

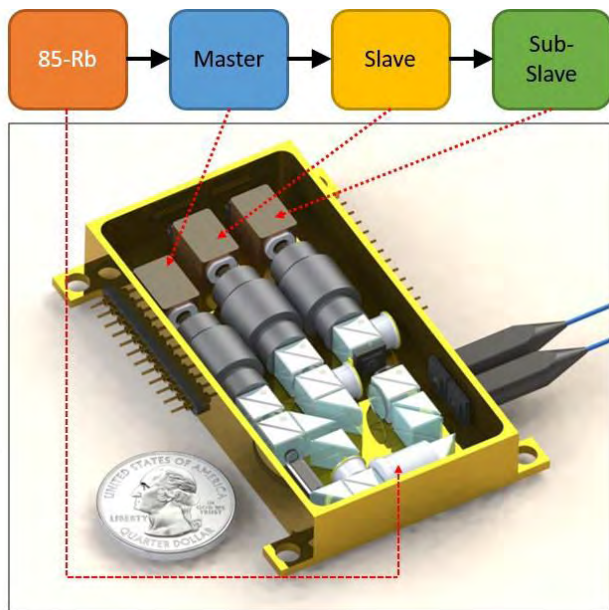
Project Title: Compact Phase Locked Laser System for Atom Interferometric Inertial Sensors

Small Business Information

- Firm Name: *Physical Sciences Inc.*
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Company Logo: 

Project Photo:



General

- Topic Number: N211-094
- Current Technology Readiness Level (TRL): TRL 4
- Projected TRL/Date: TRL 6, January 2025
- Keywords: Navigation, quantum sensor, atom interferometry, accelerometer, Laser source

The Challenge

Quantum inertial sensors also known as atom interferometers (AI) can provide the sensitivity and accuracy required for high-performance inertial navigation applications, however, the size, weight, and power (SWaP) of currently demonstrated AI greatly exceed the practical limits for inertial navigation systems (INS).

The Innovation

To overcome this challenge, Physical Sciences, Inc. (PSI) develops the Simplified Atom Interferometer Laser System (SAILS) that will be capable of generating two frequency-referenced and phase-coherent optical wavelengths within a minimum amount of electro-optics and optics involved.

A key innovation is a recognition that only two frequencies are required at any given time in the sequence and the development of a universal AI laser system using a reference combined with two frequency-agile lasers.

Further innovations include: an optical phase modulator based on thin-film lithium niobate, a miniature optical isolator tailored for the needs of this particular optical setup and custom-designed low SWaP housing of distributed feedback lasers (DBR).

The Naval Benefit

Precise navigation is the key component for success for a variety of Navy missions. Quantum sensors are high impact investment in strategic-grade accelerometers for GPS-denied navigation. Of all technologies, only the atom interferometers (AI) have demonstrated comparable or exceeding accuracy compare to state-of-the-art mechanical accelerometers and gyroscopes.

SAILS is enabling technology that allows to drastically reduce SWaP of optical systems required for AI and thus makes possible field use of AI for the Navy's needs. Implementation of AI can greatly increase the accuracy of navigation in GPS-denied or GPS-degraded environment.

The Future

PSI's commercialization approach will focus on either strategic alliances through sales and marketing agreements with established product companies; or licensing agreements with large industrial partners.

We anticipate a significant size in the defense market for this technology. For example, we consider that a SAILS unit could be utilized within the inertial guidance system to replace the current mechanical accelerometers with atom-based accelerometers.

SAILS-based AI is beneficial for other government agencies. For example, NASA routinely employs gravimeters for multiple missions. Further, AIs have commercial applications for both navigation and gravimeters.