

Abstract Submitted
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Measuring the atomic recoil frequency with a grating-echo atom interferometer¹ BRYNLE BARRETT, ADAM CAREW, A. KUMARAKRISHNAN, Department of Physics and Astronomy, York University — We discuss progress toward a precise measurement of the atomic recoil frequency using a grating-echo atom interferometer. Large laser-cooled samples of ^{87}Rb with temperatures as low as $2.4\ \mu\text{K}$ have been achieved in a new experimental apparatus with a well-controlled magnetic environment. We have realized interferometer signal lifetimes approaching the transit time limit in this system ($\sim 270\ \text{ms}$), which is comparable to the timescale of Raman interferometers. The measurement technique involves exciting the sample with three chirped standing wave pulses, and mapping out the contrast of an atomic density grating as a function of the third pulse time. The signal exhibits narrow fringes that are separated by measurement timescales of $\sim 50\ \text{ms}$. This interferometer can also be used for sensitive measurements of magnetic field gradients and gravitational acceleration [B. Barrett *et al*, Phys. Rev. A **84**, 063623 (2011)].

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A. Kumarakrishnan
Department of Physics and Astronomy, York University

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