

Custom Ultra-Short Pulse Laser Systems

Capabilities

Since Applied Energetics' inception, a detailed and thorough understanding of ultra-short pulse (USP) lasers has been required for the Department of Defense (DoD) research contracts. AE has a dedicated team of scientists, engineers, and technicians focused on the research, development, operation, and applications of USP lasers. The USP lasers available from AE are uniquely suited to deliver the pulse energy intensities required for demanding applications such as optical filament research, micro-machining, solar cell scribing, time-resolved spectroscopy, and many others.

Variety of Laser Systems Built

Pulse Energy	Pulse Width	Rep Rate	Wavelength
> 400 mJ	130 fs	10 Hz	800 nm
> 10 mJ	< 2 ps	1 kHz	1030 nm
> 20 nJ	200 to 500 fs	30 MHz	1025 - 1055 nm

The system pictured below is capable of:

- 10mJ at 1 kHz
- Pulse width <2ps
- $M^2 < 3$



Applications

- Micro-machining
- Photomask repair
- Thin film scribing
- Time-resolved spectroscopy
- Biological diagnostics
- Defense
- Laser R&D

Features

- Turn-key operation
- Benefits of a minimal optics design are:
 - * Low maintenance
 - * High reliability
- Optional pulse stretcher & compressor
- Customized controls
- Built in diagnostics: energy, pulse stability, auto-correlator, wavelength control

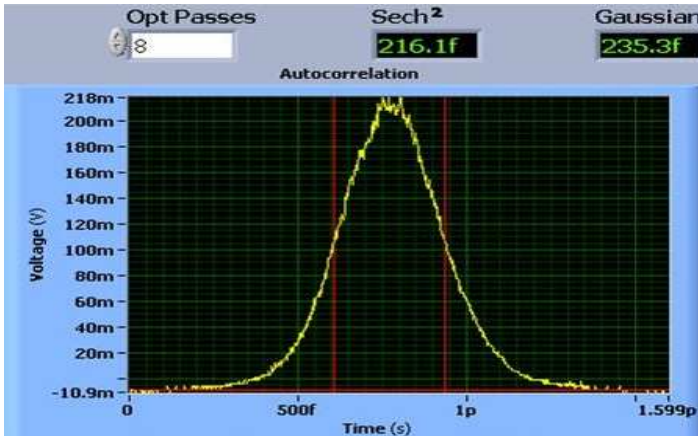
The Transportable Demonstrator pictured below was built to study laser-atmospheric interactions in a wide variety of environments and over long ranges. Unique features:

- vehicle-based mobile laser laboratory
- 5 terawatts peak power
- 130 fs USP laser system
- high-energy pulse, > 400mJ at 10 Hz
- motion-stabilized beam delivery

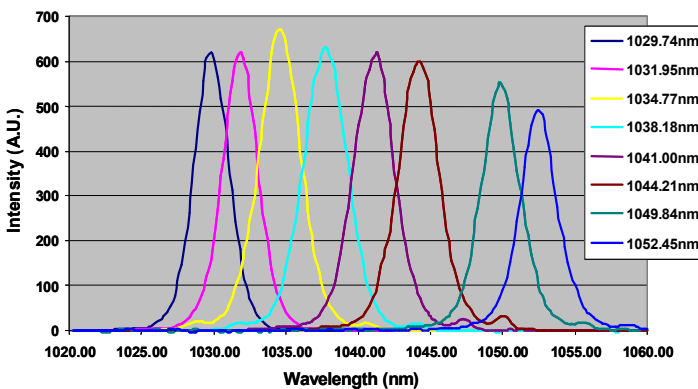


Femtosecond Laser Performance

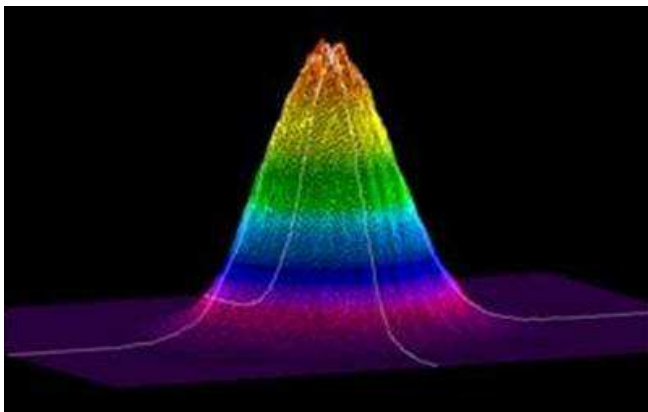
- * Diode pumped Yb:KYW gain media
- * Wavelength adjustable from 1025 - 1055 nm
- * Average power 0.6 to 1.0 W
- * Spectral bandwidth >3nm
- * ≥ 20 nJ/pulse
- * Pulse width range 200 to 500 fs
- * 30 MHz repetition rate
- * $M^2 \leq 1.1$



Pulse Width



Yb:KYW Laser Tunability Range



Beam Profile

Unique Laser Solutions

- * Multiple gain media capability
Yb:KYW, Yb:YAG, Yb fiber, Ti:Sapphire
- * Pulse width range from
100 fs to 10 ps
- * Pulse Energies from
 μ J to >100 mJ
- * High repetition rates
- * High order harmonic generation
- * Direct diode pumped

High Performance Systems

The combination of the proprietary femtosecond laser with various amplifiers enables very high performance laser systems.

A high energy system has the following capabilities:

- * Yb:KYW oscillator and Yb:YAG amplifier
- * 1031nm Wavelength
- * Up to 10 mJ per pulse
- * 1 to 10 ps pulse width range
- * 1 to 10 kHz Rep rate range
- * $M^2 \leq 2$

A high average power system is capable of:

- * Over 100 Watts average
- * 1031nm Wavelength
- * 30 MHz repetition rate

