

# Directed Energy Priorities to Achieve Battlefield Overmatch

Leveraging DE Capabilities to Meet  
Emerging U.S. National Security Needs

# Introduction

To achieve battlefield overmatch and superiority, the U.S. is working to expedite DE programs and initiatives for operationalization in the near term. With this in mind, we took a look at recent directed energy developments in China, Russia, and the United States.

If you find this report informative, be sure to join us at the **4th Annual Directed Energy Systems Summit**, taking place this June 26 -28, in Washington, DC. Over the three-day summit, we will examine the latest DE advancements, initiatives and plans regarding technology, acquisition and service roadmaps. This event will bring together thought leaders, acquisition executives, industry solution providers, and academia in order to tackle some of the challenges that face this community in the near, mid, and far term fight. We will look to gain insight and lessons learned from warfighter perspectives on the operational challenges and requirements of DES that will influence the capabilities of this game-changing technology.

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## China to Deploy ASAT Laser by 2020

China's military is anticipated to deploy a laser weapon capable of destroying U.S. military satellites in low earth orbit within the next year, according to information disclosed in the U.S. Defense Intelligence Agency's recent **report** on space threats.<sup>1</sup> Tracking and identifying satellites is the first step in the challenging process of firing a directed energy weapon, or missile, against an orbiting satellite.

China plans to use high-energy ground-based lasers in a future war to disrupt Global Positioning System satellites that provide pinpoint targeting of U.S. missiles. The Chinese directed energy weapon is among an assortment of space warfare tools – ground-based ASAT missiles, cyber attacks, electronic jammers, and small 'hunter-killer' satellites – which Beijing plans to use in attacks on U.S. satellites in a future conflict. In addition to lasers, China has worked on other directed energy arms, including high-powered microwave, radio frequency, railgun, and particle beam weapons.<sup>2</sup>

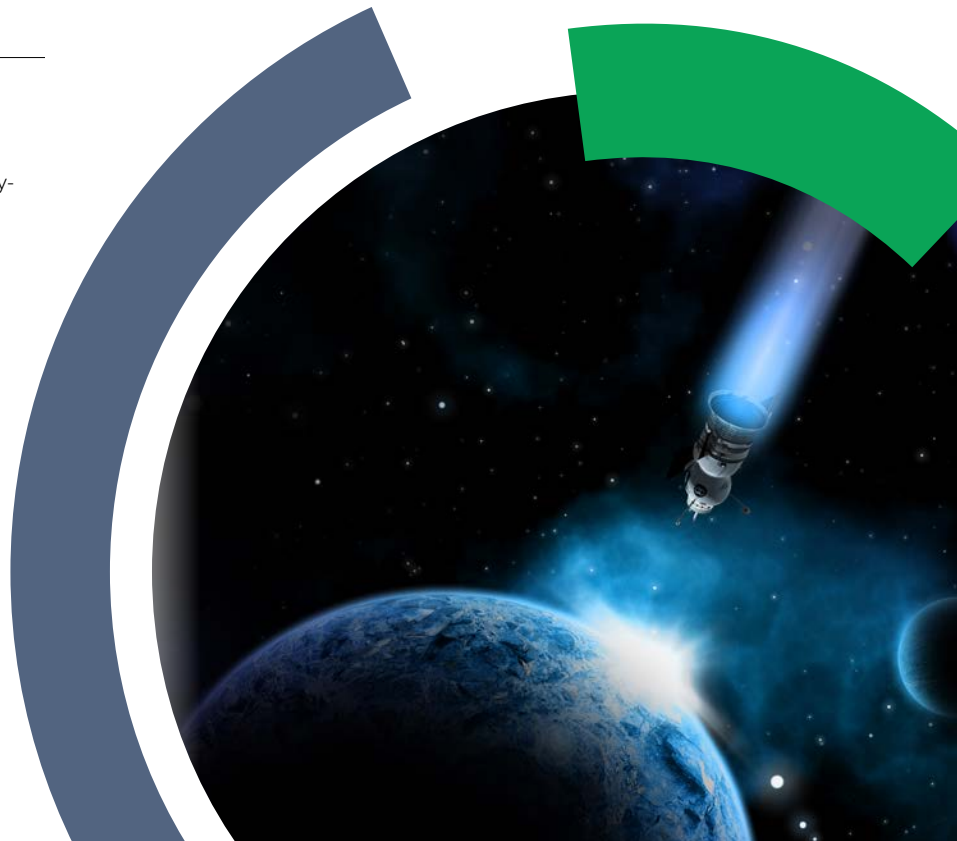
"China likely will field a ground-based laser weapon that can counter low-orbit space-based sensors by 2020, and by the mid-to-late 2020s, it may field higher power systems that extend the threat to the structures of non-optical satellites," the unclassified report said. "China and Russia, in particular, have taken steps to challenge the United States," the report states, noting military doctrines of both states' militaries regard satellite attacks "as a means to reduce U.S. and allied military effectiveness." While both Russia and China are building an array of satellite killing weapons, the DIA report suggests China's space forces appear to be advancing more rapidly.

According to the DIA report, the threat is not theoretical and is increasing; backed by growing networks of space-based intelligence, surveillance, and reconnaissance systems. This report marks the first time a U.S. intelligence agency has disclosed details of the ASAT laser deployment plans.

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<sup>1</sup>[http://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space\\_Threat\\_V14\\_020119\\_sm.pdf](http://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf)

<sup>2</sup><https://freebeacon.com/national-security/dia-china-to-deploy-asat-laser-by-2020/>



## Russia Deploys New Combat Laser System

Russia's Peresvet laser system entered experimental combat duty on December 1, 2018, the Russian defense ministry revealed. The new Russian laser weapon is designed to instantly obliterate targets and there is speculation the lasers could shoot down incoming missiles and airplanes, according to The Moscow Times. The military began taking possession of the first shipments in 2017 as part of Russia's ongoing military modernization program.<sup>3</sup>

Not much is publicly known about the Peresvet combat laser system, as Sputnik, a Russian media outlet controlled by the government, noted.

"It is expected to be an air-defense system that can track and shoot down hostile aircraft and missiles," Sputnik explained, adding, "Some suggest it will be tasked with 'blinding' sophisticated enemy systems, making them inoperable."<sup>4</sup>

Russian President Vladimir Putin first announced the existence of this new laser weapon in March 2018 during his State of the Nation address, during which

he briefly introduced the "Combat Laser Complex."

"We have achieved significant progress in laser weapons," he disclosed, "It is not just a concept or a plan any more. It is not even in the early production stages. Since last year, our troops have been armed with laser weapons."

"We are one step ahead our rivals," Putin added without providing any evidence.<sup>5</sup>

Deputy Defense Minister Yuri Borisov released additional information in an interview with Russian state media outlet TASS, explaining that the device could destroy targets "within fractions of a second."<sup>6</sup>

Key details about the laser, including its power and even purpose are still a mystery, with Moscow declaring it is "not time yet" for details.<sup>7</sup>

<sup>3</sup> <https://themoscowtimes.com/news/russias-new-laster-weapons-systems-enter-into-service-military-says-63709>

<sup>4</sup> <https://www.businessinsider.com/russia-deploys-new-laser-weapon-with-russian-armed-forces-2018-12>

<sup>5</sup> <http://tass.com/defense/1034344>

<sup>6</sup> <http://tass.com/defense/993509>

<sup>7</sup> <https://www.popularmechanics.com/military/weapons/a25414008/russia-deploys-new-ground-based-laser-weapon/>

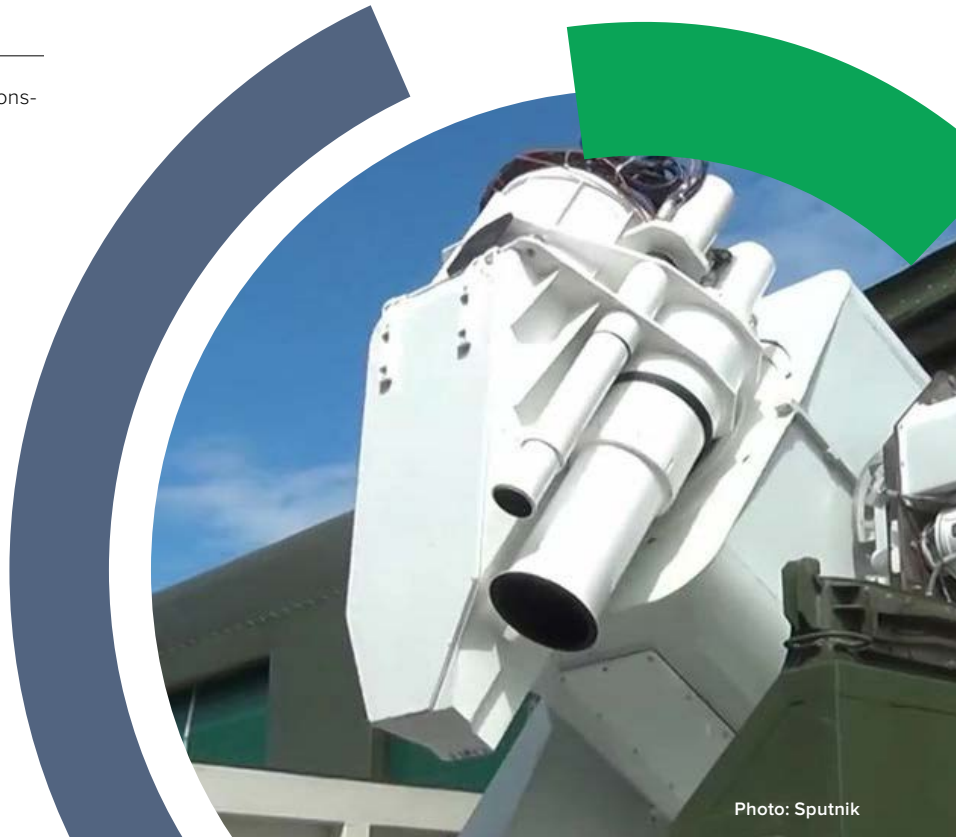


Photo: Sputnik





## United States

### U.S. Air Force Plans Future Tests for Laser & Microwave-Based Directed Energy Weapons

On January 23, 2019, the U.S. Air Force announced that it is planning future experiments involving laser and microwave energy weapons after recent successes in testing sessions. The DE experiments are meant to provide further understanding on how DE capabilities can be used and progressed.

The experiments by the 704th Test Group are intended to offer a better understanding of the capabilities of off-the-shelf high-power microwave and high energy laser systems against targets, according to the Air Force.

“The test scenario was air base defense against small unmanned aerial systems,” said John Cao, director of the Directed Energy Combined Task Force. “Two industry systems, one high power microwave and one high energy laser, were evaluated, with more than 220 vertical-lift and fixed-wing UAS [unmanned aerial systems] sorties flown as threats.”

“Valuable data were collected to address the experiment’s objective,” Cao said. “Now we’re in the planning stages of conducting more DE experiments.”



Photo: U.S. Air Force

### U.S. Air Force Moves Forward on Project to Increase the Power of Laser Weapons for Tactical Aircraft

U.S. Air Force aerial warfare experts are launching a new effort to increase the power and efficiency of laser weapons to make them suitable for next-generation tactical aircraft. Officials of the Air Force Research Laboratory Directed Energy Directorate at Kirtland Air Force Base, N.M., issued a broad agency announcement in January 2019 (FA9451-19-S-0001) for the Compact High Energy Laser Subsystem Engineering Assessment (CHELSEA) project.

<sup>8</sup> <https://www.militaryaerospace.com/articles/pt/2019/01/directed-energy-weapons-microwaves-lasers.html>

<sup>9</sup> <https://www.af.mil/News/Article-Display/Article/1736919/704th-test-group-successfully-leads-directed-energy-experimentation-campaign/>

<sup>10</sup> <https://www.militaryaerospace.com/articles/2019/01/laser-weapons-power-tactical-aircraft.html>

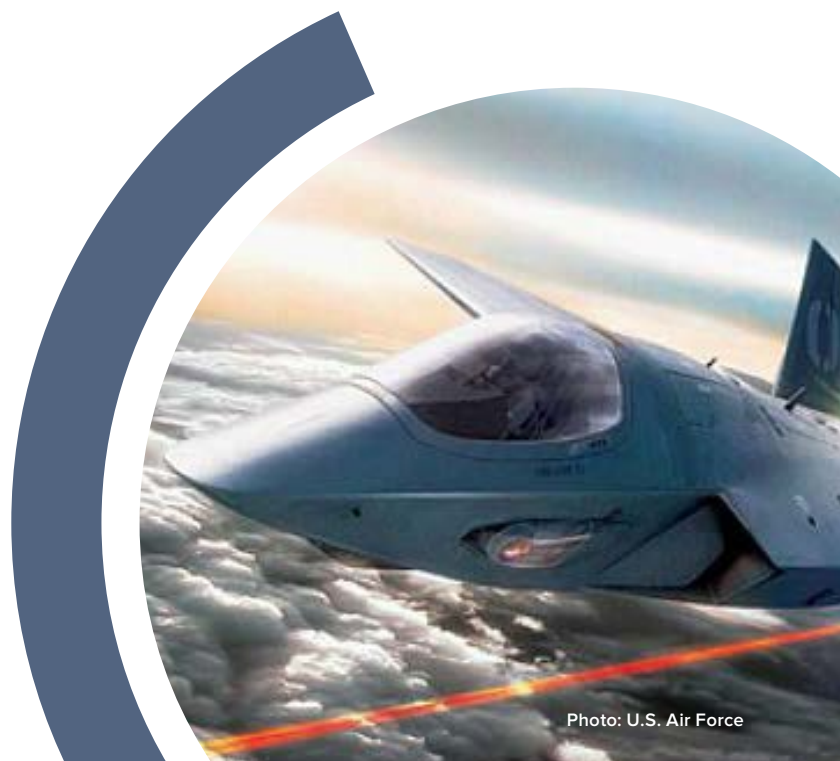


Photo: U.S. Air Force



## United States Continued

Specifically, CHELSEA seeks to identify technologies that offer significant increases in power of prototypes developed in the Air Force Self-protect High Energy Laser Demonstrator (SHiELD) project and its laser subsystem called Laser Advancements for Next Generation Compact Environments (LANCE).

Air Force researchers say they will use CHELSEA data to help design and build by 2024 a Technology Readiness Level-5 laser prototype of a compact, ruggedized, high-energy laser subsystem suitable for tactical aircraft able to fly at near the speed of sound.

### U.S. Army Issues RFI for Enabling Technologies in Tactical Laser Weapons for Light Combat Vehicles

Officials of the Army Contracting Command at Redstone Arsenal issued a request for information (RFI-HEL-2019) in early February for the High Energy Laser Weapon Subsystem Technologies project to find subsystems for beam control, lasers, power storage, power generation, adaptive optics, image trackers, target illuminators, fire-control software and thermal management.<sup>11</sup>

Army laser weapons experts are looking for companies able to provide compact, rugged, and modular enabling technologies for a new generation of high-energy laser weapons that could be mounted to light tactical combat vehicles. These next-generation laser weapons will be designed to shoot down unmanned aerial vehicles (UAVs) and manned reconnaissance aircraft, as well as to provide intelligence, surveillance and reconnaissance.



**“The directed energy community is leveraging mature technologies for rapid prototyping and experimentation that will expedite the fielding of directed energy capabilities into the hands of the Warfighter.”**

**— Colonel Richard Haggerty, Project Manager, Instrumentation, Targets, Threat Simulators, and SOF Training Systems (PM ITTS), PEO STRI, U.S. Army**

*Colonel Richard Haggerty will be speaking at the upcoming 4th Annual Directed Energy Systems Summit.*

<sup>11</sup> <https://www.militaryaerospace.com/articles/2019/02/enabling-technologies-laser-weapons-light-combat-vehicles.html>



## United States

### The U.S. Navy Requests \$299 Million in FY 2019 for the Navy Laser Family of Systems (NLFoS)

The FY 2019 budget requests \$299 million for the Navy Laser Family of Systems (NLFoS), which is selected a Rapid Prototyping, Experimentation and Demonstration (RPED) initiative to provide near term ship based laser weapon capabilities.

The NLFoS efforts form the foundation of an incremental strategy for increased laser weapon capability as it matures. NLFoS includes the following initiatives: 1) Surface Navy Laser Weapon System (SNLWS); 2) Optical Dazzling Interdictor, Navy (ODIN); 3) Solid State Laser Technology Maturation (SSL-TM); and 4) Ruggedized High Energy Laser (RHEL).

SNLWS will develop a ship-mounted weapon system with the development of 4 units in 2019, which will include a High Energy Laser with an integrated

low power laser dazzler. It will be used for counter-Unmanned Aerial Vehicle, counter-Fast Inshore Attack Craft, and counter-Intelligence, Surveillance, and Reconnaissance missions. ODIN will design and develop a near-term shipboard counter-ISR capability with installation of 2 units on DDGs in FY 2019. SSL-TM will develop an advanced 150kW laser weapon demonstrator that will support future laser development with installation on a LPD17 class ship for sea tests in FY 2019. RHEL will develop an alternative 150kW laser source employing different laser architecture for the incremental strategy for increased capability.



<sup>12</sup> [https://www.secnav.navy.mil/fmc/fmb/Documents/19pres/Highlights\\_book.pdf](https://www.secnav.navy.mil/fmc/fmb/Documents/19pres/Highlights_book.pdf)

**Join us!**

June 26 - 28, 2019 | Washington, D.C.

**Developing and Deploying DE Capabilities to Meet Emerging National Security Needs**

IDGA's **4th Annual Directed Energy Systems Summit** will provide a means to discuss the ongoing efforts to develop and deploy directed energy systems in support of U.S. national security priorities and battlefield superiority.

Directed Energy systems and weapons offer a unique response to rapidly emerging global threats, one that has grown in popularity across the Services, DoD, and the Federal Government. As a force multiplier, DE weapons and systems offer numerous capabilities and applications across a multitude of operating environments, and at this summit, you will have the opportunity to learn more about DoD and Military Service roadmaps, the role of DE for national security, future force development, to include DE solutions for the warfighter, acquisition priorities, and more.

**No Cost Passes Available for Active U.S Military and Federal Government Employees**

**2019 Highlighted Speakers:**



Major General Shoffner  
 Commanding General  
**Fires Center of Excellence**



Mr. Paul Mann  
 SES, Technical Director  
**Naval Surface Warfare Center, Port Hueneme Division**



Congressman Douglas L. Lamborn  
 Co-Chair, Directed Energy Caucus  
**U.S Congress**



John Cao  
 Director  
**DE Combined Test Force (DE CTF), Air Force Technical Center / 704th Test Group**



Mr. Michael Holthe  
 Director for Lethality  
**ASA(ALT)/ODASA Research and Technology**



Mr. Scott Boyd  
 Director  
**Joint Laser System Effectiveness Joint Test, NSWC Dahlgren**



Harry Sinsheimer  
 Deputy Director  
**Joint Directed Energy Transition Office (DE JTO)**



Col Richard Haggerty  
 Project Manager, Instrumentation, Targets, Threat Simulators, and SOF Training Systems (PM ITTS)  
**PEO STRI U.S. Army**



Dr. Michael Jirjis  
 Chief Directed Energy Experimentation, AF Strategic Development Planning & Experimentation  
**USAF**



Tim Andreadis  
 Head, High Power Microwave Section  
**Tactical Electronic Warfare Division, Naval Research Laboratory**

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