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 multiaxis (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 6.7×10^{-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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