

# 20 W High Efficiency 1550 nm Pulsed Fiber Laser, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



## ABSTRACT

High efficiency pulsed lasers have been considered to be an enabling technology to build high power transmitters for future deep space high rate space communications. However, to achieve a high peak power at a high repetition rate and with a short pulse width and >25% wall plug efficiency still remains an issue unsolved. PolarOnyx proposes a novel approach targeting to make 20W high power fiber laser at 1550 nm and resolve the issues of efficiency. A tabletop feasibility demonstration has been carried out at the end of Phase I. A prototype will be delivered at the end of Phase II.



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## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: In addition to NASA's deep space communications, the proposed short pulse high power fiber laser approach can also be used in other applications, such as space, aircraft, and satellite applications of LADAR systems and communications. PolarOnyx will develop a series of products to meet various requirements for NASA/military deployments.

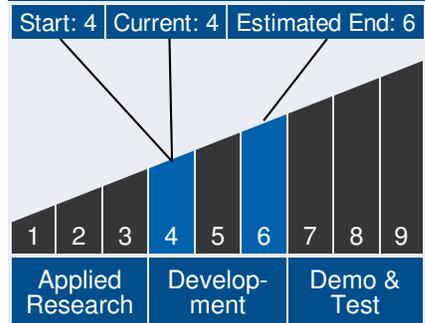
### To the commercial space industry:

Potential Non-NASA Commercial Applications: High power fiber lasers represent the next generation of critical optical components needed to build the coherent optical communications of the future and cable TVs that will deliver increased communication bandwidth and improved Quality of Service (QoS) end users. The market for the application is growing and will be of great potential of hundreds of millions market. Other commercial applications include -Material processing. This includes (1) all types of metal processing such as welding, cutting, annealing, and drilling; (2) semiconductor and microelectronics manufacturing such as lithography, inspection, control, defect analysis and repair, and via drilling; (3) marking of all materials including plastic, metals, and silicon;

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## Technology Maturity



## Management Team

### Program Executives:

- Joseph Grant
- Laguduva Kubendran

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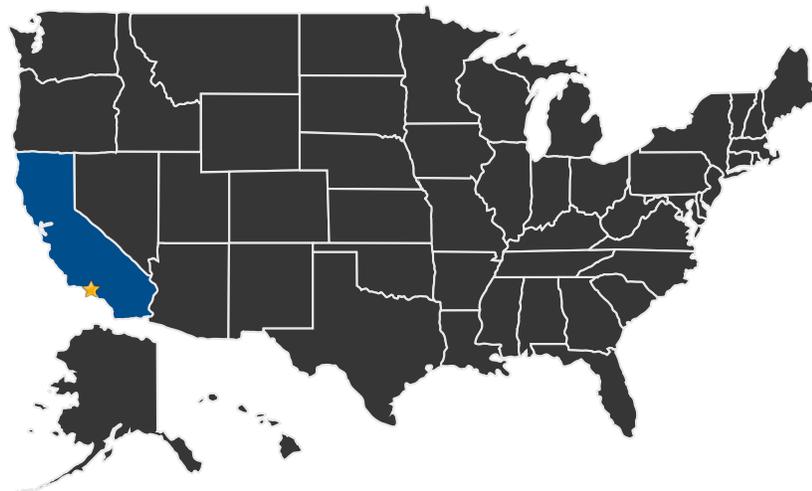
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(4) other materials processing such as rapid prototyping, desk top manufacturing, micromachining, photofinishing, embossed holograms, and grating manufacturing. - Medical equipment and biomedical instrumentation. The high power laser can be applied to ophthalmology, refractive surgery, photocoagulation, general surgery, therapeutic, imaging, and cosmetic applications. Biomedical instruments include those involved in cells or proteins, cytometry, and DNA sequencing; laser Raman spectroscopy, spectrofluorimetry, and ablation; and laser based microscopes.

## U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States  
With Work

★ **Lead Center:**  
Jet Propulsion Laboratory

### Other Organizations Performing Work:

- Polaronyx, Inc. (San Jose, CA)

### Management Team (cont.)

**Program Manager:**

- Carlos Torrez

**Principal Investigator:**

- Jian Liu

### Technology Areas

**Primary Technology Area:**

- Science Instruments, Observatories, and Sensor Systems (TA 8)
  - └ Remote Sensing Instruments and Sensors (TA 8.1)
    - └ Lasers (TA 8.1.5)
      - └ Light Detection and Ranging (LIDAR) Fiber Transmitter (TA 8.1.5.11)

**Secondary Technology Area:**

- Communications, Navigation, and Orbital Debris Tracking and Characterization Systems (TA 5)
  - └ Optical Communications and Navigation (TA 5.1)
    - └ Lasers (TA 5.1.3)

**Additional Technology Areas:**

- Science Instruments, Observatories, and Sensor Systems (TA 8)
  - └ Remote Sensing Instruments and Sensors (TA 8.1)
    - └ Lasers (TA 8.1.5)
      - └ Pulsed Laser (TA 8.1.5.7)

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## PROJECT LIBRARY

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### Presentations

- Briefing Chart
  - (<http://techport.nasa.gov:80/file/17709>)

## DETAILS FOR TECHNOLOGY 1

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### Technology Title

20 W High Efficiency 1550 nm Pulsed Fiber Laser