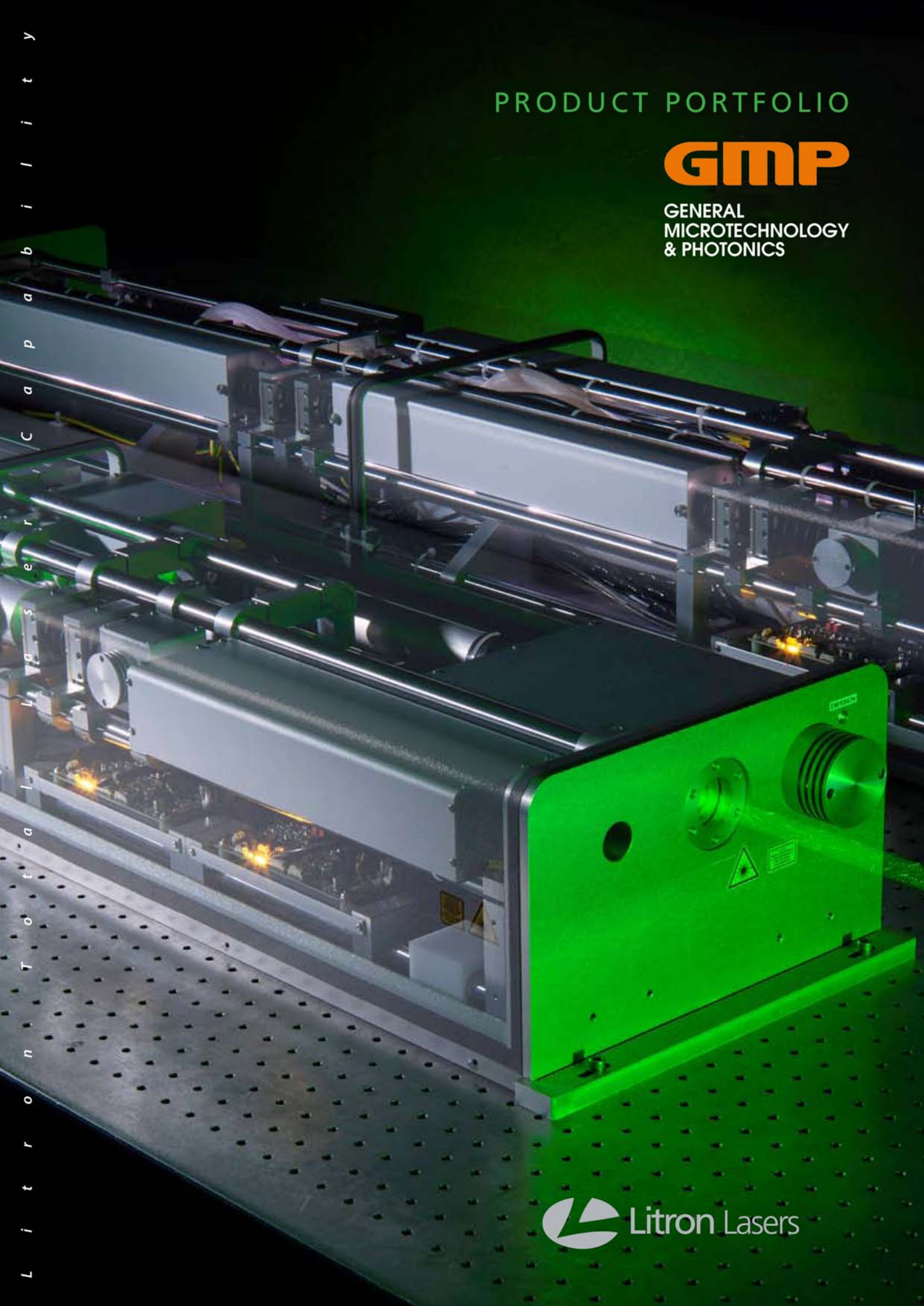
Litron Laser Capability

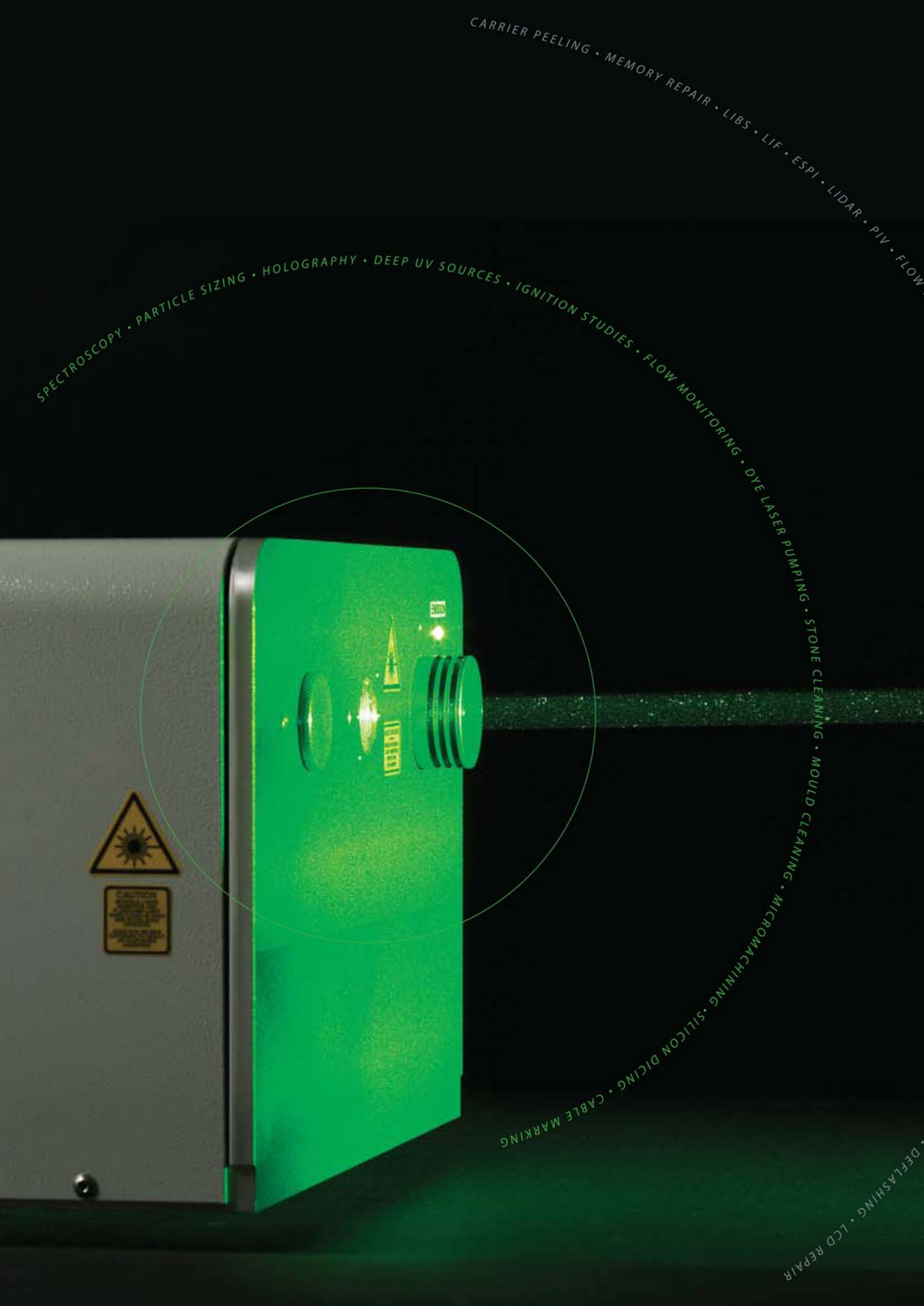
PRODUCT PORTFOLIO

GMP

GENERAL
MICROTECHNOLOGY
& PHOTONICS



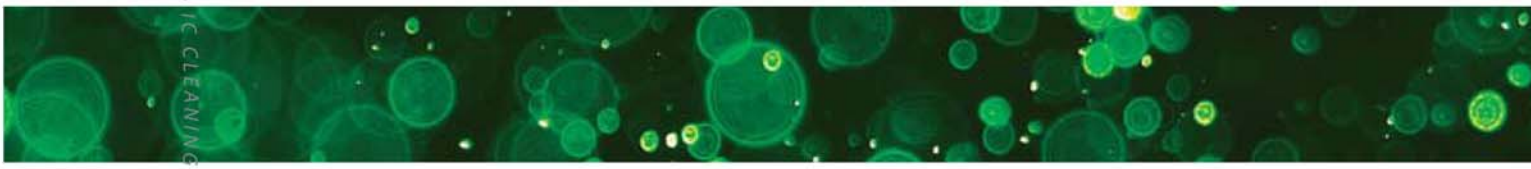
Litron Lasers


CARRIER PEELING • MEMORY REPAIR • LIBS • LIF • ESPI • LIDAR • PIV • FLOW
SPECTROSCOPY • PARTICLE SIZING • HOLOGRAPHY • DEEP UV SOURCES • IGNITION STUDIES • FLOW MONITORING • DYE LASER PUMPING • STONE CLEANING • MOULD CLEANING • MICROMACHINING • SILICON DICING • CABLE MARKING
• DEFLASHING • LCD REPAIR

Designed for Research
Engineered for Industry

Litron Lasers has enjoyed continued growth and development since its inception in 1997 and now sits firmly at the forefront of solid state laser technology. An installed product base of several thousand lasers spanning the globe is the result of many years development and interaction with our customers.

From the beginning Litron has developed lasers that can be operated 24/7 in the most demanding industrial environments. To supply a laser that is best suited to an application it is key to appreciate the process where it will be used and with an extensive knowledge of industrial and scientific applications, Litron provides lasers to match many customer requirements.



Litron's standard laser designs lend themselves to easy customisation, yielding fast, cost-effective solutions. For some highly specialised applications Litron can utilise its in-house machining capability to offer bespoke laser products to encompass the customer's key design constraints in a timely fashion. To this end Litron continues to invest in key areas to maintain long term industrial OEM partnerships.

Litron is continually improving and extending its product range. Please visit www.litronlasers.com or contact us directly for the latest information and developments.

DYNAMICS • OPO PUMP SOURCE • SURFACE TREATMENT • IC CLEANING • ABLATION • SOLAR PANEL PROCESSING • HOLE DRILLING

Compact Pulsed Nd:YAG Lasers

The TRL Series - High Repetition Rate and High Energy

SERIES FEATURES

- ***Output energies up to 850mJ***
- ***Repetition rates up to 200Hz***
- ***Twin-rod architecture for birefringence compensation***
- ***Rugged industrial design***
- ***Auto-tune harmonics***
- ***LUCi touchscreen control***

APPLICATIONS INCLUDE

- ***OPO pumping***
- ***Ti:S pumping***
- ***Dye laser pumping***
- ***Deflashing***
- ***Cleaning***
- ***Spectroscopy***
- ***LIBS***

The Nano TRL series high energy lasers in a compact package for research & industry

The Nano TRL offers energies up to 850mJ and repetition rates up to 200Hz. They are sealed to IP54 against the ingress of moisture and dirt and extremely field rugged. The Nano TRL is a fully birefringence compensated pulsed laser system offering both high energy and high repetition rate outputs. Its twin-rod architecture ensures high beam homogeneity even at very high average power outputs. The Nano TRL is designed to suit demanding industrial applications with a sealed laser head machined from solid aluminium, ultrastable mirror mounts and industry-leading lamp lifetimes. Resonator options include unstable Gaussian coupled, stable, and stable-telescopic configurations, allowing for a multitude of applications.

The Nano TRL is a natural development extending Litron's Nano group of products giving more power in a compact package.

Harmonic wavelengths are realised by bolt-on modules with auto-tuning capability that can be added or removed as required. Power supplies for the range include state-of-the-art IGBT switching into the flashlamp, giving increased efficiency and stability as well as significantly prolonging lamp life due to the much lower currents.

Intelligent laser head technology allows for easy head and power supply swapping as well as optional full auto-tracking of harmonic wavelengths. Auto-tracking continuously monitors the harmonic output energy and actively controls the phase-matching angle of the crystal to ensure that maximum conversion efficiency and therefore output is always achieved. This is most useful for the fourth and fifth harmonics where crystal absorption at the harmonic wavelength leads to self heating of the crystal.

Standard touchscreen control via the LUCi controller gives the user a simple and intuitive interface with full access to all system controls and information.

Many systems are fully air cooled and require no external services except a mains electrical input.

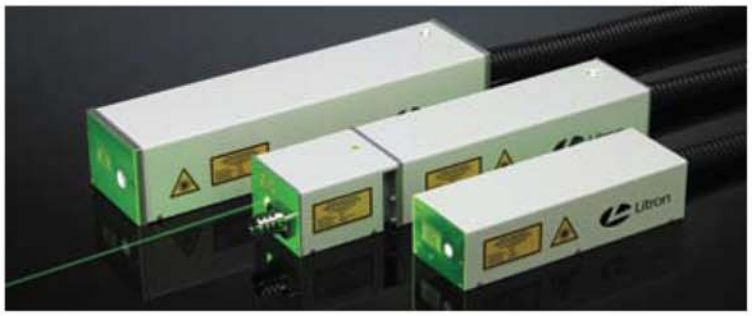
TRL

Ultra-compact Pulsed Nd:YAG Lasers

The Nano Series - Small in Size, Big in Performance

The Nano series is a family of compact and rugged Q-switched lasers suited to a multitude of applications including mask repair, LIBS, LIDAR, PIV, pump sources and spectroscopy.

They have been designed to satisfy the demands of customers today. With industry leading performance in every respect, and unsurpassed design and build quality, the Nano series sets the benchmark for ultra-compact laser systems today.



Above, a Nano TRL is shown pumping the Litron Aurora Broadband OPO.

Below, a Nano TRL linked to an articulated arm.

At the heart of all lasers in the Nano range is a robust monolithic resonator machined from a solid piece of aluminium leading to a solid and stable platform on which the systems are built. Ultra-stable mirror mounts, a stainless steel pumping chamber with close coupled ceramic reflectors, and proprietary long-life flashlamps result in homogeneous, stable outputs.

Nano Series Models

Nano S/SG

Small, rugged, reliable and efficient. Conventional stable/Gaussian coupled resonator with electronically verified intra-cavity safety shutter.
Repetition rate: up to 100Hz.
Energy: up to 130mJ at 10Hz.

Nano L/LG

Rigid, stable construction through elegant design lends itself to use in demanding industrial applications.
Repetition rate: up to 100Hz.
Energy: up to 340mJ at 10Hz.

Nano T

As the Nano L but with telescopic stable resonator for very low beam divergence and excellent uniformity.
Repetition rate: up to 50Hz.
Energy: up to 320mJ at 10Hz.

Nano TRL

Twin-rod oscillator with birefringence compensation for excellent beam quality. Extra rugged industrial design.
Repetition rate: up to 200Hz.
Energy: up to 850mJ at 10Hz.

Nano O

Smallest head in the range, designed specifically for incorporation into customers' equipment. Fully air cooled option available where water is not desired such as portable LIBS applications.
Repetition rate: up to 100Hz.
Energy: up to 130mJ at 10Hz.

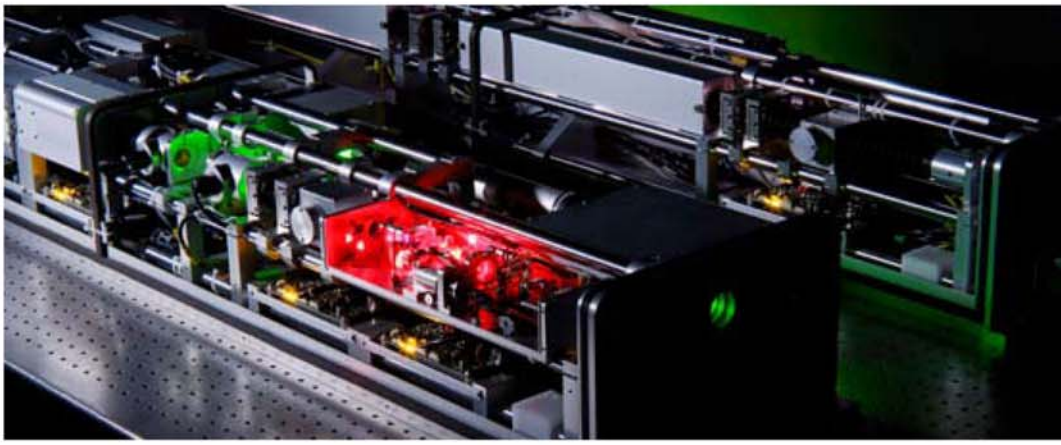
nano

High Energy Pulsed Nd:YAG Lasers

LPY Series - Performance as Standard with a Range of Options

FEATURES

- ***Rugged industrial build***
- ***Up to 10J at 1064nm***
- ***Telescopic or Gaussian resonators***
- ***Optional seeder package***
- ***All harmonics to 5th available***
- ***Full energy in <5 minutes at all wavelengths***
- ***Full RS232 software control***
- ***Fully integrated power supply and cooler***



Superior performance through superior design.

The LPY series of pulsed lasers have been designed to suit almost any industrial or research application in which a high-energy or high-specification Nd:YAG laser is required. Based around a fully self supporting invar rail the LPY series exhibit both exceptional mechanical and thermal stability.

A 'no-compromise' design approach is evidenced in the build quality, a parameter that sets these lasers well apart from any of their competitors.

The modular design of the laser head allows a wide variety of resonator configurations to be offered, from single rod oscillators to fully birefringence compensating twin-rod oscillator, twin-rod-amplifier systems. Furthermore, a choice of stable, stable-telescopic or unstable Gaussian-coupled resonators is available, allowing the customer to specify a system that suits their requirements.

10J output stage

An LPY7000 with an output of 1J at 532nm, 30Hz.

OPTIONS AND ACCESSORIES

- ***Motorised harmonics***
- ***Auto harmonic switching***
- ***Injection seeding***
- ***Line narrowing etalon***
- ***Auto-tracking and auto-stabilisation***

APPLICATIONS INCLUDE

- ***Dye laser pumping***
- ***OPO pumping***
- ***Spectroscopy***
- ***LIBS***
- ***LIDAR***
- ***PIV***

LPY700 laser pumping an external Litron Aurora Broadband OPO.

Rugged, Invar stabilised, pulsed Nd:YAG lasers with high energy and high performance for industrial and scientific applications.

The LPY7000 lasers offer extremely high Q-switched outputs up to 3.5J and repetition rates of up to 50Hz. Based around our proven self-supporting Invar frame their robust build quality suits them to both industrial and scientific applications. Energies up to 10J are also available at 1064nm with extra amplification.

The lasers are provided in an oscillator, pre-amplifier, main-amplifier arrangement.

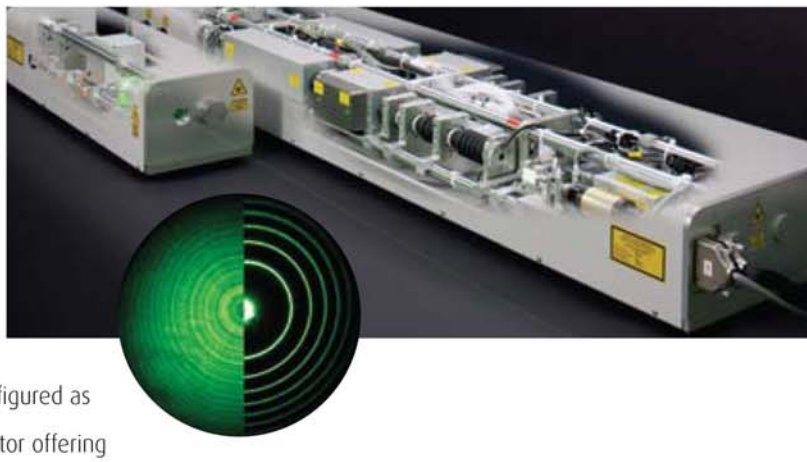
The oscillator may be configured as a stable-telescopic resonator offering a low order multimode output with a smooth spatial and temporal profile, or as an unstable Gaussian-coupled resonator offering a single transverse mode output with slightly higher peak powers.

Lamp change is performed in a matter of minutes with no need for any re-alignment at all. An IP54 sealed case ensures that the laser is protected against the ingress of dirt and moisture when used in industrial environments.

Injection seeding

Injection seeding is an option that can be added to any of Litron's high energy LPY series lasers. With the addition of an SLM seed laser and appropriate control electronics output linewidths of 0.003cm^{-1} for Gaussian-coupled resonators and 0.0016cm^{-1} for true TEM_{00} resonators are achieved.

With Litron's ultra-stable mirror locking electronics, extremely stable high energy SLM outputs are realised.



Options and Accessories

All harmonic wavelengths to the fifth are available as well as options that include auto-tracking, auto-stabilisation, motorised attenuation, motorised mirror control and automatic wavelength selection.

Aurora II Integra OPO

Integrated Nd:YAG Pumped Type II BBO OPO

FEATURES

- *Continuous tuning range 400-2300nm*
- *UV harmonic option for 205-419nm*
- *Linewidth <3cm^{-1}*
- *Fully integrated pump laser and OPO*
- *Motorised OPO tuning with optional closed loop wavelength feedback*
- *Walk-off compensation*
- *1064nm variable optical attenuator*
- *Highly stable pump laser and OPO pulse energy*
- *355nm process shutter with energy monitoring as standard*
- *Full PC control via RS232*

Options Include

- *Motorised and closed loop automatic tuning of pump laser harmonics*
- *Auto-stabilisation of pump energy including power supply control*

Applications

Photoacoustic Imaging

Laser Induced Fluorescence

Photobiology

High Resolution Spectroscopy

Non Linear Spectroscopy

Remote Sensing

Process Monitoring

Combustion Research

Display Manufacture and Testing

Aurora II INTEGRA

Aurora II Integra OPO

The Aurora II Integra series is a fully motorised, type II BBO OPO and Nd:YAG pump laser integrated into a single head. By combining a matched pump laser and OPO onto an ultra rigid Invar optical rail the long-term alignment, pulse stability and performance of the OPO output are assured. The highly modular component design is ideally suited for customised solutions which can be tailored to each user's individual application. This provides for unprecedented multi-wavelength flexibility in either research or industrial applications.

The Aurora II series of type II broadband OPOs have been designed for reliability, stability and ease of use, with a true no-gap output between 410nm and 2300nm. An optional second harmonic generator gives access to the 205-419nm region, extending the standard tuning range into the UV. A double-pass pump configuration is used to ensure the highest efficiency of the OPO. Coated and temperature stabilised crystals are enclosed in a sealed housing to ensure system longevity. Litron's bespoke OPO resonator design also provides class leading spectral purity with OPO signal linewidths less than 2cm^{-1} for a significant part of the visible tuning range.

The pump laser is a critical part of any OPO to ensure the performance and reliability of the system as a whole. The Aurora II can incorporate a wide choice of optimised pump lasers from Litron's wide range of pulsed Q-switched Nd:YAG lasers, with a choice of repetition rates from 10Hz to 200Hz.

Both the pump laser and the compact OPO are controlled and tuned via an intuitive computer controlled interface that adjusts the angle of the BBO crystal with a high resolution stepper motor. Automatic tuning is available using an optional in-built spectrometer and closed-loop feedback to adjust the OPO crystal angle. Optional auto-stabilisation and auto-tuning of

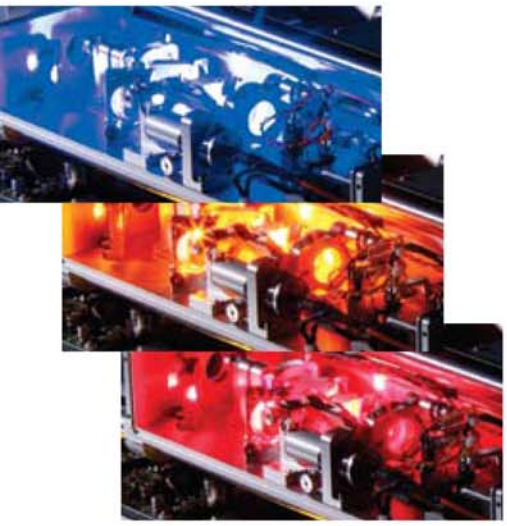
the 355nm pump laser provide an additional level of automation and long-term stability control for continuous operation in industrial applications.

Aurora II-532 Integra

Also available in the range is the Aurora II-532 Integra, which uses a 532nm pump laser to provide a tuneable laser source between 670nm to 1064nm. The Aurora II-532 is based on the same fully integrated system design as the Aurora II Integra and shares its modular flexibility to be pumped by a wide range of LPY models. All options and features are common with the Aurora II.

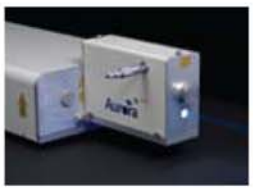
Aurora 1.57

For IR applications in LIDAR and spectroscopy the Aurora 1.57 is a dedicated all-in-one sealed OPO for use in more extreme environments. The Aurora 1.57 is a 1064nm pumped fixed wavelength OPO optimised for maximum 1.57µm output energy. The pump laser and OPO are mounted in a single compact fully sealed laser head with an air-cooled power supply.

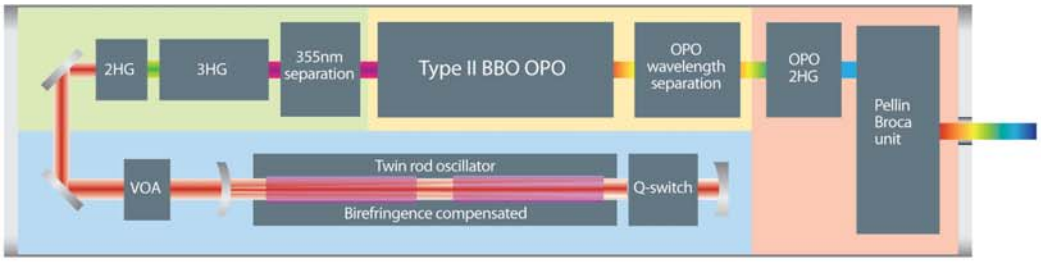


Aurora I Integra

The Aurora I Integra uses a Type I BBO crystal for a broadband tuneable source in the 410nm to 680nm range. The Aurora I is most suitable for applications where pulse energy is the highest priority and where the wavelength linewidth is of less importance.



Aurora II Integra Type II BBO OPO Unit Schematic View



Schematic shows the compact arrangement of the combined pump laser and Aurora II Integra OPO in a single housing.

High Repetition Rate Lasers for PIV

Diode Pumped Nd:YLF and Nd:YAG Lasers for Time-resolved PIV Applications

LDY300 PIV Series Diode Pumped Q-switched Nd:YLF Lasers.

FEATURES

- ***Up to 30mJ, 527nm, 1kHz***
- ***Low M^2 output***
- ***Invar stabilised optical rail***
- ***Fully integrated power supply and chiller***

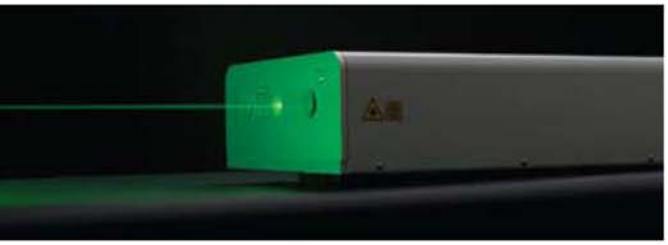
LDY300 PIV

The LDY300 lasers are diode pumped, dual cavity, Nd:YLF laser systems designed for imaging applications such as PIV. Output energies of up to 30mJ at 527nm per cavity at 1kHz are available.

The lasers are built around a rugged self supporting invar rail that bestows excellent mechanical and optical stability. This, coupled with the proprietary resonator design, leads to excellent output beams that are spatially and temporally extremely smooth and stable, giving rise to light-sheets that offer almost identical shot to shot illumination.

The robust design of these lasers suits them to the harshest of industrial applications and research applications alike.

The power supply and closed-circuit chiller are all housed in a compact rack. The system can be controlled either by the in-built LCD interface or via RS232 with the supplied software suite or dll. External triggering of the lasers is accessible via a TTL interface.



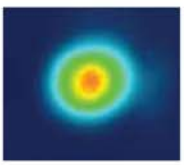
LD-G PIV Diode Pumped Q-switched Nd:YAG Lasers.

FEATURES

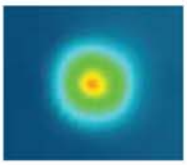
- ***7.5mJ per Pulse, 10kHz***
- ***150W at 532nm total output***
- ***Circular homogeneous beam***
- ***140ns pulse width at 10kHz***
- ***Fully integrated power supply and chiller***

The LD75-G PIV

The LD75-G PIV is a dual laser head system built for time-resolved PIV applications. The system comprises two fully independent intracavity doubled Nd:YAG lasers, each giving outputs of 75W at 532nm, that are combined to a common beam axis. Both lasers can be independently triggered and controlled. The Invar rail around which the system is constructed imparts exceptional stability and the sealed head enclosure ensures continuous reliable operation in non-ideal environments. The power supplies and chiller are fully integrated in a single unit. With no services except the mains electrical input the LD75-G PIV is a stand-alone turnkey system with an output suited to many time resolved PIV applications.



Near field beam profile at 10kHz 75W, 532nm



Far field beam profile at 10kHz 75W, 532nm

LDY·300PIV

LD75·G PIV

Plasma PIV High Repetition Rate Lasers

Pulsed Diode Pumped Nd:YAG Lasers for PIV Applications

FEATURES

- ***0-200Hz operation***
- ***M^2 <10***
- ***Fully diode pumped***
- ***Long diode life***
- ***Fully independent operation and timing***
- ***Smooth homogeneous profile***
- ***Optimised for high brightness light-sheets***
- ***Compact integrated PSU and cooler***

DPSS Plasma PIV

The Plasma PIV system is a dual head, pulsed, diode pumped laser designed specifically for PIV applications. The Plasma PIV comprises two fully independent extra-cavity frequency doubled, pulsed Q-switched Nd:YAG DPSS lasers, that are beam combined to a common beam axis.

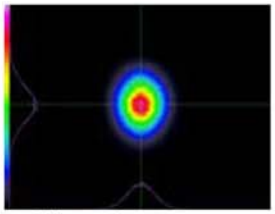
Pulsed diode pumping provides an unprecedented level of flexibility not available previously in PIV lasers. With an output of 75mJ per pulse up to 150Hz and 60mJ at 200Hz and with pulse lengths of <10ns, it is suited to a large range of cameras and PIV setups.

Both lasers can be independently controlled and externally triggered. The Invar rail around which the system is constructed imparts exceptional stability and the sealed head enclosure ensures a continuous reliable operation in non-ideal environments.

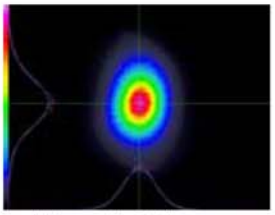
Ultra-stable mechanics, damage resistant optics and innovative design make the PIV system highly reliable. Offering circular uniform beams, with low M^2, it is an ideal tool for high brightness, high homogeneity, light-sheet formation.

With no services except the mains electrical input the Plasma PIV is a stand-alone turnkey system with an output suited to a huge range of PIV applications.

Additionally, with minimal maintenance requirements and few consumable parts, the Plasma offers high uptime, low cost of ownership and outstanding performance.



Near field beam profile at 10Hz
75mJ, 532nm



Near field beam profile at 200Hz
60mJ, 532nm

PLASMA PIV

Bernoulli PIV Series – Vibration & Shock Proof

Ultra Rugged Nd:YAG Lasers for PIV

FEATURES

- ***IP67 sealed laser head***
- ***Shock and vibration proof***
- ***Energies up to 200mJ***
- ***Repetition rates up to 200Hz***
- ***Intelligent head technology***
- ***LUCi touchscreen control***

The Bernoulli PIV is a fully integrated, fully sealed, shock and vibration-proof PIV laser system. Machined from solid aluminium and sealed to IP67 the laser head is built for use in demanding applications where the environment would naturally preclude the use of many standard systems.

Incorporating two fully independent laser heads the Bernoulli gives output energies of up to 200mJ at 532nm and repetition rates of up to 100Hz. Powered by a compact fully integrated power supply and cooler unit and controlled via the LUCi touchscreen controller the Bernoulli is both simple and intuitive to use. Industry standard mounting for light sheet optics is standard as is a full suite of trigger and synchronisation inputs for absolute control of the laser output. Standard accessories such as a motorised attenuator and PC software suite make the Bernoulli the most fully featured system of its type available.

bernoulli
piv

Pulsed Nd:YAG Lasers for PIV

The Worlds Most Comprehensive Range of PIV Lasers from a Single Manufacturer

FEATURES

- ***Outputs of up to 1J at 532nm***
- ***Repetition rates of up to 200Hz***
- ***Compact and portable***
- ***Homogeneous beams***
- ***Fully independently triggered***
- ***LUCi touchscreen control***

All of Litron's PIV laser systems are twin head devices, meaning that the PIV system contains two totally independent lasers.

The range of PIV systems is based around the compact Nano series, the invar stabilised LPY series and the diode pumped LDY series.

The overriding factor that sets Litron's products apart is quality. This is evidenced not only in the design and construction of the product, but also in its performance. In any imaging application the beam quality is of paramount importance as this completely determines the light sheet quality.

By choosing a suitable resonator configuration the output beam quality can be controlled to give a very smooth spatial profile which remains homogeneous as it propagates right into the far field.

It is our philosophy to provide a laser system that suits an application. A 'one system fits all' approach, as offered by most manufacturers, does not allow the customer to optimise their process. For applications such as PIV Litron has developed resonators that will yield extremely uniform light sheets whose pulse to pulse structure and stability remains constant. These are all based around our stable or stable- telescopic resonators.

Nano Series Models

Nano S PIV

The smallest in the series. Two Nano S lasers mounted onto an aluminium gauge plate to provide robustness. Beam combination optics and any harmonic generation units are mounted onto this plate for increased stability. Both lasers share the same integral power supply and cooling unit.

Nano L PIV

Exceptional industrial robustness. The Nano L laser can be run at 100Hz enabling results to be taken at 200Hz. Industry-leading specifications are achieved from a very compact laser head.

Nano T PIV

Like Nano L but with telescopic resonators for low divergence, enabling light sheets up to four times thinner or longer than most other systems.

Nano TRL PIV

High energies from a compact package. Dual head high energy laser systems with output energies up to 425mJ at 532nm per laser head.

LPY PIV Also Available

LPY PIV

Invar stabilised PIV lasers for high average power PIV and other double pulse applications. Twin rod birefringence compensation provided for stability and beam homogeneity.

Power supplies for the range include state-of-the-art IGBT switching into the flashlamp, giving increased efficiency and stability and significantly prolonging lamp life due to the much lower currents.

Up to 1.2J at 15Hz and 50mJ at 200Hz, 532nm.

nanoPIV

Industrial Nd:YAG Laser Systems

Rugged OEM Lasers for a Multitude of Applications

Litron offers many OEM systems designed for use in industrial applications.

Both diode pumped and lamp pumped sytems are available.

Fundamental to the design of all industrial systems is their ability to operate on a continuous basis in the harshest of environments. Optical stability is achieved only through mechanical stability. Based around either a self-supporting Invar frame or monolithic aluminium resonators these lasers are extremely rugged.

LD75-G and LD150-G

The LD75-G and LD150-G are Q-switched intra-cavity frequency doubled DPSS lasers delivering average powers of 75W and 150W respectively at 532nm and at a pulse frequency of 10kHz.

The design of the resonator and the good thermal management of the DPSS architecture allows the user to change repetition rate from 1 to 50kHz as desired while keeping excellent pulse stability and mode structure.

A well-proven invar based rugged head design gives excellent mechanical strength and thermal stability. State-of-the-art control and power supply architecture ensure flexible and efficient performance.

Simple integration with OEM equipment and process lines makes this platform ideally suited to demanding high volume industrial and scientific applications.

Applications Include: PIV, Photovoltaic Processing, Poly-silicon Annealing, Hard Materials Processing, Spectroscopy, LIDAR and Ti:Sapphire Pumping.

DPSS Plasma

The Plasma pulsed Q-switched Diode Pumped Solid State (DPSS) laser continues Litron Lasers' continuous new product development. The laser head, machined from a solid aluminium billet, is extremely compact thus reducing weight and increasing durability. Sealed, it is ready for use in the harshest of environments.

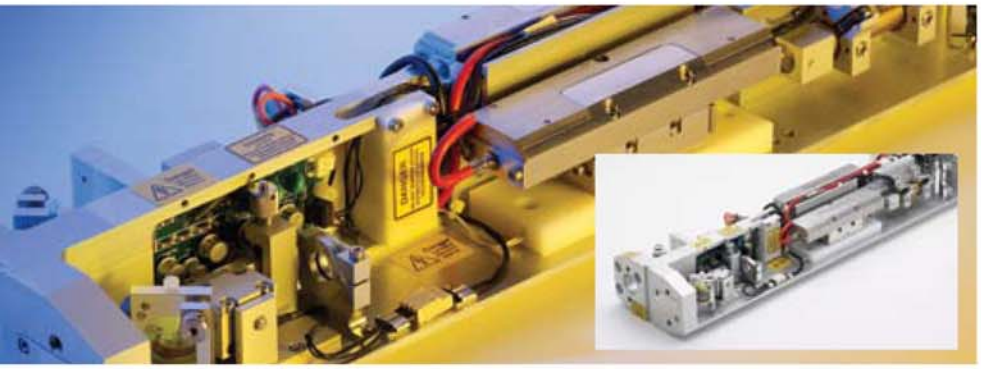
A twin-rod birefringence compensated oscillator gives high homogeneity, low M^2 output beams which result in high harmonic conversion efficiencies. Output energies of up to 150mJ at 1064nm at 200Hz are available.

As all drive electronics are contained within the laser head it is only necessary to supply a chilled water supply and a DC voltage to the unit. Such simplicity allows for quick and easy system integration.

LPY7000

The LPY7000 lasers are suited to industrial applications both due to their robust construction on a rugged Invar rail and the plethora of available control and stabilisation options available. Outputs of up to 10J and repetition rates of up to 50Hz lend these systems to applications where a high peak power with substantial energy is required such as laser peening, LIBS, plasma formation and many ablative processes. Industry leading flashlamp lifetimes reduce process downtime and cost of ownership.

Custom Laser Systems
Flexibility and Expertise



Custom Laser Head

Custom 10J Q-switched Laser

Litron's flexible approach and expertise in laser design means custom lasers are a natural part of our production.

In addition to its standard range, Litron produces a great variety of custom systems, either based on standard modules or, where necessary, offers a complete design to fit your needs.

The high degree of modularity in the design of Litron's lasers, both mechanical and electrical, yields a platform ideally suited to non-standard bespoke systems. Mechanically the invar rail structure and associated optical and mechanical mounts form a set of components whose placement within the rail are largely variable. Due to this almost any optical configuration can be achieved with absolutely standard components. This is a significant advantage when adapting an existing design to a specific requirement or when producing an entirely new type of system.

Special and Non-laser Products
Complimentary to all Litron Products

Energy Monitoring

Litron manufactures a comprehensive range of laser energy monitors. These are photodiode based instruments and allow extremely accurate analysis and measurement. Litron's range of monitors can measure every pulse from the laser system, rather than averaging the energy as many calorimetric devices do. This leads to unrivalled accuracy and flexibility of measurements. Typically the pulse to pulse repeatability is better than 0.2%.

Special Products

GLASS LASERS
Can be made to special order.

RUBY LASERS
Custom lasers available with up to 1J Q-switched, 10J normal mode.

Er:YAG LASERS
2.94µm output, ~200µs pulse length.
Up to 1J output. Q-switched option available.

Our policy is to improve the design and specification of our products. The details given in this document are not to be regarded as binding.

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Litron Lasers