Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Experimental realisation of a BEC waveguide Sagnac atom interferometer[1] KATARZYNA KRZYZANOWSKA, Los Alamos Natl Lab, JORGE FERRERAS, Magnetic Shields Limited, KEVIN HENDERSON, CHANGHYUN RYU, MALCOLM BOSHIER, Los Alamos Natl Lab — Sagnac atom interferometers in which atoms move in free-fall can function as high-performance rotation sensors. However, the comparatively large physical size of such devices is a problem in some important applications. This issue motivates the development of waveguide Sagnac atom interferometers because they offer the prospect of a large enclosed total area in a small physics package. We are developing a Sagnac atom interferometer utilizing Bose-condensed rubidium atoms confined to a waveguide formed from a collimated laser beam. Delta-kick cooling is used to prepare low-density atomic wavepackets with a temperature of 300pK. The low temperature reduces the impact of interatomic interactions, as well as the expansion of the wavepacket during the interferometer cycle. The BEC is split, reflected and recombined with a series of Bragg pulses while the waveguide moves transversely so that the wavepacket trajectories enclose an area. We have achieved an enclosed area of 0.8 mm^2 with a coherence time of 80ms. In this talk, we will describe recent progress on the experiment and discuss important systematic errors in this type of atom interferometer.

[1]DARPA for providing main funding

Katarzyna Krzyzanowska
Los Alamos Natl Lab

Date submitted: 31 Jan 2020 Electronic form version 1.4