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An interferometer with magnetic guided Cesium atoms for inertial sensing LU QI, JIANCHENG FANG, ZHAOHUI HU, HAIRONG LI, YAN WANG, ZHUOHUAN LIU, Science and Technology on Inertial Laboratory, Beihang University, YUCHI ZHANG, College of Physics and Electronic Engineering, Shanxi University — We discuss progress toward precision measurements of inertial forces by a magnetic guided Cesium(Cs) atom interferometer using grating echo technique. About 1e8 Cs atoms are loaded from a 2D Magneto-Optical Trap to a horizontal macroscopic magnetic guide, in which atoms float and interact with 2 pulses of standing-wave lasers. The lasers are blue detuned from $6^2S_{1/2}$,F=3 $\rightarrow$ $6^2S_{3/2}$,F=4 resonance and are separated by T in time. An atom density grating is formed in the vicinity of 2T, which is illuminated by a probe laser. The Bragg scattering of the probe laser is detected with balanced heterodyne technique, by which both the amplitude and phase of the density grating are obtained. The effect of acceleration and rotation can be extracted from the phase shift of the back-scattered light. The interference time is demonstrated to be prolonged with confined Cs atoms, compared to the interferometer without magnetic guide. Some properties of Cs, including recoil frequency, are measured and decoherence mechanism of Cs atoms in the magnetic guide is studied. Now we have realized interferometry in the static guide on a time scale of 2T $\sim$ 20ms. Further enhancements are anticipated by extending the interference time scale and enclosing interferometer loop.

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