

HiLASE will offer Open access to the following lasers and target areas:

**1) High energy nanosecond Bivoj laser**



-Repetition rate: 1 Hz and 10 Hz

-Pulse length: 10 ns & 5 ns

-Energy at 1030 nm: 5.5 J and ~ 5.0 J on LSP/LIDT stations @ 10 ns, 4.2 J and ~ 3.8 J on LSP/LIDT stations @ 5 ns  
(with attenuator and pulse picker)

-Energy at 515 nm: 2.5 J on LIDT station @ 10 ns (without attenuator)

-Beam dimensions: 22 mm x 22 mm (square)

-Wavelength: 1030 nm & 515 nm

-Polarization: linearly polarized

-Availability: 11 am - 6 pm

-Pulse to pulse energy stability: 3% (5% at 515 nm)

**2a) High repetition rate picosecond Perla C laser**



- Repetition rate: 50 kHz or 100 kHz (now optimized for 50 kHz)
- Pulse length: 1.5 ps up to 100 W (6 ps at 250 W)
- Energy: 5 mJ in compressed pulse (50 kHz)
- Beam diameter: approx. 4 mm (it can be modified)
- Wavelength: 1030 nm + 515 nm (up to 30 W/100 kHz/1 ps) + 257.5 nm (up to 4-5 W/100 kHz/1 ps)
- Polarization: linear
- Availability: 8 hours/day
- Long-term power stability: <1.2 % RMS over 6 hours
- Beam quality: M2 = 1.4 – 1.8, depending on output power

**2b) High repetition rate picosecond Perla B laser**



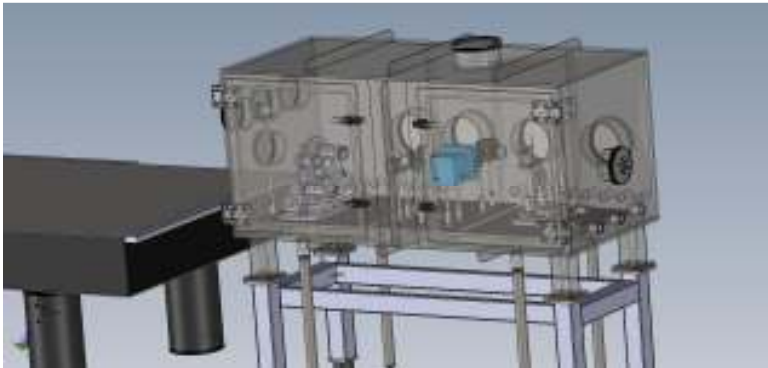
- Repetition rate: 1 kHz
- Pulse length: 1.3 ps
- Energy: 13 mJ

- Beam diameter: <4 mm (collimated, can be modified)
- Wavelength: 1030 nm + 515 nm (up to 4 mJ/1 kHz/1 ps/M<sup>2</sup> = 1.5)
- Polarization: linear
- Availability: 8 hours/day
- Long-term power stability: <1 % RMS
- Beam quality: M<sup>2</sup> = < 1.2

### **2c) High repetition rate nanosecond DG laser**

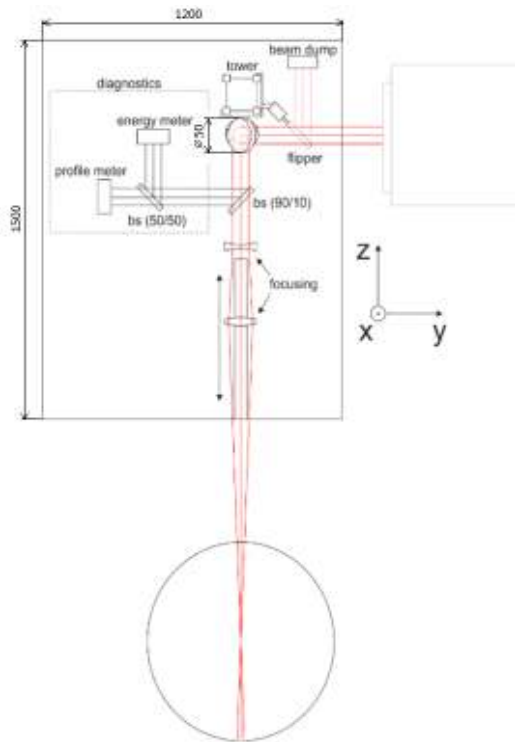
- Repetition rate: 1 kHz
- Pulse length: 1.4 ns (compressor not yet installed)
- Energy: 100 mJ
- Beam diameter: 8 mm (collimated)
- Wavelength: 1030 nm
- Polarization: linear
- Availability: 8 hours/day
- Long-term power stability: <1 % RMS
- Beam quality: M<sup>2</sup> <2

### 3) Laser-Induced Damage Threshold (LIDT) target area



- ISO LIDT tests 1-on-1, s-on-1 type 1 and 2, r-on-1
- ISO 7 clean room environment
- Samples size up to 100x100x100 mm (it can be increased in special cases)
- Samples weight up to 1,5 kg
- Angle of incidence 0° to 60°
- Pulsed laser at 1030 nm and 515 nm, 10 ns, 10 Hz, up to 5 J @ 1030 nm and 2 J @ 515 nm
- 400 μm spot size round Gaussian or 3x3 mm<sup>2</sup> square top-hat
- Pulsed laser at 1030 nm, 1.8 ps, 1 kHz, up to 10 mJ
- variable spot size, round, Gaussian
- Online fast camera 1000 fps
- Post-test analysis with laser scanning microscope

#### 4) Laser Shock Peening (LSP) target area



- Load capacity: 20 kg
- Max. workpiece size: 0.5 m
- Experience with these materials: Titanium alloys, stainless steel, aluminum alloys
- Beam size: up to 5 mm x 5 mm
- Productivity: up to 200 cm<sup>2</sup>/hour
- Results: uniform strengthening of the surface layer up to depth of 1 mm, extension of the lifetime of the component
- Testing methods: residual stress measurement by X-Ray diffraction and hole drilling (ASTM standard E 837), measurement of fatigue strength and material lifetime

**5) Laser micro-machining target area with PERLA C**



- Position precision : up to 2 microns
- High precision and sharp edges

**6) Laser micro-processing target area with Pharos laser**



**Pharos**

- Repetition rate: 1 kHz – 200 kHz
- Pulse length: 250 fs – 10 ps
- Maximal power: 6 W
- Maximal pulse energy: 1 mJ

- Wavelength: 1030 nm
- Beam diameter at 1/e<sup>2</sup> of intensity: 5 mm
- M<sup>2</sup>: < 1.2
- Polarization: linear
- Harmonics frequencies available (for 2 kHz and 250 fs pulse duration):
  - 2<sup>nd</sup> harmonic at 515 nm (~ 0.5 mJ @ 2 kHz);
  - 3<sup>rd</sup> harmonic at 343 nm (~ 0.25 mJ @ 2kHz);
  - 4<sup>th</sup> harmonic at 257 nm (~ 0.1 mJ @ 2kHz).

#### Galvanoscanner

- Wavelengths: 1030 nm, 515 nm
- Maximal scan speed: 2 m/s
- Spot size: ~ 25 μm
- F-Theta lens with focal length: 16.3 cm
- Processing area (with XY stages): 12 x 12 mm (100 mm x 100 mm)

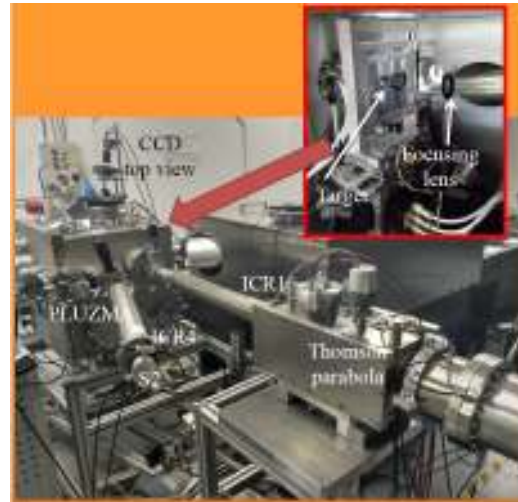
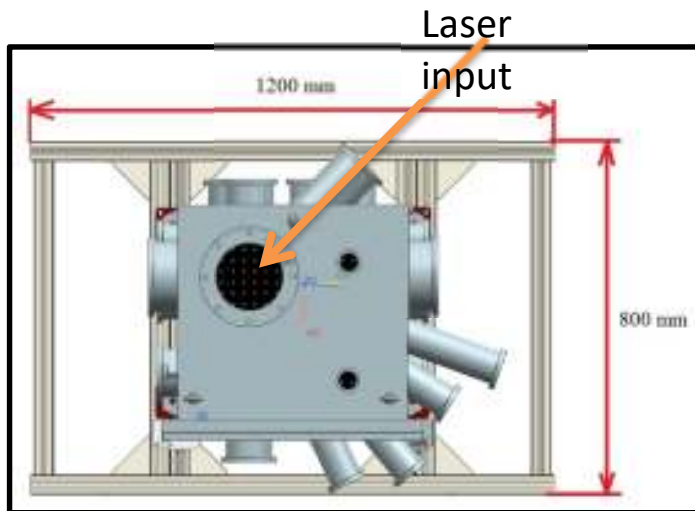
#### Motorized XY stages

- Travel Range: 100 mm
- Maximum speed: 500 mm/s
- Bidirectional repeatability: ± 1.5 μm
- On-axis accuracy (absolute): ± 5 μm
- Resolution: ~ 0.5 μm
- Motor Type: Brushless DC linear motors

#### Manual stages

- 25 mm travel range, resolution of 500 μm per revolution for coarse positioning of samples

**7) Laser ion generation target area (shared with ELI)**



- 10 cm focusing lens
- Top view CCD camera
- Thomson Parabola
- TOF detectors at different angles and distances