

Docket #: S13-118

Atom interferometer for high precision navigation and gravity sensing

Researchers in Prof. Mark Kasevich's laboratory have developed a patented “point source” interferometer designed to precisely sense inertial force with a simple physical configuration suitable for portable field devices such as gyrocompasses, navigation systems and metrology instruments. It uses multi-axis (two rotation, one acceleration) sensing at long interrogation times to directly characterize phase shifts by combining spatially resolved imaging with a localized atomic source. This design improved acceleration sensitivity more than 2 orders of magnitude over previous limits.

Stage of Research

The inventors demonstrated a light-pulse atom interferometer with an inferred acceleration sensitivity of $6.7 \times 10^{-12}g$ for each shot.

Applications

- **Inertial measurement unit**, for portable, fieldable instruments with end user applications such as:
 - compact, high accuracy inertial navigation for autonomous vehicles
 - precision gyrocompassing/attitude determination
 - optical wavefront metrology

Advantages

- **High precision** - acceleration sensitivity more than 2 orders of magnitude over previous limits

- **Low-cost:**
 - single shot mode where useful data can be obtained from a single interferometer run
 - simple physical configuration suitable for portable instruments

Publications

- S.M. Dickerson, J.M. Hogan, A. Sugarbaker, D.M.S. Johnson, and M. A. Kasevich. ["Multiaxis Inertial Sensing with Long-Time Point Source Atom Interferometry"](#) *Physical Review Letters*, published 19 August 2013.

Patents

- Published Application: [20140375998](#)
- Issued: [9,018,579 \(USA\)](#)

Innovators

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