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Strong-field interactions between a nanomagnet and a cavity mode[1] O. SOYKAL, M. E. FLATTÉ, OSTC and Department of Physics and Astronomy, University of Iowa — We analyze the interaction of a nanomagnet with a single mode of a microcavity in a fully quantum-mechanical treatment. We consider a spherical cavity roughly 1 mm^3 in volume, and a nanomagnet consisting of 10^9 spins treated as a macrospin, in the presence of a static magnetic field. For an initial configuration of no photons in the cavity and the macrospin oriented antiparallel to the field, the interaction Hamiltonian contains magnet-microwave mode coupling terms that exceed several GHz. Thus for quality factors in excess of 100, strong-field effects should be observable in the nanomagnet/cavity dynamics. Coherent states of the nanomagnet/photon system are characterized by large oscillations in the photon number (and nanomagnet spin), and are characterized by exceptionally long dephasing times.

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