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A Novel Cavity-Based Atom Interferometer JUSTIN BROWN, BRIAN ESTEY, HOLGER MÜLLER, University of California Berkeley — The world's leading atom interferometers are housed in bulky atomic fountains. They employ a variety of techniques to increase the spatial separation between atomic clouds including high order Bragg diffraction. The largest momentum transfer in a single Bragg beamsplitter has been limited to 24 $\hbar k$ by laser power and beam quality. We present an atom interferometer in a 40 cm optical cavity to enhance the available laser power, minimize wavefront distortions, and control other systematic effects symptomatic to atomic fountains. We expect to achieve spatial separations between atomic trajectories comparable to larger scale fountains within a more compact device. We report on our progress in developing this new interferometer using cold Cs atoms and discuss its prospects for exploring large momentum transfer up to 100 $\hbar k$ in a single Bragg diffraction process. The compact design will enable the first demonstration of the gravitostatic Aharonov-Bohm effect.

Justin Brown
University of California Berkeley

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