

# Innovation

**SBIR Topic Number:**  
AF071-005

**SBIR Title:**  
Laser Transportable  
Mid-Infrared Ultrashort  
Pulsed Laser Systems and  
Technology

**Contract Number:**  
FA9451-08-C-0060

**SBIR Company Name:**  
Lockheed Martin Aculight  
(formerly Aculight  
Corporation), Bothell, WA

**Technical Project Office:**  
AFRL Directed Energy  
Directorate, Kirtland AFB,  
NM

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.



Fiber-based laser developed by Lockheed Martin Aculight

## Innovative Fiber-Based Laser

- There is a need for high-peak power, ultra-short pulse lasers in military and industrial applications
- Lockheed Martin Aculight developed an innovative fiber-based laser that affords the generation of mid-infrared light in short pulses with high-peak power at a high-repetition rate
- This system exploits the natural advantages of fiber lasers over bulk solid-state lasers, producing a compact, robust, and efficient laser with the potential to produce a flexible pulse format
- This laser technology provides a combination of wavelength, pulse duration, and peak power that are not currently available from any other laser source

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## Air Force Requirement

There is a need for high-peak power, ultra-short pulse lasers in industrial applications (e.g., material processing) and military applications such as remote sensing, proactive infrared countermeasures (IRCM), and non-lethal weapons. Wavelengths in the mid-infrared range are of particular interest for some of these applications, notably proactive IRCM.

## SBIR Technology

Lockheed Martin Aculight developed an innovative fiber-based laser that affords the generation of mid-infrared light in short pulses with high-peak power at a high-repetition rate. This system exploits the natural advantages of fiber lasers over bulk solid-state lasers, producing a compact, robust, and efficient laser with the potential to produce a flexible pulse format. As such, the fiber laser is ideal for rapid deployment in the field.

## Potential Application

This laser technology provides a combination of wavelength, pulse duration, and peak power that are not currently available from any other laser source. This laser can be used for experiments to further clarify and define the desired parameter range for future Air Force systems.

## Company Impact

Lockheed Martin purchased Aculight Corporation in 2008 to strengthen its core offerings and create the potential for adjacent market expansion.

This SBIR Program has enabled Lockheed Martin Aculight to combine its innovative work in high-peak power, near-infrared (IR) fiber lasers with its depth of experience in nonlinear frequency conversion to produce a short-pulse, high-peak power, mid-IR light source with all the advantages of fiber lasers. This natural combination of these two technologies has increased the company's understanding of the science behind both of them. The SBIR Program has also offered the opportunity to implement new packaging concepts for both high-peak power, near-IR fiber lasers and nonlinear frequency conversion modules.

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# SBIR/STTR

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