

DOD Small Business Solicitation Addresses EMSO Topics

By John Knowles

The DOD has released its third major Broad Agency Announcement (BAA) of FY2023 under its Small Business Innovative Research (SBIR) program. The SBIR solicitation covers nearly 90 research topics, several of which address Electromagnetic Spectrum Operations (EMSO)-related efforts, including directed energy (DE) projects.

SBIR contracts typically begin with Phase 1 research studies valued at \$100,000 or less. Some topics eventually transition to Phase 2 work, which often involves hardware and software development. A very small number of the projects progress to Phase 3 demonstrations. The DOD uses these SBIR contracts to explore new concepts or to evaluate specific upgrades to existing weapons systems.

Most of the EMSO-related topics in the current SBIR solicitation address Air Force needs. The EMSO-related topics are:

AF233-0013: Wafer scale Zinc Selenide (ZnSe) Single Crystals: According to the topic description, the objective of this effort is to “develop a commercial single crystal growth process for 50mm diameter zinc selenide (ZnSe) wafers.” The description adds, “The need for high-brightness, compact infrared lasers operating in the mid-wave infrared (MWIR) through far infrared has long been established in the Global Strike Operational Imperative to address infrared missile threats. Beyond infrared countermeasures (IRCM), such frequencies have applications in spectroscopy, and imaging, for both military and commercial users.

Phase 1 work calls for developing a scalable ZnSe growth process and then demonstrating a single crystal of ZnSe with a (100) orientation with at least 10x10x1mm dimensions. Phase 2 would use the growth process established in Phase I to demonstrate and deliver a single crystal of ZnSe with a (100) orientation with at least 25mm in diameter and a 1mm thickness. The topic point of contact is James Mann, 1- (937) 713-8991, e-mail james.mann.11@us.af.mil.

AF233-0024: Optical Fiber Combiner for Combining MWIR Quantum Cascade Laser Beams: The objective of this project is to develop an optical fiber combiner that can demonstrate the ability to receive power from seven or more quantum cascade lasers emitting at a wavelength between 4.5 and 5 micrometers. The total output power from the optical fiber combiner should exceed 80% of the total power input by the combined quantum cascade laser. The optical fiber combiner will be designed in such a way as not to undergo damage or degradation while outputting a sustained average power of up to 60 Watts. Phase 1 work entails "performing a study on fiber materials, coatings, coupling of the quantum cascade laser produced beam (of a wavelength between 4.5-5 micrometer) into fiber, and fiber combining scheme projecting the feasibility of the combiner system output to retain 80% of the total power introduced into its inputs. Phase II awardees will be expected to accomplish fabrication and demonstration of the optical fiber combiner system using commercially available quantum cascade lasers, demonstration and measurement of power at output compared to the sum of the power of the component lasers before combining, and delivery of an optical fiber combiner." The topic point of contact is Matthew Suttinger, 1 (505) 846-5742, e-mail matthew.suttinger@us.af.mil.

AF233-0026: Compact High Power Microwave Antenna: "The objective of this SBIR is to design, build, and test high frequency, high gain antennas for High Power Microwave (HPM) applications. These new antennas would open up a new

capability for HPM by allowing the HPM system to use already existing apertures on airborne platforms. There are three main goals for the antenna design from this effort. The first goal is a compact mechanically or electrically phased antenna. The second goal would be for the antenna to be broadband and cover the entire X-band. The third goal would be to reduce antenna sidelobes, maximizing the power of directed energy and reducing collateral damage.” The topic description also stated, “The goal of this topic is the development of a phased array antenna suitable for HPM sources at GW power levels that are broadband with minimal sidelobes.” Phase 1 work would see the contractor demonstrate through electromagnetic simulation a phased array antenna with a threshold gain of 24 dBi and an objective gain of 30 dBi of gain across the frequencies within the X-band (8-12 GHz). The antenna shall be phase steerable with at least plus or minus 20 degrees in both azimuth and elevation. The antenna must be able to handle a threshold power of 20 megawatts per square meter with an objective power handling of 100 megawatts per square meter.” During Phase 2, the contractor would “design, build, and demonstrate a single element of the phased array antenna designed in Phase I.” The topic point of contact is Daniel Guillette 1 (505) 853-3445, e-mail daniel.guillette@us.af.mil.

SF233-D001: Miniature Smart Satellite Threat Warning Sensor:

This is a “Direct to Phase 2” effort. The objective is to perform a “brass-board level demonstration of a low SWaP smart multi-threat warning autonomous sensor with an extremely low false alarm rate. The design must have inherent manufacturing-friendly characteristics and be launch- and space-qualified for the SDA transport and tracking constellations in low earth orbit (LEO). At Phase II, a laboratory brass-board demonstration is undertaken in a vacuum chamber with suitable access ports to stimulate the threat sensor prototype system with low-power threat-based RF and laser signals.” The topic point of contact is Greg Grozdits, 1 (318) 436-9434, e-mail greg.g.grozdits.civ@mail.mil.

Proposals to these and other topics under the DOD SBIR 2023.3 BAA are due on October 18. More details are available at www.dodsbirsttr.mil.