Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Microwave and RF micro-traps S. AUBIN, A. ZILTZ, Dept. of Physics, College of William and Mary — We present a theoretical study of far-detuned microwave and radio-frequency (RF) micro-traps on atom chips that derive their trapping potential from the AC Zeeman effect. These traps are inherently spin-dependent and can be used to confine any alkali ground state. Furthermore, they can be used to simultaneously target qualitatively different potentials to different spin states and atomic species. RF micro-traps traps can operate at any magnetic field, thus enabling the use of magnetic Feshbach resonances to tune atom-atom interactions. Remarkably, we find that the potential roughness that frequently plagues atom chip micro-magnetic traps is strongly suppressed in RF micro-traps. These traps can also be used for RF evaporation and for producing adiabatic potentials by applying an additional near-resonant RF field. RF micro-traps are well suited for generating one-dimensional quantum gases with tunable interactions, atomtronics, and atom interferometry.

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Date submitted: 04 Feb 2011 Electronic form version 1.4