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Coupling ultra-cold atoms with nano-mechanics ANDREW GERACI, University of Nevada, Reno, MATT EARDLEY, National Institute of Standards and Technology, Boulder, CO, CRIS MONTOYA, University of Nevada, Reno, JOHN KITCHING, National Institute of Standards and Technology, Boulder, CO — Recently there has been a significant interplay between the fields of solid-state and atomic physics, ranging from using ultra-cold atoms to simulate condensed-matter systems to physically coupling cold atoms with solid state devices such as micro-resonators. In particular, micro-mechanical resonators can be used to manipulate and probe cold atomic samples with single-spin sensitivity and sub-micron spatial resolution. We describe ongoing experimental efforts to couple laser-cooled Rb atoms to a magnetic cantilever tip, and discuss prospects for using nano-resonators for individual lattice-site addressing of atoms trapped in optical lattices [1]. Looking forward, hybrid quantum systems consisting of cold atoms interfaced with mechanical devices may have applications in quantum information science.

[1] A. A. Geraci and J. Kitching, Phys. Rev. A 80, 032317 (2009).

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