

STELLARIS 8

Technical Documentation | 05.2020



SPECIFICATIONS

MICROSCOPES	Microscope stand	Options
	Upright	DM6 CS
		DM6CFS
		DM8 CS
Inverted	DMi8 CS DMi8 CS Premium	
VIBRATION ISOLATION	Isolation options	Specifications
	Anti-vibration table	Yes (active/passive)
MICROSCOPE FOCUS	Focus options	Specifications
	Autofocus	Optional reflection-based Adaptive Focus Control (AFC) for Leica DMi8 CS with 15 Hz sampling rate. Image Based Autofocus for transmission light and fluorescence images. Can be combined with AFC
	Motorfocus	Travel range depending on mechanics of microscope/ minimum step size 50 nm, adjustable in increments of < 4 nm (z-wide)
	Closed loop focus	Repeatability < 20 nm without hysteresis
	Z galvanometer	Selectable z modes (Galvo Flow/discrete steps) available, 1500 µm range/minimum step size 20 nm, adjustable in increments of < 1.5 nm Unique xzy scan mode for real-time xz slices, for setup of correction collar and for quick assessment of axial resolution (superZ)
	Z piezo stage	500 µm range. Minimum step size 5 nm. Scan mode xzy for real-time xz slices, for setup of correction collar and for quick assessment of axial resolution
CONTINUOUS WAVE LASERS	Laser type	Specifications
	UV/405	OPSL 80 mW: 355 nm
		Diode laser 50 mW: 405 nm
	VIS	Diode laser 40 mW: 448 nm
		Solid state laser 20 mW: 488 nm
		Solid state laser 20 mW: 514 nm
		DP solid state laser 20 mW: 561 nm
		Diode laser 30 mW: 639 nm
		Diode laser 30 mW: 730 nm
	PULSED LASERS	Laser type
VIS		White Light Laser: >0.9 mW 440–485 nm, >1.8 mW 485–790 nm, 78 MHz
		White Light Laser: >0.9 mW 440–485 nm, >1.8 mW 485–790 nm, 78 MHz. Integrated pulse picker: 78, 39, 20, 10, 5, 2.5 MHz
		Diode, 0.8 mW: 470 nm; 40, 20, 10, 5, 2.5, 1.25, 0.62, 0.31 MHz
		Diode, 4 mW: 440 nm; 40, 20, 10, 5, 2.5, 1.25, 0.62, 0.31 MHz
UV/405	Diode, 1 mW: 405 nm; 40, 20, 10, 5, 2.5, 1.25, 0.62, 0.31 MHz	
EXCITATION MODULATION	Modulation type	Specifications
	AOTF VIS	Up to 8 channels
	AOTF UV/405	Up to 2 channels
	Pulsed laser driver	Optional
	Direct modulation	For 405 nm

OPTICS	Number of laser ports	Up to 4 (UV/405 & VIS & STED & MFP)
	Number of VIS lasers	Up to 8 channels, incl. WLL lines
	Excitation – emission splitting	Acousto-Optical Beam Splitter (AOBS)
	Simultaneous visible laser lines (AOBS)	max. 8 (both in fluorescence and reflection mode)
	Detection range	Internal spectral detection: 410–850 nm
	UV/405 and VIS imaging	Sequential (line/frame/stack) or simultaneous
	Field upgradable	Yes (most options, e.g. STED)
	UV/405 correction	Unified concept with CS2 optics
	Pinhole	Stable single pinhole (maintenance-free)
	Pinhole-diameter control	Motorized by software, wavelength-dependent automatic mode available
	Notch filters	2 Fluorifier discs with numerous options
SCANNERS	Scanner design	Specifications
	Scanning concept	X2Y-scanner with optically correct scanning at low inertia
	Switch FOV-scanner-resonant scanner	Online switch for tandem scanner
	Field-of-view scanner	Specifications
	Maximal line frequency	5200 Hz (bidirectional)
	Minimal line frequency	1 Hz
	Line frequency	Freely selectable in steps of 1 Hz (unidirectional), 2 Hz (bidirectional)
	Maximal frame rate 512 x 512	10 fps
	Maximal frame rate 512 x 16	131 fps
	Beam park	Yes
	Maximal frame resolution	8192 x 8192 (FLIM: up to 4096 x 4096)
	Scan zoom	0.75–48x
	Panning	Yes
	Field rotation	200° optical
	Field diameter	22 mm
SCANNERS	Resonant scanner 8kHz	Specifications
	Maximal line frequency	16 kHz (bidirectional)
	Minimal line frequency	8 kHz
	Maximal frame rate 512 x 512	28 fps
	Maximal frame rate 512 x 16	290 fps
	Maximal frame resolution	2496 x 2496 pixel
	Scan zoom	1.25–48x
	Panning	Yes
	Field rotation	200° optical
	Field diameter	13 mm
	Resonant scanner 12kHz	Specifications
	Maximal line frequency	24 kHz (bidirectional)
	Minimal line frequency	12 kHz
	Maximal frame rate 512 x 512	40 fps
	Maximal frame rate 512 x 16	428 fps
	Maximal frame resolution	1664 x 1664 pixel
	Scan zoom	2–48x
	Panning	Yes
	Field rotation	200° optical
Field diameter	8 mm	

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SCAN MODES	Scan options	Available
	xyz, xt, xyt, xyzt, xyλ, xyλt, xyzλ, xyzλt	Yes
	xyz, xzt, xzyt, xzλ, xzλt	Yes, real-time z sectioning with SuperZ Galvanometer and PiezoZ stage
ADVANCED SCAN MODES	xyΛ, xzΛ, xyzΛ t, xyzΛ, xyλΛ, xz λΛ	Yes (WLL)
INTERNAL CONFOCAL DETECTION	Spectral Detection Unit	Specifications
	Spectral detection range	410–850 nm, tunable
	Emission separation	Highly sensitive prism-based spectral detection
	Maximum number of detectors	5
	Tunability of emission bands	Yes
	Simultaneously tunable spectral detection channels	max. 5
	Spectral tuning resolution	1 nm across full spectrum of 410–850 nm
	Minimal detection range	5 nm
	Photon detection electronics	Specifications
	Photon counting time resolution	97ps
	Photon counting scheme	Power counting: 0, 1, 2 (double) photons identified
	TauSense capability	TauGating: up to 16 tunable timegates, simultaneously
		TauContrast: Mean photon arrival time image
		TauSeparation: Lifetime based component separation
		TauScan, GateScan
	Digitalization resolution	8, 12 or 16 Bit
	Sampling frequency	10,3 GHz for digital and photon counting detector modes
		80 MHz for analog detector modes
	DETECTOR TYPES	Power HyD S
Max. number of detectors		5 (1 mandatory, 2 for STED)
Sensor type		Multi-pixel silicon photo-multiplier array
Detection modes		Analog, reflection, counting
TauSense capability		Yes
Spectral sensitivity range		410–850nm
Typical photon detection efficiency (PDE)		> 58% @ 500nm
Power HyD X		Specifications
Max. number of detectors		4 (1 mandatory for 775 STED)
Sensor type		GaAsP hybrid detector
Detection modes		Digital, counting
TauSense capability		Yes
FALCON capability (FLIM)		Yes
FALCON capability (FCS)		Yes
Spectral sensitivity range		410–750nm
Typical photon detection efficiency (PDE)		> 46% @ 500nm

	Power HyD R	Specifications
	Max. number of detectors	1
	Sensor type	Extended red GaAsP hybrid detector
	Detection modes	Digital, counting
	TauSense capability	Yes
	FALCON capability (FLIM)	Yes
	FALCON capability (FCS)	Yes
	Spectral sensitivity range	410–830 nm, tunable
	Typical photon detection efficiency (PDE)	> 26 % @ 635nm
LIGHTNING	Number of spectral channels	5 spectral detectors
	Lateral resolution	Up to 120 nm
	Axial resolution	Up to 200 nm
EXTERNAL CONFOCAL DETECTION	Detection types	Applications
	APDs	2, for imaging and Fluorescence Correlation Spectroscopy (FCS)
NON-CONFOCAL DETECTION	Transmitted light detection	Specification
	Brightfield/Transmitted light detector	Optional, allowing BF, DIC, etc.
ELECTRONICS	Devices	For Imaging
	Scanner control	Digital (FPGA, field programmable gate arrays)
	Trigger in/out	Yes
	Auxiliary data input channels	Up to 2
	Workstation	Dedicated HP workstations for parallel GPU processing
	Software Control	Programmable control panel with LCD function and value display
EXTENSIONS	Devices	For Imaging
	Auxiliary emission port	Optional
	Environmental control	Various options and accessories
SOFTWARE	Core Functionality	
	Image Compass	Simplistic user interface, even for complex experiments Set up of multicolor experiment with one click per fluorophore Maximal signal yield through optimal acquisition settings selected automatically Multidimensional acquisition, full control of motorized hardware
	TauSense	Instant access to average arrival time (AAT) and intensity information in every experiment (TauContrast) Differentiate between desired and unwanted fluorescence signal (TauGating, GateScan) Separate fluorophores using lifetime based information (TauSeparation, TauScan)
	Dynamic Signal Enhancement	Uncompromised temporal resolution up to 420 fps maintaining optimal signal to noise ratio
	Lightning	Lightning basic detection package. Fully automated online data acquisition with super-resolution down to 120 nm. Adaptive image quality determination and reconstruction
	Navigator	Navigator basic package. Spiral scan to easily generate an overview of your specimen. Sticking plus mark and find functionalities
	Lambda scan	Acquisition of emission spectrum using spectral detectors
	Lambda-lambda scan	Acquisition of emission spectrum using spectral detectors. Acquisition of excitation spectrum using white light laser
	Z intensity compensation	Laser power and/or detector gain adjustments within z stacks

SPECIFICATIONS

Optional Packages		
	LAS X Lightning Expert	Customizable image information extraction by adaptive deconvolution
	LAS X Assay Editor	Pre-configured specimen carriers
	LAS X 3D Visualization	Fast, GPU-based processing of large 3D stacks, unique clipping tool, movie rendering and export tools
	LAS X 2D/3D Analysis	2D/3D multi channel analysis and classification
	LAS X Measurement	2D measurements
	LAS X MicroLab	FRAP, FLIP, photoconversion, FRET (acceptor photobleaching, sensitized emission)
	LAS X FRAP	FRAP, FLIP, photoconversion
	LAS X Live Data Mode	Recording of manual and automated workflows, trigger functions, complex timelapse series
	LAS X Environmental Control	Setting up, logging and monitoring of climate conditions
FLIM	FALCON	<p>FASt Lifetime CONtrast imaging and analysis</p> <p>High photon-flux FLIM acquisition</p> <p>FLIM-FRET analysis</p> <p>Phasor-FLIM analyses</p>
NANOSCOPY	STED ONE/STED	<p>592 STED: Vortex donut (FWHM): $xy < 50$ nm; $z =$ confocal</p> <p>592 STED: Z donut (FWHM): $xy < 130$ nm; $z < 130$ nm</p> <p>660 STED: Vortex donut (FWHM): $xy < 50$ nm; $z =$ confocal</p> <p>660 STED: Z donut (FWHM): $xy < 130$ nm; $z < 130$ nm</p> <p>775 STED: Vortex donut (FWHM): $xy < 50$ nm; $z =$ confocal</p> <p>775 STED: Z donut (FWHM): $xy < 130$ nm; $z < 130$ nm</p>
	Tau-STED	<p>Tunable resolution based on lifetime</p> <p>Automatic lifetime-based background suppression algorithm</p> <p>Light dose reduction (WLL excitation and STED) for all STED lines (592, 660, 775 nm)</p> <p>Available for 2D and 3D STED in live and in fixed specimens, also for multicolor applications</p> <p>Automated workflow integrated in LAS X software</p>
DLS (DIGITAL LIGHTSHEET MODULE)	Microscope stand	DMi8 CS, DMi8 CS Premium
	Synergies	<p>Confocal (included)</p> <p>STED, FALCON</p>
	Illumination	<p>HCX PL FLUOTAR 4x/0.13</p> <p>HC PL FLUOTAR 2.5x/0.07</p> <p>L 1.6x/0.05 DLS</p>
	Detection	<p>HC FLUOTAR L25x/0.95 W DLS working distance = 2.5 mm, water immersion</p> <p>HC APO L 20x/0.50 W DLS working distance = 3.5 mm, water immersion</p> <p>HC FLUOTAR L 16x/0.60 IMM CORR DLS working distance = 2.5 mm, water to BABB immersion</p> <p>HC APO L10x/0.30 W DLS working distance = 3.6 mm, water immersion</p> <p>HC FLUOTAR 5x/0.15 IMM DLS working distance = 4.95 mm, water to BABB immersion</p>

Mirror	TwinFlect 7.8 mm Water (specimen size: max. 3.5 mm, short axis)
	TwinFlect 7.8 mm Glycerol (specimen size: max. 3.5 mm, short axis)
	TwinFlect 7.8 mm Glycerol/BABB (specimen size: max. 3.5 mm, short axis)
	TwinFlect 5 mm (specimen size: max. 2.0 mm, short axis)
	TwinFlect 2.5 mm (specimen size: max. 1.0 mm, short axis)
Two-sided illumination	With one illumination objective via TwinFlect mirrors
Light sheet thickness	2.3–14 μm
Field of view	Max. image diagonal up to 2075 μm with the 5x detection objective
Specimen size	Diameter of sample (short axis) \leq 3.5 mm, diameter long axis determined by the mounting dish
Sample mounting	Sample mounting in standard glass bottom dishes (recommended cover slip thickness 170 μm +/- 20 μm), mounting in aqueous solutions, or solutions with RI up to 1.54 (BABB) depending on optics used, specimen elevated ~500 μm from cover slip, multiposition experiments supported
Incubation	Dedicated stage incubation system
Cameras	Leica DFC9000 GTC
	Hamamatsu Orca Flash 4.0 V3
Camera properties	Pixel size 6.5 μm
Maximum pixel format	2048 x 2048
Bit depth	16 bit
Max frame rate DFC9000 GTC	Up to 64 fps at 2048 x 2048 in xyt format Up to 94 fps at 1000 x 1000 in xyt format Up to 41 fps at 2048 x 2048 in xyz format Up to 50 fps at 1000 x 1000 in xyz format
Max frame rate ORCA Flash 4	Up to 60 fps at 2048 x 2048 in xyt format Up to 93 fps at 1000 x 1000 in xyt format Up to 41 fps at 2048 x 2048 in xyz format Up to 50 fps at 1000 x 1000 in xyz format
Wide field imaging	Transmitted and incident illumination for sample positioning
VIS Laser (Light Sheet Generation)	All VIS lasers including White Light Laser, 405 nm
Filter	Selection of notchfilter for simultaneous excitation with up to four laser lines. Selection of bandpass filter for detection
Multi-channel acquisition	Fast sequential scan via AOTF
Software	LightSheet Wizard fully integrated in LAS X
	3D Visualisation and Processing Pipeline
	Environmental Control

SPACE REQUIREMENTS

Inverted Stands (options)

Small computer table (90 cm); supply unit to the left of the microscope table

Dimensions of the system

(length x depth x height)

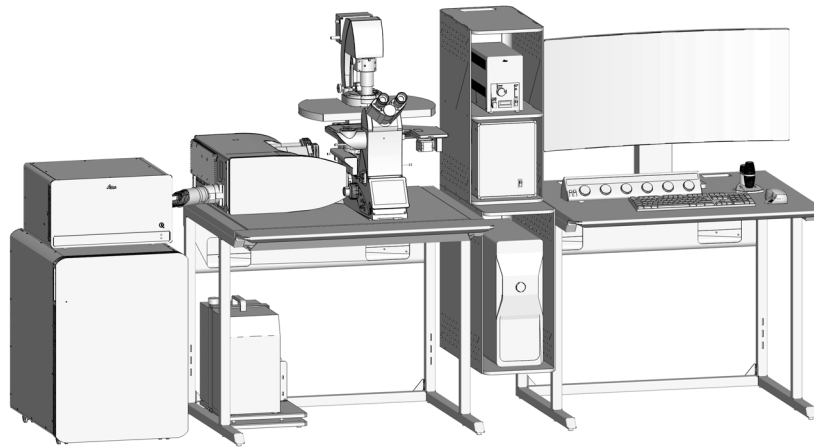
276 cm x 100 cm x 175 cm

(9' 1" x 3' 3" x 5' 9")

**Space requirements including
free room around the system**

356 cm x 250 cm

(11' 8" x 8' 2")



Large computer table (150 cm); supply unit to the left of the microscope table

Dimensions of the system

(length x depth x height)

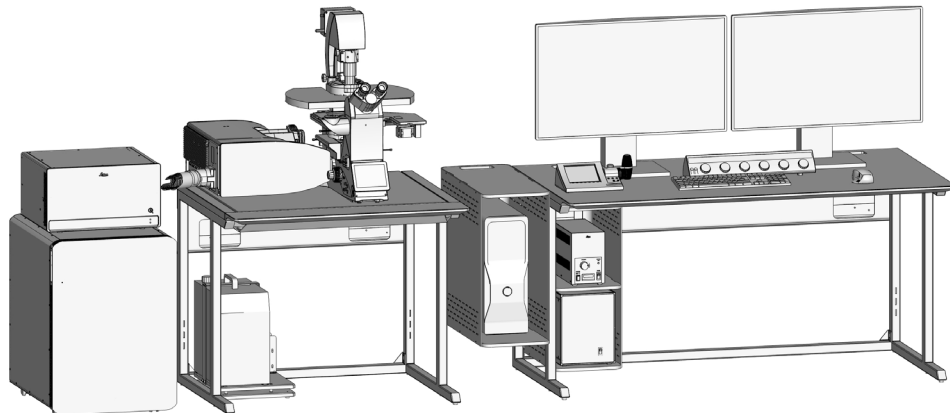
335 cm x 100 cm x 175 cm

(11' x 3' 3" x 5' 9")

**Space requirements including
free room around the system**

415 cm x 250 cm

(13' 7" x 8' 2")



Inverted Stands (options)

Large computer table (150 cm); supply unit below the work table

Dimensions of the system

(length x depth x height)

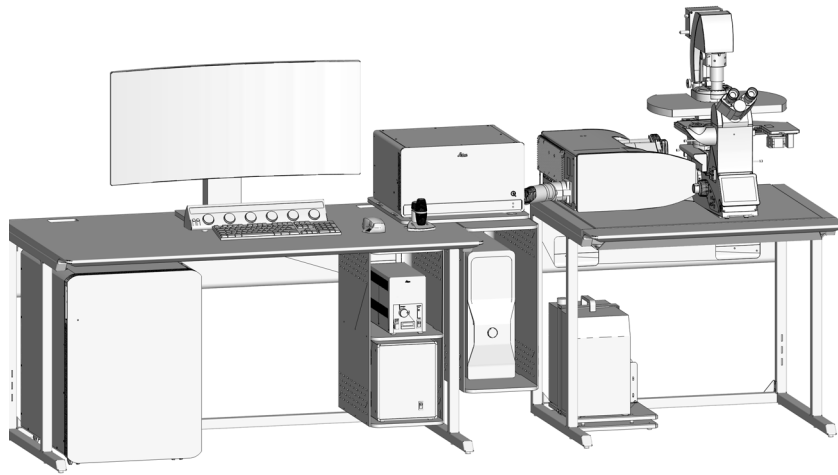
280 cm x 100 cm x 175 cm

(9' 2" x 3' 3" x 5' 9")

**Space requirements including
free room around the system**

360 cm x 250 cm

(11' 10" x 8' 2")



Upright Stand (option)

Small computer table (90 cm); supply unit to the left of the microscope table

Dimensions of the system

(length x depth x height)

295 cm x 100 cm x 175 cm

(9' 8" x 3' 3" x 5' 9")

**Space requirements including
free room around the system**

375 cm x 250 cm

(12' 4" x 8' 2")

