

Topic: N152-116

SA Photonics, Inc.

Affordable Compact HPRF/HPM Attack Warning System

SA Photonics' Wideband Agile Threat Sensor (WATS) addresses the Navy's need for an affordable and compact High-Power Radio Frequency / High-Power Microwave (HPRF/HPM) attack warning technology that detects, characterizes and precisely geo-locates HPRF threats while being fully immune to HPRFs. WATS consists of multiple completely passive HPM probes connected by fiber optic cables to an electronic processing system, designed for UAVs and other aircraft and surface vessels. Furthermore, WATS's tolerance of extremely high electromagnetic amplitudes enables the system to survive repeated exposure to attack without losing sensitivity. SA Photonics, which specializes in the development of advanced photonics systems to solve demanding problems for military and commercial customers, envisions in-house product manufacturing, as it has on past product developments.

**Technology Category Alignment:**

RF Components for sensing, transmission and communication

Fixed Wing Vehicles (includes UAS)

Broadband/Multispectral Components and Systems

Preemptive/Proactive Effects

Radio Frequency (RF) (non-EW)

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**SYSCOM:** ONR

**Contract:** N68335-17-C-0112

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-17-C-0112](https://navystp.com/vtm/open_file?type=brochure&id=N68335-17-C-0112)

# Department of the Navy SBIR/STTR Transition Program

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## WHO

**SYSCOM:** ONR

**Sponsoring Program:** ONR Code 35: Counter Directed Energy Weapons Research

**Transition Target:**

**TPOC:**

Mr. Ryan Hoffman  
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**Other transition opportunities:** This attack warning technology is not limited to Navy systems. SA Photonics is also pursuing applications with other DoD assets, from UAVs and manned aircraft to terrestrial vehicles and bases.

**Notes:** The image at right shows the system configuration for WATS, SA Photonics' "Wideband Agile Threat Sensor."



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## WHAT

**Operational Need and Improvement:** Advances in high power microwave threats pose significant dangers to critical naval electronic systems. The Navy has a need for an affordable and compact High-Power Radio Frequency / High-Power Microwave (HPRF/HPM) attack warning technology that detects, characterizes and precisely geo-locates HPRF threats while being fully immune to HPRFs.

**Specifications Required:** The HPRF sensor should be able to provide frequency information of the attack, which may be wideband pulses (100-500 MHz, pulse widths 2 – 200 ns) or narrowband (500 MHz – 5 GHz, pulse widths 1ns-5µs). It is desirable to obtain HPRF geolocation information with an error of less than 5 degrees in both the azimuth and elevation/declination and provide an approximate target range. The system should be able to survive HPRF field intensities in excess of 50 W/cm<sup>2</sup> without damage to the detection system. Furthermore, a low SWaP footprint is needed such that the product can be easily integrated into Navy platforms (including helicopters and UAVs).

**Technology Developed:** WATS is a low-cost, agile HPRF/HPM attack warning system, consisting of multiple completely passive HPM probes connected by fiber optic cables to an electronic processing system. WATS is able to detect, characterize and precisely geo-locate HPRF threats while being fully immune to HPRFs. Additionally, WATS is a low SWaP device that functions over a wide range of possible attack frequencies.

**Warfighter Value:** This technology will provide significant protection to low flying UAVs and rotorcraft, ground and surface vessels, and even military and government complexes, all of which are especially vulnerable to HPM attack. Since HPM sources are readily available that can generate high energy microwave pulses powerful enough to disable or damage electronic systems, WATS technology will be crucial in providing future real-time notifications of an HPM attack. Furthermore, since these attacks occur without an explosion or any other type of external indication, the accurate source localization WATS provides will be essential to the warfighter.

## WHEN

**Contract Number:** N68335-17-C-0112 **Ending on:** April 5, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Preliminary Design Review	N/A	Design Analysis Complete	3	4th QTR FY17
Critical Design Review	N/A	Detailed Design Complete	3	2nd QTR FY18
Lab Integration	Low	System integration complete	4	1st QTR FY19
Performance Validation	Low	Performance validated in lab setting	5	2nd QTR FY19
Testing at China Lake	Med	Performance validated in outdoor test range	6/7	2nd QTR FY19

## HOW

**Projected Business Model:** SA Photonics intends to undergo initial production of the WATS system onsite. The company has a history of successful small-scale production for commercialized SBIR products. We envision teaming with a prime contractor for WATS product sales. We would look for the prime contractor to supply sales support, installation support, and maintenance support.

**Company Objectives:** SA Photonics' WATS is positioned to be a low-cost, performance-improving attack warning tool not just for Navy use, but with military assets across the DoD. As a result, we are excited to present the product to a range of program offices at the FST, as well as a number of prime contractors, specifically those who work with aircraft and electronic warfare.

**Potential Commercial Applications:** In addition to military applications with UAVs, rotorcraft, fixed-wing aircraft, naval ships, and military bases, civilian uses of WATS technology will allow for commercial sales. These primarily include larger passenger and cargo aircraft, as well as some private jets and helicopters. Additionally, high-value ground facilities, in particular those vulnerable to industrial, political or financial sabotage, will find value with WATS. These include industry offices (e.g. defense contractors), commercial data centers, airports, and banks and financial institutions.

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