Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Spin-mediated Hybrid Quantum Optomechanics[1] AIRLIA SHAFFER, LAURA CHANG, YOGESH SHARAD PATIL, Cornell University, FRANCESCO BARIANI, University of Arizona, SWATI SINGH, ITAMP, Harvard-Smithsonian Center for Astrophysics, ADITYA DATE, California Institute of Technology, SRIVATSAN CHAKRAM, Cornell University, KEITH SCHWAB, California Institute of Technology, PIERRE MEYSTRE, University of Arizona, MUKUND VENGALATTORE, Cornell University — We describe our realization of a hybrid quantum system where a macroscopic mechanical resonator is coupled to the collective spin of an ultracold gas through a remote optical interface. Through this interface, the spin ensemble is capable of sympathetic cooling, sub-SQL detection and quantum control of the mechanical resonator. As such, this hybrid quantum system presents a powerful scheme to combine the robustness of the mesoscopic resonator with the sensitivity and coherence of the spin ensemble. Our ongoing studies of this system include various aspects of quantum metrology and the out-of-equilibrium dynamics of open quantum systems.

[1]This work is supported by the ARO MURI on non-equilibrium dynamics, the DARPA QuASAR program through a grant from the ARO and an NSF INSPIRE award.

Yogesh Patil
Cornell University

Date submitted: 30 Jan 2015 Electronic form version 1.4