Calibration of atomic trajectories in a large-area dual-atom-interferometer gyroscope

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Atom interferometers present ultrahigh sensitivities for measuring inertial forces. The dual atom interferometers are usually used to build the gyroscope due to high rejection of common-mode noise. The symmetry and overlapping of atomic trajectories becomes very important as the area of atom-interferometer loop is increased. We demonstrate a method for calibrating atomic trajectories in a large area dual atom interferometer gyroscope [1]. The atom trajectories are monitored by modulating and delaying the Raman transition, and they are precisely calibrated by controlling the laser orientation and the bias magnetic field. The Earth' rotation rate is precisely measured with a high-precision atom-interferometer gyroscope.

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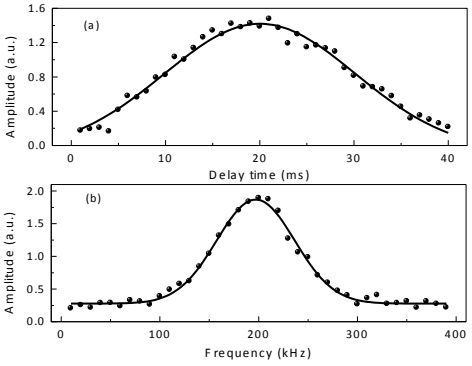

Fig.1.The atomic trajectory measurement using the interaction between the atoms and the Raman beams. (a) Delaying the Raman pulse interaction time to measure the horizontal position. (b) Scanning the Raman transition to measure the vertical velocity.

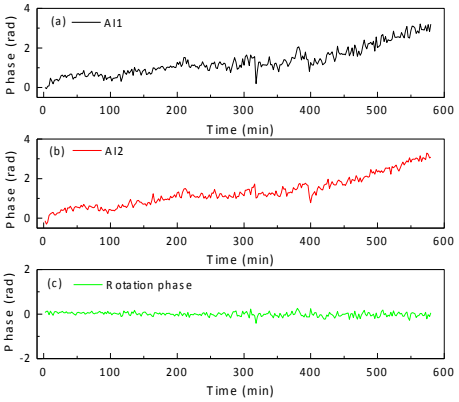

Fig. 2. The dependence of the phase drift on time. (a) The initial phases of the first atom interferometer. (b) The initial phases of the second atom interferometer. (c) The differential phase of the dual atom interferometers.

Keywords: ATOM INTERFEROMETER, ROTATION MEASUREMENT, COLD ATOM,

References

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