Abstract Submitted
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Spin Optodynamics in Magnetic Solids[1] TIANYU LIU, Optical Science and Technology Center and Department of Physics and Astronomy, University of Iowa, XUFENG ZHANG, HONG X. TANG, Department of Electrical Engineering, Yale University, MICHAEL E. FLATTÉ, Optical Science and Technology Center and Department of Physics and Astronomy, University of Iowa — Coherent couplings between cavity photons and spin ensembles, such as cold atoms [1] and nanomagnets [2], have been studied theoretically before. By virtue of magneto-optic interactions, we propose here to use a photonic cavity made of magnetic crystal to study the intrinsic coupling rate (g_0) that describes the effect of a single photon on the cavity. Cavity bistability due to multistatic magnetization is identified, and with clever choosing of driving fields, one can realize coherent amplification/damping of spin-wave amplitudes, which is superior than the incoherent methods, such as the one using spin transfer torque. Our theory has great potential in developing all optical control of magnonics.

[1] N. Brahms and D. M. Stamper-Kurn, Phys. Rev. A **82**, 041804 (2010).
[2] Ö O. Soykal and M. E. Flatté, Phys. Rev. Lett. **104**, 077202 (2010).

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