LICENSING OPPORTUNITY: INERTIAL POINT-SOURCE MATTER-WAVE ATOM INTERFEROMETER GYROSCOPE AND EXTRACTING INERTIAL PARAMETERS

DESCRIPTION

Problem

Point-source atom interferometers are an emerging technology for precisely measuring rotation. When the rotation rate being measured is small, extracting the rotation rate from the interferometer signal is challenging because only a fraction of an interferometer fringe is visible. In this regime, it is not normally possible to distinguish rotations from a loss of fringe contrast.

Invention

The invention, Simple, High dynamic range, and Efficient Extraction of Phase map (SHEEP), is a technique to directly measure the atom phase gradient pattern in a point source matter-wave atom interferometer gyroscope. By making measurements at several interferometer phase set points, a full interferometer fringe can be reconstructed and the rotation rate of the system can be clearly extracted. This make the extraction of inertial (gyroscopic) motion in a point-source atom interferometer possible in the low-rotation-rate regime.

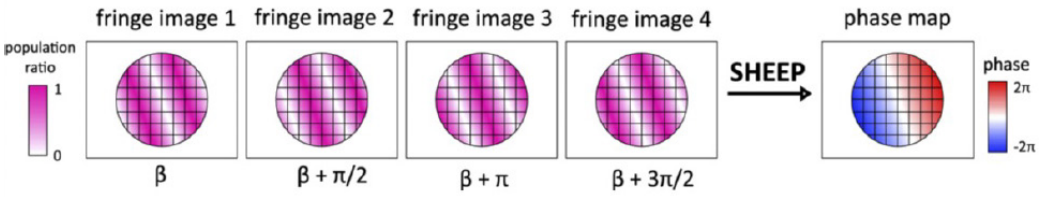
BENEFITS

Commercial Application

Inertial navigation systems rely on precise rotation and acceleration measurements to establish position. Atom interferometer gyroscopes are likely to be an important tool for future such systems. Atom interferometer gyroscopes are likely to have better long-term stability, accuracy and scale factor stability than conventional technologies.

Competitive Advantage

This has a number of advantages over previous methods, including the ability to measure smaller rotation rates, data processing that does not require fitting a 2D sine function to a data image, a higher measurement bandwidth, a reliable measurement with low contrast fringes, and an unambiguous rotation measurement. It is a simple and powerful method that is advantageous for an inertial navigation system.



An example showing how four interferometer images taken at different phases can be combined to create a phase map, which uniquely determines the rotation rate.

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