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A Dual-Condensate Interferometer for Vibration-Free Measurements R.H. LEONARD, R.A. HORNE, C.A. SACKETT, University of Virginia — A generic problem with atom interferometry is a high sensitivity to vibrational noise. In particular, the low frequency vibrations associated with building, traffic, and seismic activity can be very difficult to isolate, and can limit the usable measurement time of the interferometer. An alternative solution is to simultaneously implement two interferometers in the same apparatus, such that the vibrational noise is common mode but the signal to be measured is not. The difference in phase measured between the two interferometers then provides a signal measurement that is independent of the noise. This technique has previously been implemented effectively using non-condensed atoms for gravity gradiometry and rotational sensing. We present here a dual-interferometer scheme based on Bose-Einstein condensates confined in a linear magnetic guide. With only conventional vibration isolation, the coherence time of the interferometer is limited to about 70 ms, whereas (noisy) interference has been observed for up to 1 s. Current experimental results from the dual interferometer scheme will be presented, along with techniques for applying the scheme to various types of measurement.

Charles Sackett
University of Virginia

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