

Abstract Submitted  
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**Cold atoms coupled with mechanical oscillators** JOSE VALENCIA, CRIS MONTOYA, GAMBHIR RANJIT, ANDREW GERACI, University of Nevada, Reno, MATT EARDLEY, JOHN KITCHING, National Institute of Standards and Technology, Boulder, CO — Mechanical resonators can be used to probe and manipulate atomic spins with nanometer spatial resolution and single-spin sensitivity, ultimately enabling new approaches in neutral-atom quantum computation, quantum simulation, or precision sensing. We describe our experiment that manipulates the spin of trapped, cold Rb atoms using magnetic material on a cantilever. Cold atoms can also be used as a coolant for mechanical resonators: we estimate that ground state cooling of an optically trapped nano-sphere is achievable when starting at room temperature, by sympathetic cooling of a cold atomic gas optically coupled to the nanoparticle.

Jose Valencia  
University of Nevada, Reno

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