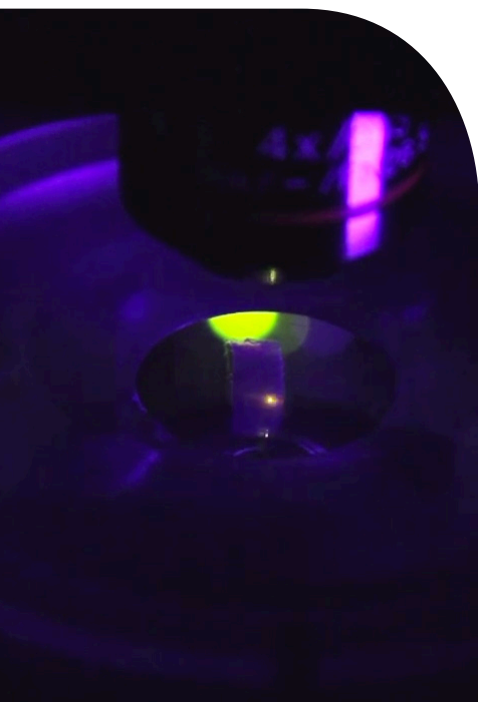


## **LASU - Laser Applied Stimulation & Uncaging**

**Optogenetics & Uncaging**



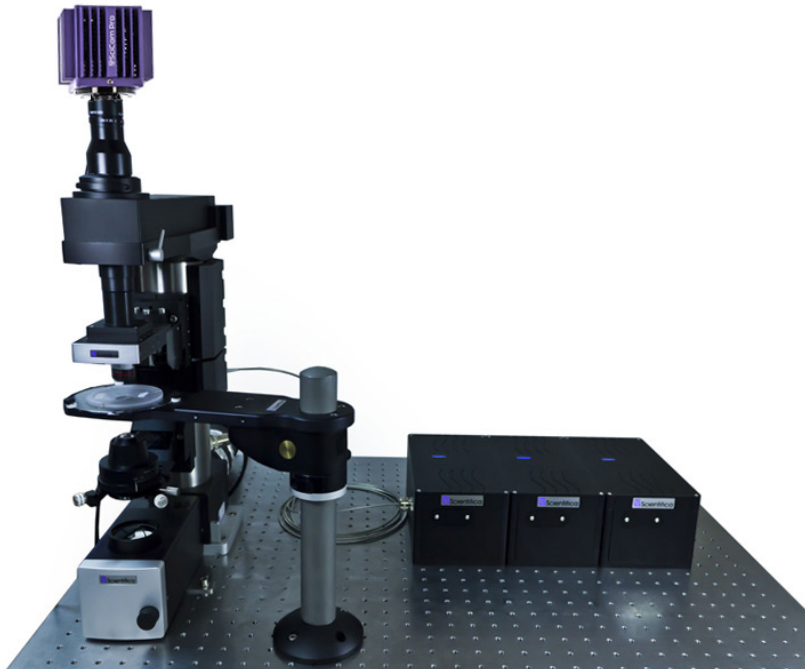
[www.scientifica.uk.com/lasu](http://www.scientifica.uk.com/lasu)

[www.scientifica.uk.com](http://www.scientifica.uk.com)

# LASU - Laser Applied Stimulation & Uncaging

## Two techniques, one system

The LASU system is ideal for researchers engaging in optogenetics, uncaging or other photo-stimulation experiments. The laser spot positioning is both accurate and repeatable enabling fast experimental manipulation of biological systems.



### Uncaging & photostimulation in one

A number of laser wavelengths are available including those suitable for channelrhodopsin, halorhodopsin and uncaging.

Purchase a system with a single wavelength or incorporate numerous laser modules to enable multiple applications.

### Compact

The compact nature of the LASU scan head and laser modules, plus the option of free-space or fibre-launched laser input, means this system fits on most standard antivibration tables.

### Modular

Based on the highly successful design of Scientifica's award-winning Multiphoton Imaging System, LASU uses galvanometer scanning mirrors for fast, accurate and repeatable laser spot positioning.

The LASU system fits directly onto Scientifica's SliceScope upright microscope making it easy to upgrade existing rigs and the perfect choice for any lab wanting to perform in vitro optogenetics or uncaging.

### Software

LASU is controlled entirely through specially-designed software which includes a range of easy to use functions allowing for instant "out of the box" use.

LASU's software displays a live feed from the camera and comes pre-installed on the PC supplied with the system. Complete control through the software means spot positioning, laser power and pulse frequency can all be manipulated through the clear graphical interface.

**Experiment** **Tuning** **Laser Settings**

**Laser Wavelength (WL)**  
☒ 405 nm  
☐ 476 nm  
☐ 561 nm

**Point** **Raster** **Grid** **Spiral**

**Radius [μm]**

**Repeat (RPT)**

**Objective**  
☒ 4X  
☐ 40X  
☐ 60X

**No. Of turns**

**Duration of Scan [ms]**

**Ext Trig**  
☐

**Image name**

**Stimulate**

**Repeat**

**Select Type**

**Abort** **Delete all** **Delete**

**Protocol Editor**

ID	Type	RPT	PPL	WL	PD	NOP	BF	SD	DOS
0	Pt	NA	NA	405	25	5	5	0	NA
1	Pt	NA	NA	405	25	5	5	0	NA
2	Pt	NA	NA	405	25	5	5	0	NA
3	Pt	NA	NA	405	25	5	5	0	NA
4	Grd	NA	NA	405	25	5	5	0	NA
5	Grd	NA	NA	405	25	5	5	0	NA
6	Grd	NA	NA	405	25	5	5	0	NA
7	Grd	NA	NA	405	25	5	5	0	NA
8	Grd	NA	NA	405	25	5	5	0	NA
9	Grd	NA	NA	405	25	5	5	0	NA
10	Grd	NA	NA	405	25	5	5	0	NA
11	Grd	NA	NA	405	25	5	5	0	NA
12	Grd	NA	NA	405	25	5	5	0	NA
13	Grd	NA	NA	405	25	5	5	0	NA
14	Grd	NA	NA	405	25	5	5	0	NA
15	Grd	NA	NA	405	25	5	5	0	NA
16	Grd	NA	NA	405	25	5	5	0	NA
17	Grd	NA	NA	405	25	5	5	0	NA
18	Grd	NA	NA	405	25	5	5	0	NA
19	Grd	NA	NA	405	25	5	5	0	NA
20	Grd	NA	NA	405	25	5	5	0	NA

**Protocol Name**

**Zoom** **Point** **Hand** **Grid** **Raster** **Spiral**

**Camera Name**

**Contrast**  
 Maximum [%]  
  
 Minimum [%]

**Exposure time [S]**

**FPS**

**LASU RACK TEMPERATURE [°C]**

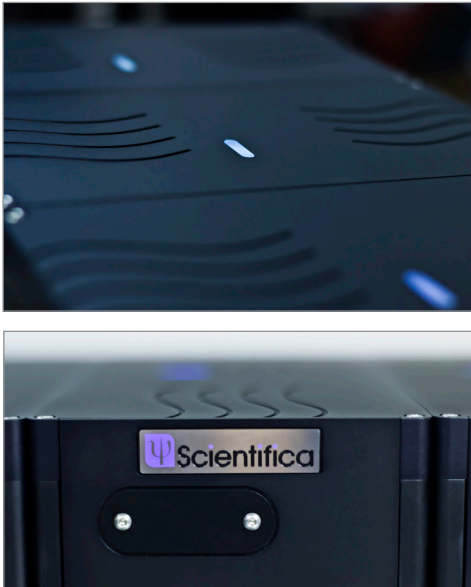
**STOP**

**Save** **Load**

LASU interface demonstrating various stimulation protocols



The compact laser housing modules free up space around your system and allow you to use existing antivibration tables



**Laser housing unit**

The LASU laser housing units include high-speed triggering electronics, the laser diodes and the coupling optics, all in one compact box.

The units can be supplied with a single laser or combined with additional laser modules which can be individually controlled or triggered via the LASU software.

**Modular advantages**

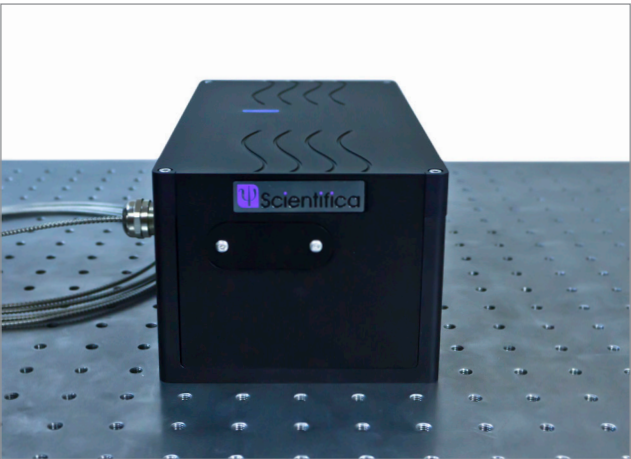
The laser housing units can be bolted securely to the antivibration table to maximise stability. As additional laser modules are added they can be simply aligned with existing laser units.

This makes upgrading and developing the system simple and cost effective.

**Laser wavelengths available**

Optogenetics	473nm, 561nm
Uncaging	405nm

- Benefits include:**
- Compact package to fit onto existing table
  - Various wavelengths available for multiple applications
  - High-speed triggering
  - Intensity control



Choose between fibre coupling or free-space launch optics to suit future research

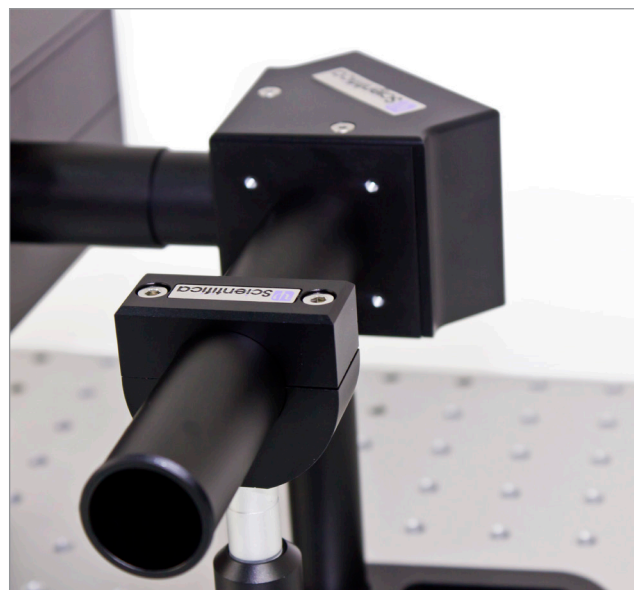


### Fibre coupling

Fibre coupling gives the advantage of greater flexibility when positioning the laser housing units. Perfect for smaller optical tables or if you wish to have the unit mounted remotely from the table top itself.

#### Benefits include:

More space efficient - can be placed anywhere  
Ideal for smaller laboratory tables  
Fibre is directly connected to the scan head, simplifying system alignment

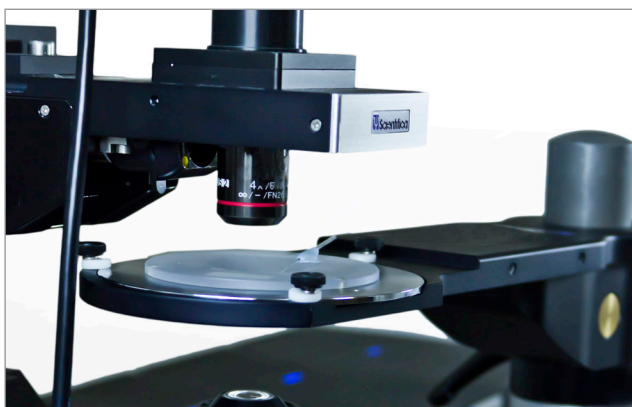


### Free-space

Free-space launch optics are ideal if your microscope is fixed to the table. This method maximises light efficiency and would be typical if you wish to move your sample relative to the microscope.

#### Benefits include:

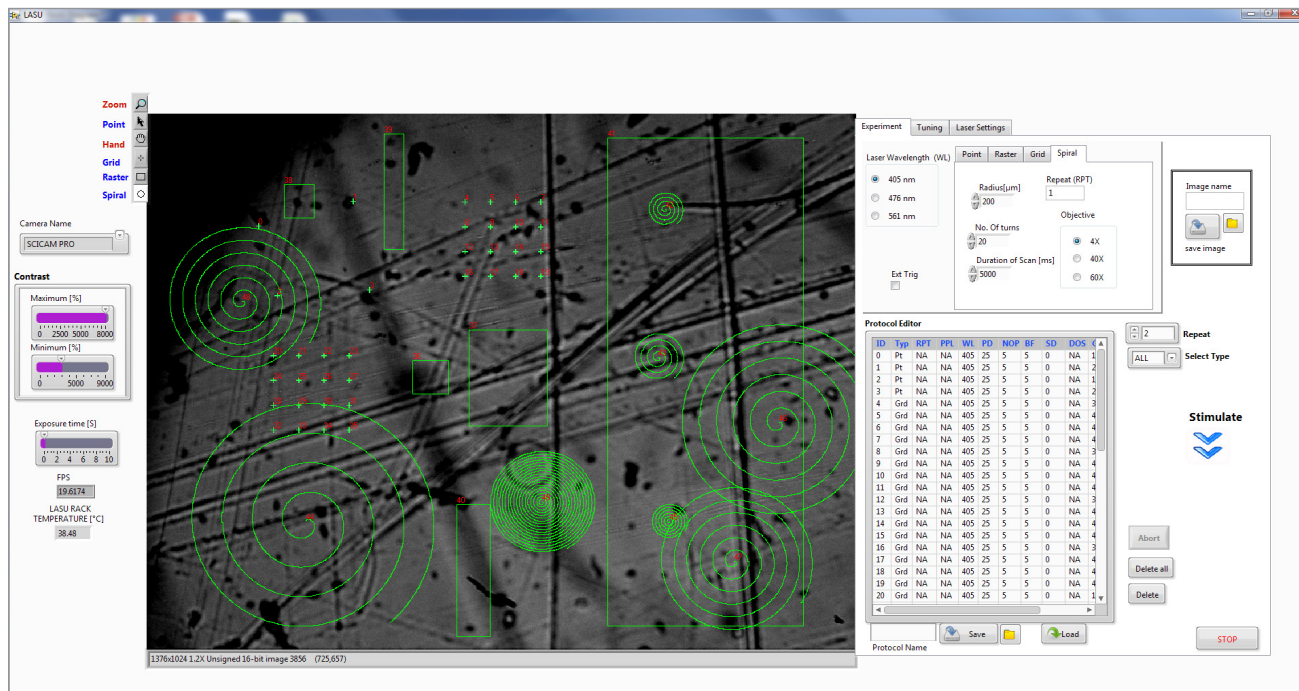
Versatility to adapt the system as your research needs evolve (to upgrade to multiphoton imaging)  
Can be used to move your sample relative to the microscope, or moving the microscope around your sample.  
More efficient laser power



# New software functionality

Scientifica and VU University Amsterdam developed the LASU software specifically for use with this system. It comes with a variety of functions as standard, enabling instant “out of the box” use. It has been designed for optical in vitro photo-stimulation experiments such as optogenetics and uncaging.

The latest software release enables greater cell area stimulation, where specific points of interest or areas to raster can be selected. Independent stimulation protocols with a choice of scanning patterns can now be determined, and the timing of stimulation can be controlled and repeated. Additionally, an improved range of cameras are now supported.



LASU interface demonstrating various stimulation protocols

## Key features

The LASU software has a range of functions that make it easy to use. It displays a live feed from the camera and comes pre-installed on the system's workstation. The updated software is available for existing and new LASU systems meaning existing systems can take advantage of the new experimental features.

## The benefits of software control

With no physical shutter on your table, the LASU system minimises vibrations, is more compact, and doesn't require the laser to be permanently switched on thus extending the lifespan of your equipment.

- Ability to select points or areas of interest giving you control of what you stimulate and choice of scanning patterns and flexible stimulation protocols
- TTL controlled timing of independent stimulation protocols to suit every experimental need
- Control of laser power and pulse frequency to optimise cell activation
- Grid generation to standardise stimulation points across your sample
- Adjustable frame rate, pixel clock, intensity control, exposure and gain provides best image optimisation

## Cameras now supported:

- Scientifica's SciCam Pro
  - Hamamatsu ORCA Flash
  - µEye UI-5240CP-M-GL-IR
- ... and more coming soon

## Technical specifications

System power	
Laser wavelengths [nm]	405, 473, $\pm 2$ nm and 561 $\pm 5$ nm
Min Pulse length [mS]	<1
CW power at the sample plane using a 4x 0.1NA (Without intermediate optics)	405 nm ~35mW 473 nm ~15mW 561 nm ~15mW
Average theoretical spot size with NA = 0.95	4x 0.1NA <10 $\mu$ m 40x 0.8NA <1.5 $\mu$ m 60x 1NA <1

Galvanometers	
Galvanometers	Cambridge technology 6215H with 3mm x and y Mirrors (separated with a 1:1 imaging relay)
Step response time	~130 $\mu$ S for minimum deflection angle
Covered Field of view	Approximately 1650 $\mu$ m with a 4x objective

Long pass filter	
Dimensions (diameter/thickness)	25 mm x 3 mm
LP filter 515 cut off wavelength LP filter 610 cut off wavelength	515 nm 610 nm

Scientifica SciCam Pro *	
Sensor type	Sony ICX-825 Scientific Interline CCD (Monochrome)
CCD Array	1360 x 1024
Pixel size	6.45 $\mu$ m x 6.45 $\mu$ m
Max. fps in Free Run Mode	22 fps (full resolution), 31 fps (binned 2x2)

\* Please contact a sales representative to discover the technical specifications for other supported cameras.

## Warranty & support

Scientifica's success is founded on the application of our significant manufacturing experience and the supply of superior customer support. We would, therefore, value the opportunity to understand your applications better and to offer no obligation advice on equipment, configurations and compatibility. The standard warranty for all Scientifica designed and manufactured goods is two years. However, Scientifica's LASU system includes components from other companies, which offer a twelve-month warranty. For an extended warranty on the full system (including some externally sourced components) please contact your Scientifica representative. All warranties cover defects in manufacturing and materials. In this unlikely event, Scientifica will manage the repair or replacement of all components.

Our team of customer support associates is dedicated to providing you with the very best advice and support, should you experience any difficulties with our products. With all products, we offer a complete installation support service.

Please speak to your sales representative for information on the licence required to drive this software.



#### United Kingdom (Head Office)

Tel: +44(0)1825 749933  
Fax: +44(0)1825 749934  
Email: [info@scientifica.uk.com](mailto:info@scientifica.uk.com)  
Web: [www.scientifica.uk.com](http://www.scientifica.uk.com)

SCIENTIFICA LTD  
Kingfisher Court  
Brambleside  
Bellbrook Industrial Estate  
Uckfield  
East Sussex  
TN22 1QQ  
UK

#### US Office

Tel: +1 609 454 6069  
Fax: +44(0)1825 749934  
Email: [info@scientifica.us](mailto:info@scientifica.us)

SCIENTIFICA LLC  
9 Trenton Lakewood Rd  
Clarksburg  
NJ 08510  
United States

Specifications and appearance are subject to change without notice or obligation on the part of the manufacturer.

Product information contained in this brochure is provided strictly under the condition that no joint venture, partnership, employment or agency relationship, express or implied, exists between Scientifica and any other external agency.

Version 2.0



THE QUEEN'S AWARDS  
FOR ENTERPRISE:  
INNOVATION  
2014