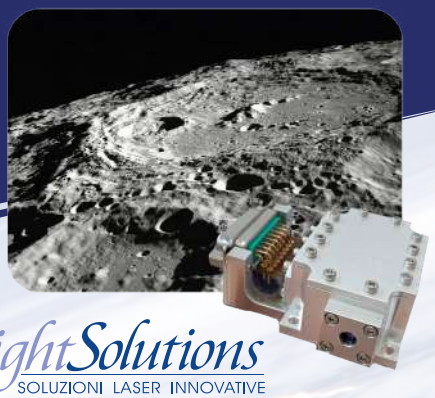
LASER SOLUTIONS for SPACE PROJECTS



Bright Solutions
SOLUZIONI LASER INNOVATIVE

Bright Solutions Srl develops and manufactures state-of-the-art ns, sub-ns, ps DPSS lasers and high brightness diode laser modules. The Company's activity is oriented towards the development of diode-pumped solid-state laser systems aimed at superior, efficiency, compactness and reliability and since 2017 its internal division **Bright Aerospace** is focused on the production of **advanced solid-state lasers for aerospace applications**.
Leveraging on their extensive expertise in creating highly ruggedized laser units designed for flight, alongside their experience in developing lasers for satellite instruments, the company offers **complete design, customization, and manufacturing services** for clients involved **in complex space missions** offering precision, reliability, and innovation in every project. https://brightsolutions.it/

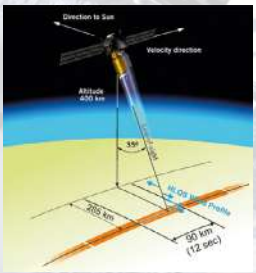
Main fields of activity include:

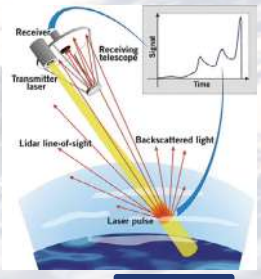
- high energy (~Joule-class) lasers @1064, 1030, 532 and 355 nm for space-borne atmospheric LiDAR instruments
- high power (~100 W class), ns and sub-ns, high repetition rate laser solutions designed for Aerospace
- multi-beam and multiple wavelength lasers for LIDAR and altimeters
- miniaturized high peak power pulsed lasers for LIMS

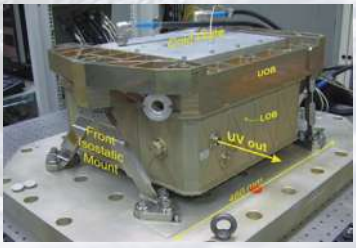
Involvement In Space Programs

2004-2007 E.S.A. AEOLUS - ALADIN (Atmospheric Laser Doppler Instrument)

Subcontractor for Laser oscillator and THG for the LIDAR transmitter prototype: >100 mJ @355nm, stabilized SLM.
Aeolus is the first ESA satellite to directly observe wind profiles from space, using innovative laser technology to improve weather forecasting and advance our understanding of atmospheric and climate processes.
Its key instrument, **ALADIN (Atmospheric Laser Doppler Instrument)**, is the first high-power UV laser system to operate in space long-term, generating powerful light pulses at 355 nm with short bursts of high power around 5 MW.
The ALADIN Laser transmitter is a Nd:YAG Q-switched Master Oscillator Power Amplifier (MOPA), frequency tripled & Injection-seeded. It operates in Continuous Mode with a PRF of 50 Hz







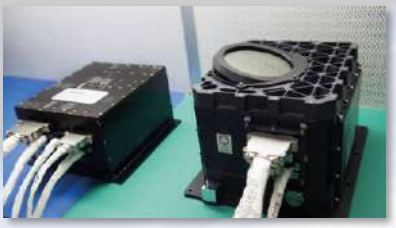
2015-2018 Laser development for a High Spectral Resolution LiDAR.

The key laser parameters required for this project were the narrow linewidth at 1064 and at 532 nm and a pulse energy close to 200 mJ

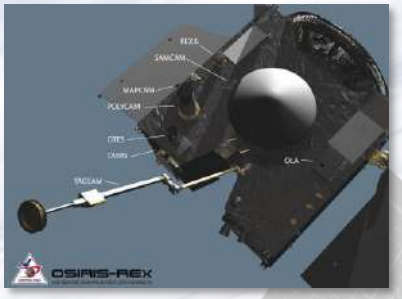
2017-2020 Development of Joule-class Lasers

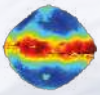
The project was related to the development of satellite-borne LIDAR instrumentation for Earth and atmosphere observation.

OSIRIS-REx (Origins Spectral Interpretation Resource Identification Security – Regolith Explorer) *is a space mission to a near-Earth asteroid (called Bennu and formerly known as 1999 RQ36) with the goal of bringing a sample back to Earth for study.*
Launched on September 8, 2016, the spacecraft reached Bennu in December 2018 and successfully collected a sample in May 2020 after overcoming numerous challenges.



The OSIRIS-Rex Laser Altimeter (OLA) is a scanning LiDAR for generation of high-resolution topographical maps of the Bennu asteroid for support in Bennu's proximity navigation, data collection for center-of-mass determination for gravitational studies, high-resolutions local maps of candidate sampling sites.
The OSIRIS-Rex Laser Altimeter (OLA) includes two laser sources and a single receiver. Both laser sources operate at 1064 nm: a low-energy 10 µJ 10 kHz sub-ns microchip laser is optimized for high-resolution short-range data collection while a higher-energy 1 mJ 100 Hz multi-ns DPSS laser is used for long range (up to 7.5 km) acquisitions. At 200 m distance accuracy up to 5 cm can be achieved.



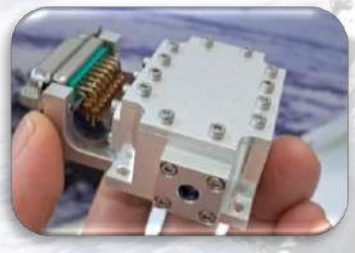


NASA

OSIRIS-REx

Space grade microchip laser: customized and miniaturized solution for on-site LIBS

Bright Solutions supplies the Laser Head Box and Laser Electronics for the Laser Ablation Ionization Mass Spectrometer (CLPS-LIMS), developed by the University of Bern, Switzerland.
CLPS-LIMS will fly as part of the payload suite aboard Blue Ghost Mission 4, led by Firefly Aerospace under NASA's Commercial Lunar Payload Services initiative. The instrument will perform in-situ chemical analysis of lunar regolith in the Moon's south polar region. https://fireflyspace.com/missions/blue-ghost-mission-4/



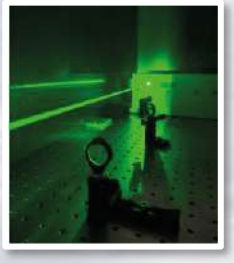
- Space grade miniaturized laser head
- 532nm output wavelength
- < 2ns pulsewidth
- up to 200 Hz rep. rate
- variable output power
- microchip laser technology
- electronic driver and special wiring included

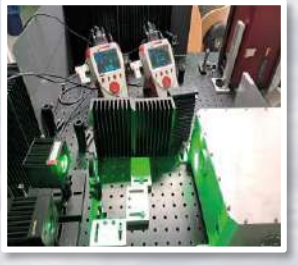
Customized laser source for space grade flash-LiDAR for landing and docking operations

Space grade compact laser head
532nm output wavelength
< 2ns pulsewidth
up to 1 kHz rep. rate
up to 2 mJ pulse energy
Active Q-Switched DPSS laser technology
3D-laser gated imaging

Custom Lasers for Ground-based Space-Satellite ranging

>2 mJ @ 532 nm
1 kHz
< 100 ps
Output pointing stability < 50 µrad
Low divergence (< 0.5 mrad)
Water cooled
Single unit design





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