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High atom number using bichromatic forces in microsized atom traps[1] J.M. GROSSMAN, S. DESAVAGE, C.L. ADLER, St. Mary's College of Southern Maryland, F.A. NARDUCCI, Naval Air Systems Command — There is currently a push to develop miniaturized ultracold-atom devices for a variety of applications. Atom chips — microscopic magnetic traps formed by current-carrying wires on a substrate — present one route to achieve this miniaturization. Unfortunately, the number of atoms captured in a magneto-optical trap (MOT) scales as the fourth power of the radius of the trapping beams. For many applications, this directly translates to a reduction in signal-to-noise ratio. It is desirable, therefore, to find a method to recover a sizeable portion of the lost atoms without significantly increasing the complexity of the overall device. Rather than relying on absorption followed by spontaneous emission, bichromatic forces rely on absorption and stimulated emission. This force is in principle limited only by the intensity of the laser used and can greatly exceed the force exerted on an atom by a single laser field. While bichromatic forces are known to work in 1-D, their effect in 3-D still needs to be studied. Furthermore, bichromatic fields have been used for cooling, but not for trapping. In this poster, we describe the design of our apparatus to study 1-D and 2-D bichromatic fields, and present some of our preliminary measurements.

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Frank Narducci
Naval Air Systems Command

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