institute of Nanoscience, Delft University of Technology, The Netherlands, DIRK BOUWMEESTER, University of California Santa Barbara, California, USA and Leiden University, The Netherlands — Nitrogen-Vacancy (NV) centers in diamond have emerged as promising candidates for solid state qubits. When placed in a confined optical field, such as exists in an optical microcavity, the properties of single quantum emitters can be drastically modified. In the weak coupling regime, the rate of spontaneous light emission from the quantum emitter can be enhanced via the Purcell effect. We demonstrate deterministic coupling between single NV centers and photonic crystal microcavities in Gallium Phosphide (GaP). Designs of novel optical cavities for coupling to NV centers in diamond will also be discussed.

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Date submitted: 19 Nov 2010 Electronic form version 1.4