

Topic: N131-046

## Physical Sciences Inc.

### Compact LIDAR for Continuous Monitoring of Atmospheric Extinction

The effectiveness of a high energy laser weapon in a given engagement can be enhanced via environmental situational awareness. This technology is a light detection and ranging sensor that measures atmospheric extinction as a function of range and direction around a vessel. The sensor is highly compact, ruggedized, and automated. Initial targeted platforms include high energy laser weapon system demonstrators. The system design has undergone extensive thermo-elastic modeling to ensure that alignment will be maintained in operation. The system is being prototyped and its functionality verified. Physical Sciences Inc. specializes in providing advanced electro-optic-based active and passive sensors for critical problems in remote sensing. Our goal is to integrate and transition this technology into government and prime contractor systems requiring environmental situational awareness.

### Technology Category Alignment:

None

None

None

### Contact:

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**SYSCOM:** NAVSEA

**Contract:** N00024-15-C-4054

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N00024-15-C-4054](https://navystp.com/vtm/open_file?type=brochure&id=N00024-15-C-4054)

# Department of the Navy SBIR/STTR Transition Program

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NAVSEA #16-590

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Compact LIDAR for Continuous Monitoring of Atmospheric Extinction

Physical Sciences, Inc.

## WHO

**SYSKOM:** NAVSEA

**Sponsoring Program:** PMS 405

**Transition Target:** Solid State Laser Technical Maturation Program (SSL-TM), Laser Weapon System Demonstrator (LWSD)

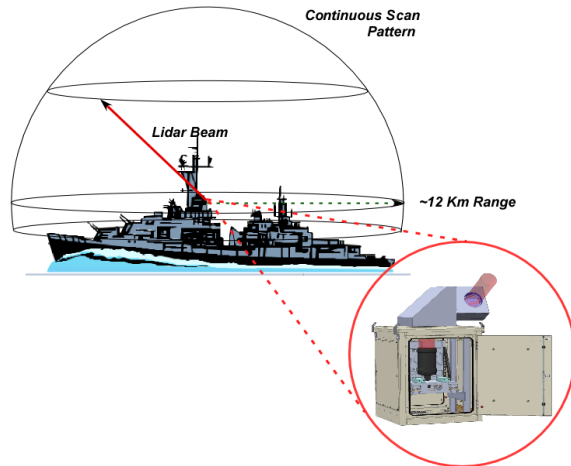
**TPOC:**

(540)653-6115

**Other transition opportunities:**

Other transition opportunities include the Army's Indirect Fire Protection Capability (IFPC) program.

**Notes:** The figure illustrates a concept for how the compact LIDAR will monitor the local environment around a ship by sweeping its beam throughout a hemisphere, in order to gather the data needed to predict the "Laser Effectiveness Range".



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## WHAT

**Operational Need and Improvement:** The potential for deployment of Laser Weapons Systems aboard Naval Vessels necessitates the ability to dynamically characterize the maritime atmosphere to predict laser effectiveness. The Navy needs novel approaches to allow a ship to determine atmospheric attenuation on a continuous or discrete basis and use this information to generate a 'Laser Effectiveness Range' for use by the ships tactical team to determine whether the laser system is an appropriate weapon choice for a given threat. Atmospheric characterization in both azimuth and elevation is desired to allow for improved weapons selection ability against surface and airborne targets.

**Specifications Required:** Operational wavelength to match wavelength of laser weapon.

Measurement over ranges from ship to horizon.

Measurement in both azimuth and elevation angles.

Capable of 24/7 operation in a maritime, shipboard environment.

Minimal maintenance requirements and/or operate as a stand-alone device

**Technology Developed:** We have developed a complete optical and mechanical design for the LIDAR.

The design has been subjected to thermo-elastic modeling.

We have developed data reduction algorithms.

**Warfighter Value:** The constant monitoring provided by the LIDAR will enhance environmental situational awareness. The data collected by the LIDAR will be used to create a 3D map of the atmospheric attenuation surrounding the ship. It will be used to estimate effective power on target. The data will contribute to quick evaluation of the effectiveness of the laser weapon against a target in a given engagement.

## WHEN

**Contract Number:** N00024-15-C-4054 **Ending on:** October 5, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Engineering Design	Med	Design Review completed	3	August 2016
Engineering Prototype Fabrication	Low	Prototype fabricated. Basic operation nominal.	4	November 2016
Engineering Prototype Initial Characterization	Low	Transmit power nominal. Received power agrees with lidar model. Basic algorithms exercised with retrieved data.	4	February 2017
Engineering Prototype Shore Demonstration	Med	Demonstration data obtained from shore test site.	6	September 2017

## HOW

**Projected Business Model:** Physical Sciences Inc. (PSI) will manufacture the LIDAR system once development and operational testing are complete at the end of a Phase III program. PSI will provide the LIDAR as a subsystem to the laser weapon system prime contractor.

**Company Objectives:** Our objective at the Forum for SBIR/STTR Transition is to meet with Navy Program and LWSD prime contractor (Northrop-Grumman/Space & Mission Systems/Redondo Beach, CA) personnel to discuss further system development and testing. The lidar system is an important part of PSI's growing family of LIDARs we are developing for atmospheric monitoring.

**Potential Commercial Applications:** Potential commercial applications include incorporation into emerging ground networks for boundary layer meteorology to determine boundary layer height and cloud ceiling. Other applications include visibility and Asian dust monitoring, hazardous volcanic ash cloud monitoring, regional air quality and human health assessments.

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