Abstract Submitted
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Bloch oscillations for large momentum transfer and high precision in an ytterbium Bose-Einstein condensate interferometer.[1] BENJAMIN PLOTKIN-SWING, KATHERINE MCALPINE, DANIEL GOCHNAUER, BRENDAN SAXBERG, SUBHADEEP GUPTA, Univ of Washington — The narrow momentum and position spread of a Bose-Einstein condensate (BEC) can help improve atom interferometric measurements. In earlier work, we demonstrated a contrast interferometer with ytterbium (Yb) BECs[2]. Here, we report progress towards implementing a second generation Yb BEC interferometer with the goal of measuring h/m, where h is Planck's constant and m is the mass of a Yb atom, in order to determine the fine structure constant α. The use of the non-magnetic Yb atom and the symmetric geometry of the interferometer make the measurement immune to several error sources. We have produced Yb BECs in a new apparatus, and are currently installing and testing the laser pulse atom-optics needed for the interferometry sequence. The precision of our measurement scales with N^2, where 2N is the number of photon recoils separating the interfering momentum states in the interferometer. We will discuss our progress towards realizing Bloch oscillations (BO) pulses for large N. Using an extension of our previous analysis[2], we will also discuss the role of diffraction phases in our interferometer due to the BO pulses.

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[2]A.O. Jamison, B. Plotkin-Swing, S. Gupta, Phys. Rev. A 90, 06

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