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Combining Cavity QED and Atom Chips THOMAS PURDY, DANIEL BROOKS, DAN STAMPER-KURN, UC Berkeley, Department of Physics — We have integrated the magnetic trapping technology of atom chips with high finesse optical cavities. Our high current capacity atom chip, consisting of a micromachined silicon substrate with thick, buried copper wires, can confine clouds of cold atoms to dimensions much less than an optical wavelength. Multiple Fabry-Perot optical resonators in the single-atom strong coupling regime of cavity QED are integrated with the chip in a configuration where the optical cavity modes form through micromachined holes which perforate the chip substrate. Because the atom chip affords precise control of the position of atoms within the standing-wave structure of the cavity mode, we will be able to study the coupling between optical and mechanical degrees of freedom of the atom-cavity system at the level where quantum effects play an important role.

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