Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Atom interferometry with large momentum transfer PEICHEN KUAN, SHAU-YU LAN, BRIAN ESTEY, HOLGER MÜLLER, UC Berkeley —
The sensitivity of light-pulse atom interferometers can be greatly improved by large momentum transfer (LMT) beam splitters and long interrogation times. Large momentum space separation Δp between two interferometric arms result in an increased phase shift proportional to Δp or even $(\Delta p)^2$, and therefore leads to superior tools for precision measurements. "BBB" beam splitters, using high order Bragg diffraction combined with Bloch oscillations, have already been demonstrated and are scalable, as their momentum transfer is not limited by the available laser power. By running an additional conjugate interferometer at the same time, noise common to both interferometers can be eliminated. We will present our work aiming at further improvements, which would allow applications requiring extremely large enclosed areas, such as test of the Einstein equivalence principle, measurements of fundamental constants, or searching for new gravitational effects.

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Date submitted: 07 Feb 2011 Electronic form version 1.4