

Topic: N152-121

## Forward Photonics LLC

Compact Air-cooled Laser Modulate-able Source (CALMS)

Forward Photonics is developing the Compact Air-cooled Laser Modulate-able Source (CALMS). This is a 3 W laser with wavelength < 400 nm. The design is compact and fully modulate-able up to 10 kHz. High powered ultraviolet (UV) operation is challenging for direct diode lasers, as the GaN diode technology is not as mature as for other materials. This power level at this wavelength is enabled by the proprietary wavelength beam combination (WBC) technology that allows for the combination of a number of individual GaN laser diodes into a single high brightness output beam. Forward Photonics specializes in high brightness direct diode laser systems.

### Technology Category Alignment:

EO/IR Components for sensing, transmission and communication

Broadband/Multispectral Components and Systems

Survivability

High Energy Lasers (HEL)

### Contact:

Dr. Jeff Shattuck

[jeffshattuck@forwardphotonics.com](mailto:jeffshattuck@forwardphotonics.com)

(617) 372-6929

<http://www.forwardphotonics.com>

**SYSCOM:** ONR

**Contract:** N68335-17-C-0292

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-17-C-0292](https://navystp.com/vtm/open_file?type=brochure&id=N68335-17-C-0292)

Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.  
ONR Approval #43-4388-18

Topic # N152-121  
Compact Air-cooled Laser Modulate-able Source (CALMS)  
Forward Photonics LLC

WHO

**SYSCOM:** ONR  
**Sponsoring Program:** PMA272  
ATAPS PE 064272N  
**Transition Target:** TAIRCM  
**TPOC:**  
Mr. Kevin Leonard  
[kevin.r.leonard@navy.mil](mailto:kevin.r.leonard@navy.mil)  
**Other transition opportunities:**  
**Notes:** 3 Band UV Laser Concept Design

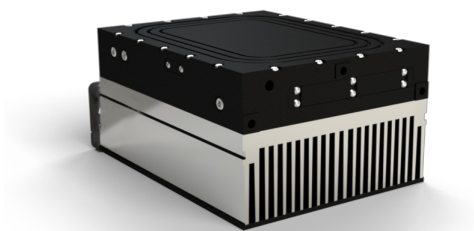


Image Provided by Forward Photonics LLC, 2018

WHAT

**Operational Need and Improvement:** Compact UV laser sources are not currently available with high output power and flexible pulsing requirements.  
**Specifications Required:** Output power > 3 W  
3 or more lines in the UVA band  
Quick switching between waveforms (DC through 10 kHz)  
100 micron core fiber output  
System size < 75 cubic inches  
Air-cooled  
**Technology Developed:** Forward Photonics' proprietary technology of wavelength beam combining (WBC) effectively solves the poor beam quality problems of direct diode lasers and is a truly scalable approach. This allows for the combination of hundreds of lower power lasers into a single output that has the beam quality identical to one of the emitters itself. Forward Photonics is able to leverage the small size and large energy density of diode bars using WBC to construct a compact UV laser system with a nearly diffraction limited output at a power level of 3-10 W. With the inherent scalability of WBC, this laser can readily be increased to power levels of >100 W in the future.  
**Warfighter Value:** Higher power and higher brightness lasers affords critical defense applications that have longer distance propagation and higher power on target.

WHEN

Contract Number: N68335-17-C-0292    Ending on: June 18, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
First Growth UV Material Characterized	Med	Lasing Achieved with Good output power	3	2nd QTR FY18
TO Can Risk Reduction Module Tested	Med	WBC Achieved	3	3rd QTR FY18
AWG Experiments Completed	High	WBC achieved on chip level scale	2	2nd QTR FY19
Second Growth UV Material Characterized	Low	Facet generation solved with competitive output power	4	2nd QTR FY19
Final Module Characterized	Low	Deliverable meets program specs	4	3rd QTR FY19

HOW

**Projected Business Model:** Our goal is to design and manufacture the lasers, which will be used by Prime contractors in their laser propagation systems.  
**Company Objectives:** Forward Photonics is looking to expand awareness of the utility of WBC lasers for defense and commercial uses. Such lasers offer high brightness output, an order of magnitude or higher brightness that can be achieved with non WBC direct diode systems. Direct diode systems offer some of the highest efficiency, lowest cost lasers available. Forward Photonics is eager to speak with laser integrators for both defense and commercial laser systems for defense platforms and materials processing.  
**Potential Commercial Applications:** Potential commercial applications for UV high brightness WBC lasers are numerous and include micromachining, spectroscopy, metal cutting and welding, and lithography.

**Contact:** Dr. Jeff Shattuck, Project Manager and Scientist  
[jeffshattuck@forwardphotonics.com](mailto:jeffshattuck@forwardphotonics.com)    6173726929