

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2020-0375

Topic # N141-008

Multispectral six-color laser transmitter for mine hunting applications

Q Peak, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 495

Transition Target: Coastal Battlefield Reconnaissance and Analysis (COBRA) Block II

TPOC:
(850)235-5404

Other transition opportunities: Airborne Laser Mine Detection System (ALMDS), Shipboard Self Defense Systems, other directed energy programs

Notes: The image at the right shows a MQ-8C Fire Scout unmanned aerial vehicle that is the intended platform for COBRA Block II.



<https://www.navair.navy.mil/product/mq-8c>

WHAT

Operational Need and Improvement: The Navy seeks to improve mine-hunting operations by using a low Size, Weight and Power (SWaP) laser source to enable detection with more wavelength diversity suitable for deployment on a Tactical Unmanned Airborne Vehicle (TUAV). This will enable mine-hunting operations to be conducted day or night and from the beach to the littoral zone.

Specifications Required: The laser source will produce four frequency bands across the visible and near infrared (NIR) with the option to change two of the wavelengths for a total of six. Two of the bands will provide vegetation sensing while a third will permit in water illumination. Significant pulse energy is required to provide a minimum system signal to noise ratio. The pulse widths will short enough to enable use in ranging systems. The target SwaP is consistent with use on a TUAV.

Technology Developed: Q-Peak has developed a compact laser pulse amplifier that enables a high-pulse-energy, one-micron laser system to be constructed. We will generate visible wavelengths by using a series of nonlinear optical elements. The wavelengths will be combined into a single beam using dichroic mirrors/polarizers. The optical elements comprising the system will be rigidly mounted using techniques compatible with high vibration environments.

Warfighter Value: The laser source that we will develop will enable enhanced detection and discrimination of mines in a variety of environments. Building the laser source consistent with use on a TUAV ensures that personnel are not exposed to hazards of close proximity mine detection. Rapid, remote mine detection, day or night from the beach to the surf will provide real time battlefield awareness

WHEN

Contract Number: N68335-20-C-0239 **Ending on:** December 20, 2021

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---------------------------------------|------------|---|------------|---------------|
| One micron system complete | Med | Demonstration of pulse energy | 4 | December 2020 |
| Visible and NIR wavelengths generated | Med | Demonstration of pulse energy and wavelengths | 4 | March 2021 |
| Phase I Base program completed | Med | Efficient co-bore sighting of all emitted wavelengths | 4 | July 2021 |
| Phase I Option complete | Med | Packaged system flight ready delivered | 4 | December 2022 |

HOW

Projected Business Model: Q-Peak's business plan would be to sell our laser source to the prime contractors who are assembling systems for the ALMDS or COBRA programs. These units will be assembled at Q-Peak's facility and if quantities exceed our capacity, we would consider licensing our technology.

Company Objectives: Our objective in participating in the Navy SBIR/STTR Transition program is to identify other applications for visible/NIR lasers. Our architecture provides flexibility in pulse energy and wavelength and may be suitable for a variety of applications. At the completion of our Phase II option, we are seeking to have our system tested in the field to further progress the TRL of our system. The technology we will develop in this program will provide a building block for future laser systems such as next generation target illumination sources.

Potential Commercial Applications: High pulse energy laser systems are typically addressed with flash-lamp pumping of laser media. The system that we will construct will offer advantages in efficiency, mean time to service, size and weight. As such, installation on aircraft platforms used in marine survey, bathymetry, search and rescue are potential commercial applications

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