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Resonant interaction of trapped cold atoms with a magnetic cantilever tip CRIS MONTOYA, JOSE VALENCIA, ANDREW GERACI, University of Nevada, Reno, MATTHEW EARDLEY, JOHN KITCHING, National Institute of Standards and Technology — We report the resonant coupling of laser cooled trapped Rb atoms to a micro-cantilever with a magnetic tip. An atom chip is used to trap, cool, and transport the atoms to the tip of the cantilever. The capacitively-driven cantilever oscillation produces Zeeman state transitions which result in a loss of population in the trap. In a suitably scaled setup, mechanical resonators could be used to probe and manipulate atomic spins with nanometer spatial resolution and single-spin sensitivity; this technique may enable new approaches in neutral-atom quantum computation, quantum simulation, or precision sensing.

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