

MAR12-2011-000625

Abstract for an Invited Paper  
for the MAR12 Meeting of  
the American Physical Society

**Towards large-scale quantum computing using spins and photons on a chip**

KAI-MEI FU, University of Washington

Nitrogen-vacancy (NV) centers in diamond are attractive candidates for quantum bits for quantum information processing. Theoretically it should be possible to build large-scale quantum optical networks with the NV-diamond system. We report HP Labs' recent results toward coupling chip-based optical cavities to negatively charged NV centers in two systems: all diamond micro-ring cavities coupled to native NV centers and GaP micro-ring cavities coupled to near surface centers formed by implantation and annealing. In both systems we observe an enhancement of the spontaneous emission rate into the NV zero-phonon line. Additionally we will discuss recent results in engineering the optical properties of near-surface NV centers suitable for photonic coupling.