

HiLASE Centre Introduction



- Cutting-edge lasers
- Advanced laser applications technologies
- High-skilled experts
- Tracked collaboration with industry and R&D centers around the globe

www.hilase.cz

HiLASE VIRTUAL TOUR

The HiLASE R&D Centre holds **several world records** e.g. in **multi-beam laser nanostructuring** and in the **speed production of laser-induced periodic nanostructures on a stainless steel surface** and has earned the esteemed title of **Centre of Excellence**. Another **world record** was earned by the high-energy DPSSL system BIVOJ, which has reached the level of 146 J at a repetition rate of 10 Hz at a wavelength of 1030 nm.

RESEARCH PROGRAMMES

Industrial Laser Applications | Scientific Laser Applications | Advanced Laser Development

HIGH-TECH LASER TECHNOLOGIES

- High-power (up to 1 kW) lasers
- High-energy – tens of Js lasers
- Advanced laser surface functionalization (up to 40000 beams simultaneously)
- Advanced metallic components strengthening by high-energy lasers – Laser Shock Peening
- Hybrid solutions – Laser with Traditional or other Laser technologies
- LIDT – ISO certified or customized tests

KEY RESEARCH AREAS



ADVANCED LASER PROCESSING & PRODUCTION TECHNOLOGIES

Laser surface treatment, laser micro/nano machining and structuring, industrial process development etc.



SPACE-BORNE LASER TECHNOLOGIES

Lasers qualified for space applications – asteroid mining, optical communication, satellite protection, defense applications and laser propulsion.



SMART & SAFE SOLUTIONS FOR LASER SYSTEMS & APPLICATIONS

Materials and components testing on laser irradiation, laser mass spectroscopy.



LASER NANOTECHNOLOGY

Pulsed laser deposition of 2D materials, laser-annealing synthesis of 2D materials, laser direct printing of 2D materials, pulsed laser fabrication of biocompatible interfaces.



LASER TECHNOLOGIES FOR COMPACT PARTICLE & RADIATION SOURCES

High-power laser sources, adaptive optics, predictive thermo-optical modeling, laser beam engineering/shaping.

INDUSTRIES WE SERVED

- Photonics
- Semiconductor
- Aerospace
- Defense & Space
- Automotive
- Tooling
- Energy
- Biomedical
- Material processing for glass, plastic, metal, semiconductor, and other industries

HILASE CENTRE OFFERS:

HIGH POWER/ENERGY LASER SOURCES

- Up to 100J energy
- Repetition rate 10 Hz
- Arbitrary pulse width 2 – 14 ns with 150 ps step
- Arbitrary beam shape (square, donut, circle, hexagonal, etc)
- Wavelengths: 1030 nm, 515 nm, 343 nm

SPACE BASED FIBER LASERS (NEW IN THE FIELD)

- High-power eye-safe laser sources for space applications (up to 10W power, tens of μ J energy, ns pulse width at 1550 nm wavelength with possibility of extension to 1030 nm or 2090 nm)

LARGE APERTURE HIGH-AVERAGE POWER PHOTONICS COMPONENTS FOR THE LASER SOURCES (SUCH AS FARADAY ISOLATION)

LASER-INDUCED DAMAGE THRESHOLD TESTING FOR PHOTONICS COMPONENTS USED IN SPACE APPLICATIONS

ADAPTIVE OPTICS USED FOR SPACE APPLICATIONS (NEW IN THE FIELD)

MODELING

- Experience in design of high energy and high-power laser systems can be transferred either to design of much larger systems for space debris removal or to design of space-based lasers with similar parameters. We can model laser energetics, cooling, birefringence, stress, beam propagation, wavefront correction etc.
- Prediction on the properties of light-weight materials under extreme thermal loads
- Predictive modeling of material's behavior under space conditions

