Bloch oscillations for large momentum transfer and high precision in an ytterbium Bose-Einstein condensate interferometer.\textsuperscript{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\textsuperscript{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 $\alpha$. 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\textsuperscript{2}, we will also discuss the role of diffraction phases in our interferometer due to the BO pulses.

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\textsuperscript{2}A.O. Jamison, B. Plotkin-Swing, S. Gupta, Phys. Rev. A 90, 06

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