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Further Toward a Li-Rb Ring Interferometer RYAN OLF, G. EDWARD MARTI, ANTON ÖTTL, DAN STAMPER-KURN, Department of Physics, University of California, Berkeley — We report on the design and current status of our experimental approach to create non-trivial, multiply connected trap geometries for quantum gases and atom interferometry. Our novel setup consists of a second-generation magnetic ring trap that employs micro-fabricated magnetic coils with 3D integration housed in a low magnetic field noise environment. These coils generate very precise, smooth and tightly confining trapping fields. The diameter of the magnetic ring trap can be controlled and adjusted over a wide range, from tens of microns to several millimeters. Thus, the apparatus can provide increased sensitivity when operated as a Sagnac-type interferometer (large ring), while still allowing us to fill the ring with degenerate quantum gases and study the effects of non-trivial topology on coherence and dynamics of Bose-Einstein condensates (small ring). Further, optical access permits us to tailor the trapping potential with precisely controlled optical fields, for example, to create tunneling barriers or beam splitters. We load the ring trap with both rubidium and lithium atoms, which will allow us to explore diverse regimes of matter-wave interferometry with bosonic and fermionic atoms of differing interaction strengths, including attractive and repulsive condensates.

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