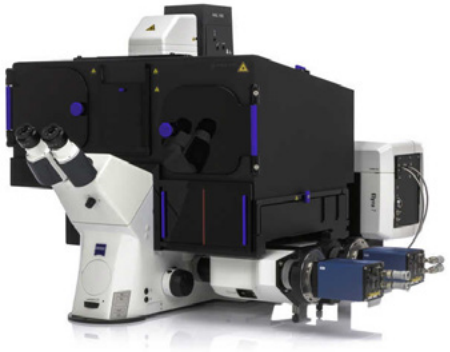
Product Information
Version 1.0

ZEISS Elyra 7

Your Flexible Platform with Lattice SIM for Fast and Gentle 3D Superresolution

Your Flexible Platform with Lattice SIM for Fast and Gentle 3D Superresolution

Life sciences research often requires you to measure, quantify and understand the finest details and sub-cellular structures of your sample. You may be working with tissue, bacteria, organoids, neurons, living or fixed cells and many different labels. Elyra 7 takes you beyond the diffraction limit of conventional microscopy to image your samples with superresolution. You can examine the fastest processes in living samples – in large fields of view, in 3D, over long time periods, and with multiple colors.



Animation

The new Lattice SIM technology of your Elyra 7 brings structured illumination microscopy (SIM) to a new level. Groundbreaking light efficiency gives you gentle superresolution imaging with incredibly high speed – at 255 fps you will get your data faster than ever before.

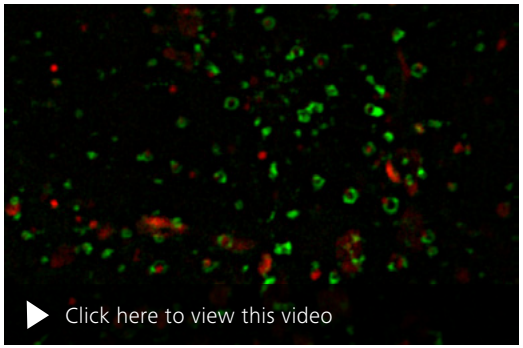
Elyra 7 lets you combine Lattice SIM with single molecule localization microscopy (SMLM) for techniques such as PALM, dSTORM and PAINT. You can now choose freely among your labels when imaging with resolution down to 20 nm laterally and 50 nm axially. High power laser lines allow you to image your sample with ease, from green to far red.

Elyra 7 is also very flexible: you can employ a wealth of contrasting techniques and combine them with optical sectioning. The new Apotome mode gives you superfast optical sectioning of your 3D samples. All that, plus Elyra 7 works seamlessly with your ZEISS SEMs in a correlative workflow.

Simpler. More Intelligent. More Integrated.

Lattice SIM – Superfast and Gentle Superresolution

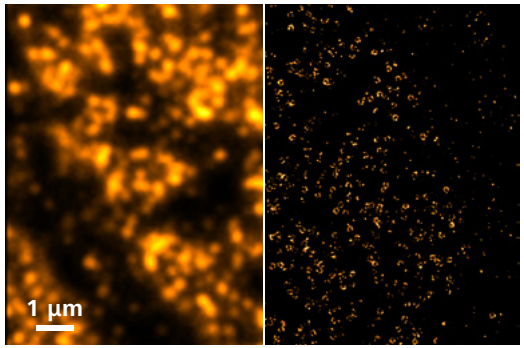
You can now use the novel Lattice SIM to uncover new mechanistic details and quantify the finest subcellular structures in large fields of view. This is a real breakthrough in light efficiency, enabling fast and gentle superresolution imaging of living specimens. Elyra 7 excels even more when it comes to fast imaging of 3D volumes at excellent z-resolution. Whether in 2D or 3D, by illuminating your samples with lower laser dosage, you minimize photodamage and so can observe fast cellular processes such as vesicle trafficking, membrane ruffling and signaling.



Lattice SIM: U2Os cell expressing an mEmerald-GFP tagged endosomal transport marker (Rab5a) and tdTomato tagged Golgi and Golgi associated transport marker.

Optimized Localization Microscopy

Single molecule localization microscopy (SMLM) gives you access to molecular mechanisms in both fixed and living specimens. You can count molecules and come to understand, molecule-by-molecule, how individual proteins are arranged within a structural context. Elyra 7's SMLM module delivers molecular resolution in large 3D volumes and powerful post-processing algorithms for quantification. With its efficient dual camera detection and high power laser lines across the visible spectrum, you're free to choose dyes and markers for your experiments.



SMLM: Xenopus laevis *A6 cells (epithelial kidney cells). Gp120, a nuclear pore complex protein arranged with eightfold symmetry was labeled with Alexa Fluor 647.*

Freedom for Your Experiments

Elyra 7 allows you to choose and combine the best imaging techniques for your experiments, now and in the future. Select the modules you need today – Lattice SIM, SMLM or a combination of both – then expand your system later, as your needs grow. Elyra 7 is not just a superb super-resolution system: it's your flexible platform for live cell imaging, allowing you to match the spatial and temporal resolution perfectly to your applications. Upgrade your system anytime with a whole range of additional options. Or use ZEN imaging software and correlative microscopy workflows to combine your data with complementary imaging modalities.

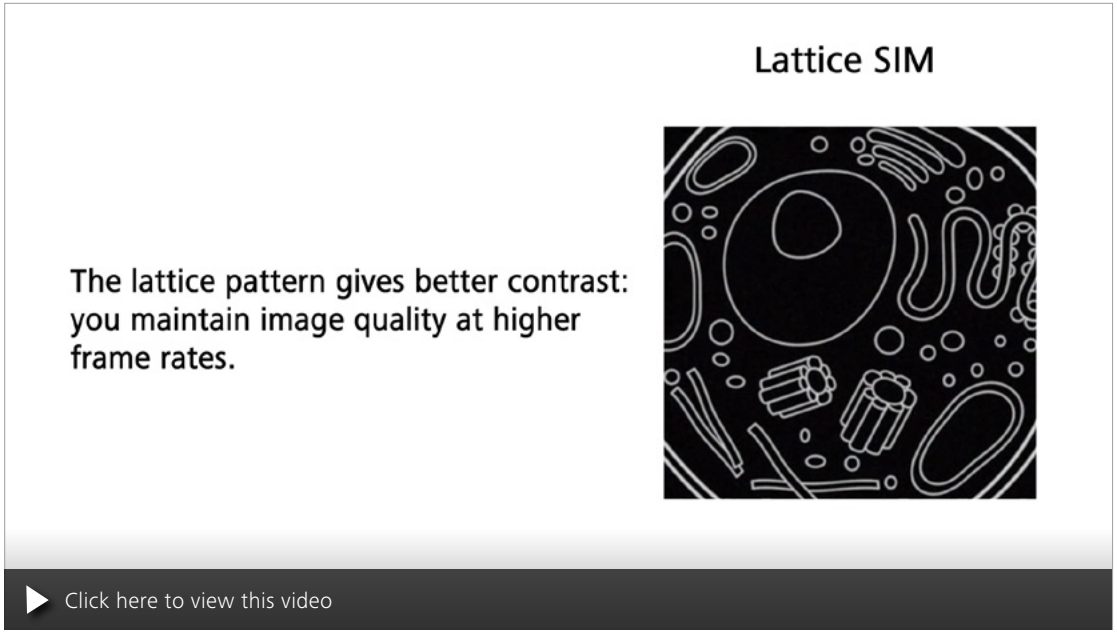
Your Insight into the Technology Behind It

Lattice SIM

In classic SIM, the sample area is illuminated and imaged with a grid pattern which changes direction and position. The grid structures interfere with structures in the sample, creating Moire fringes. These contain high frequency information – that is, high resolution information – transformed down to low frequencies that can be resolved by the microscope. The resulting image will have twice the resolution in all three dimensions.

In Lattice SIM, the sample area is illuminated with a lattice spot pattern instead of grid lines. The lattice pattern gives higher contrast and allows a more robust image reconstruction. Sampling efficiency is 2× higher than with classic SIM. As a result, you need less illumination.

It's up to you how you use this improved photon efficiency. You can image faster with high image quality and low bleaching. Or get better image quality at the same speed and low bleaching. Or image more gently with high speed and image quality. It's your choice.



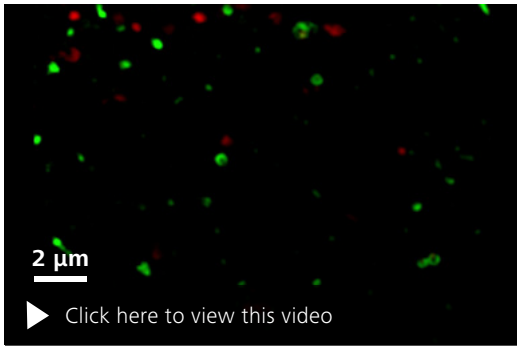
Watch the movie for a quick comparison of classic SIM and Lattice SIM

Your Insight into the Technology Behind It

Elyra 7's light-efficient Lattice SIM illumination pushes the boundaries of fast superresolution acquisition with minimized impact on the specimen. Lattice SIM provides optical sectioning and a doubling of diffraction-limited resolution in 3D (120 nm in xy and 300 nm in z). While ZEISS Elyra 7 provides optimal image quality and resolution across the entire visible spectrum with a large field-of-view, Elyra 7 with Lattice SIM gives you even more possibilities for increasing your image acquisition speed. Accelerate your acquisition of volumes by a factor of three, or push your 2D frame rate even further – up to 255 fps. You can precisely match the achievable spatial resolution and frame rate of Elyra 7 with all your scientific needs. Lattice SIM leaves you free to image faster and longer than ever before – without compromising on resolution.

Capture Fast Dynamics

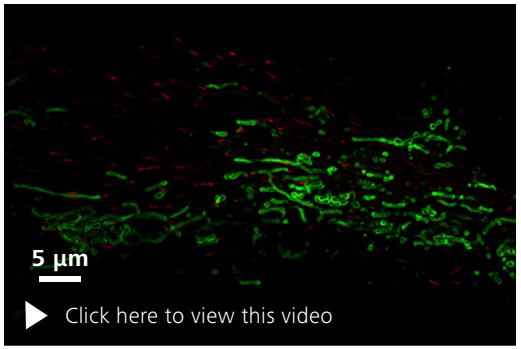
Lattice SIM lets you observe biological processes with unprecedented speed in superresolution.



Lattice SIM: U2Os cell expressing an mEmerald-GFP tagged endosomal transport marker (Rab5a) and tdTomato tagged golgi and golgi associated transport marker. The resulting images were acquired with a frame rate of >200 fps, allowing the detection of rapid events.

Gentle Superresolution Imaging

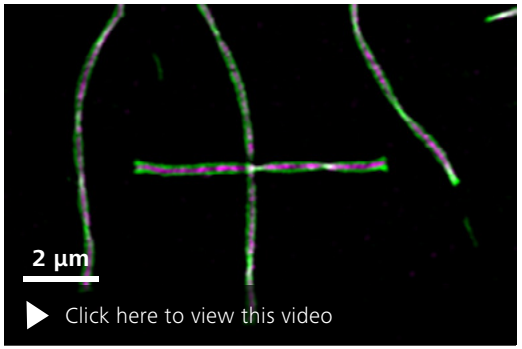
Reduce the light dosage on your specimen and still capture all the details – in multiple colors.



Lattice SIM: Tomm20-mEmerald and EB3-tdTomato in a U2Os cell were imaged simultaneously for more than 1400 frames.

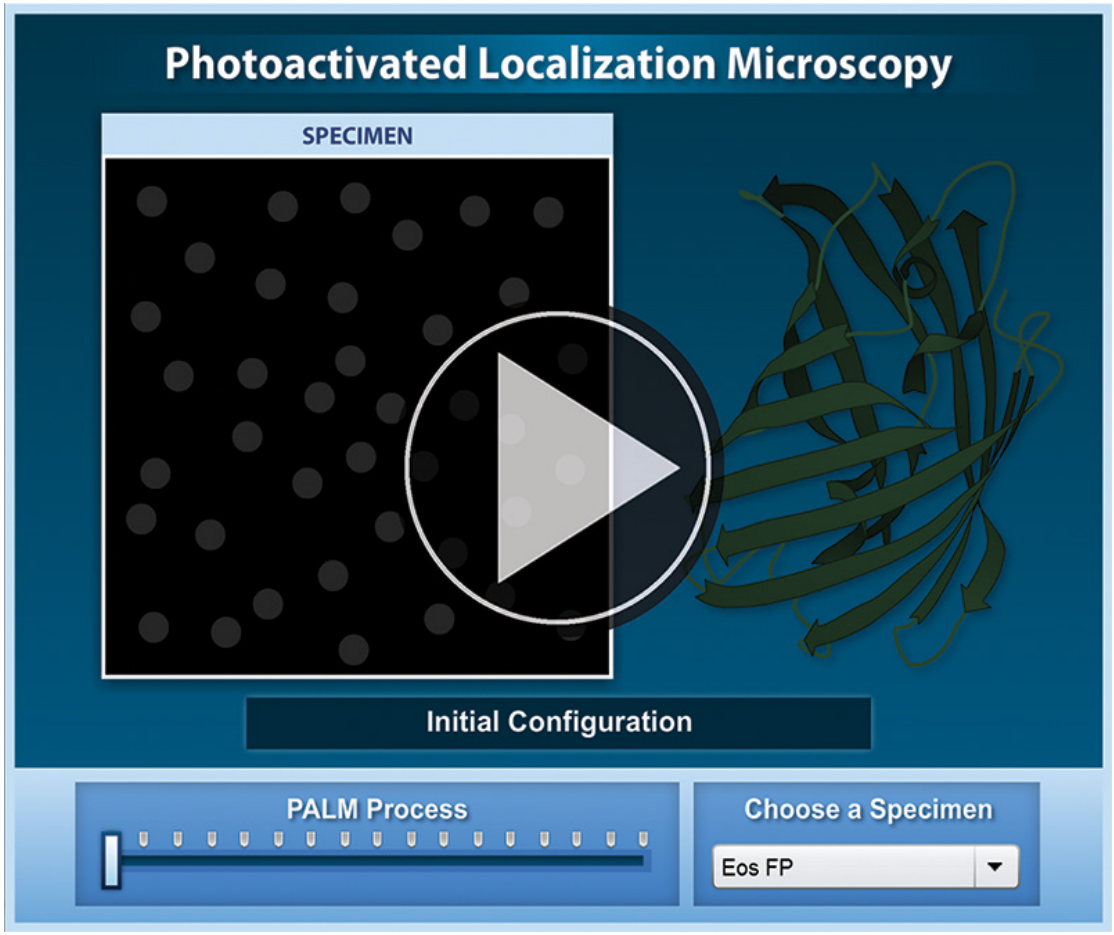
Resolve the Finest Details

Achieve optimal resolution across all wavelengths with multiple objectives.



Lattice SIM: Synaptonemal complex from mouse testis, spread on a coverslip. Sycp3 is labeled with Alexa Fluor 488 (green) and Sycp1 is labeled with Alexa Fluor 568 (magenta). Sample: courtesy of M. Spindler and R. Benavente, University of Würzburg, Germany.

Your Insight into the Technology Behind It



Animation from www.zeiss.com/campus, © Mike Davidson, FSU, Tallahassee

In single molecule localization microscopy (SMLM), photo-switchable fluorescent molecules are sparsely activated so that only one out of many will be in its on-state within a single point spread function (PSF). This lets you determine its center of mass with a localization precision that far exceeds the extension of the PSF. Once recorded, the molecule is turned to its off-state – for example by photobleaching – and the cycle of activation / deactivation is repeated again and again until all molecules are captured. The localizations are plotted in a new image to create the superresolution image. If the PSF shape codes for the z-position, the method works in 3D as well. Expect to achieve resolutions in the range of 20 – 30 nm laterally and 50 – 80 nm axially.

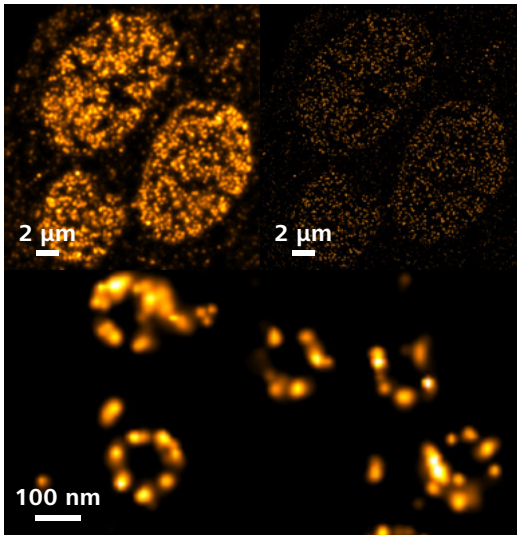
With Elyra 7, powerful laser lines across the visible spectrum give you freedom to choose the best dyes for your experiments. Plus, the dual camera option with precise synchronization allows you to capture two labels simultaneously.

Your Insight into the Technology Behind It

Single-molecule localization microscopy (SMLM) encompasses techniques such as PALM, dSTORM, and PAINT. With high power lasers across the visible spectrum and dual camera detection, Elyra 7 allows researchers to gain access to a broad range of dyes, markers and fluorophores in almost any possible combination. Elyra 7 enables quantification with consistent precision over a large field-of-view and an unprecedented z-capture range. You can now acquire 3D data from a whole cell with molecular precision.

Resolve Molecular Structures

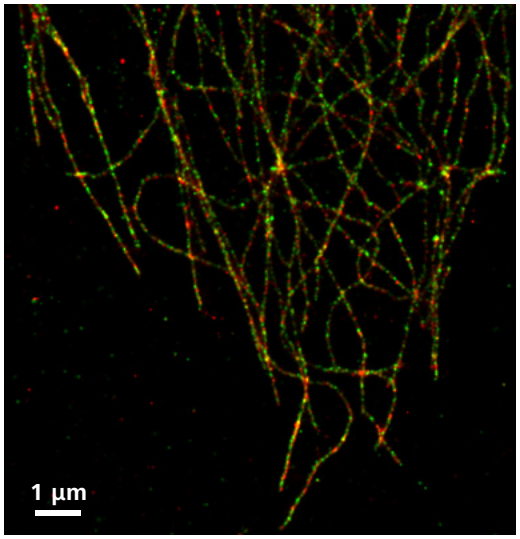
SMLM allows you to map precise locations of individual proteins.



SMLM: Eightfold symmetry of the nuclear pore complex in A6 cells. Gp210 was labeled with Alexa Fluor 647. Widefield image (top left), SMLM image (top right) and zoomed in region (bottom).

Determine the Relationships Between Molecules

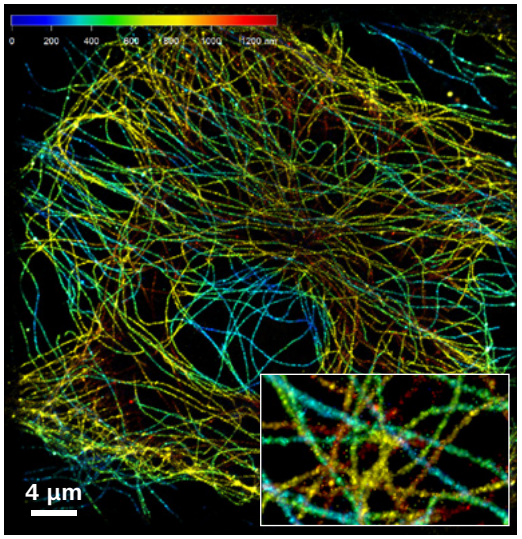
Detect two channels with molecular precision.



SMLM: Alpha tubulin was labelled with Alexa 555 and beta tubulin with Alexa 488. The two channels were acquired simultaneously.
The epitopes are either occupied by a green or red fluorophore – shown by the mutual exclusion between the green and the red signals.

Capture Information in Three Dimensions

Untangle molecular relationships in z with confidence.



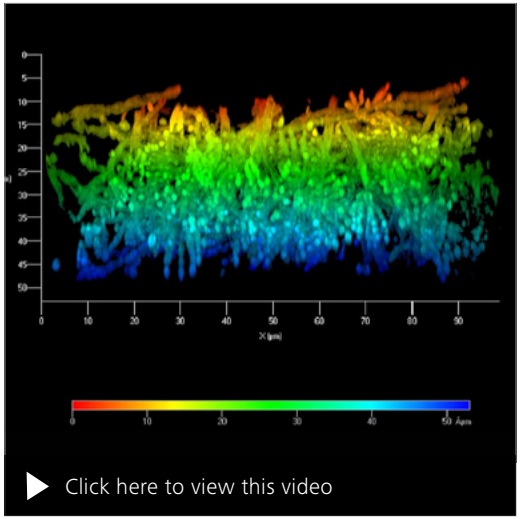
SMLM: With Elyra 7 you can image a z-depth of 1.4 µm in a single acquisition. 3D SMLM image of Alexa 647 α-tubulin color coded for depth.
Sample courtesy of Michael W. Davidson, Florida State University, USA.

Expand Your Possibilities

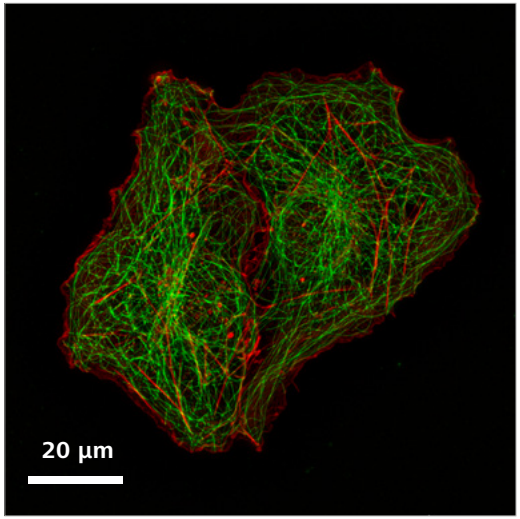
Get Superfast Optical Sectioning with the New Apotome Mode

You know the challenge: live cell imaging with a widefield system often suffers from out-of-focus blur or background signal. These effects can decrease contrast and resolution of your images. The new Apotome mode of your Elyra 7 now uses structured illumination to give you fast optical sectioning with crisp contrast and high lateral and axial resolution.

This is how it works. A grid pattern is used to illuminate and rapidly modulate the fluorescence signals in the focal plane of your microscope. After acquiring five images with different grid positions, a ZEN imaging software combines these frames into a resulting image which contains only information from the focal plane – your optical section. The new Apotome mode now allows you to perform fast and gentle live cell imaging with high contrast and resolution. Or, you can use your new optical sectioning speed to increase your productivity when acquiring large sample areas or big volumes.



Penicillium *autofluorescence. The Apotome mode allowed to image a volume of 90 × 90 × 50 µm with 422 z-planes.*



COS-7 cells. Maximum intensity projection of 73 sections. Microtubules stained with Alexa 488 (green) and Actin stained with Alexa 568 (red). The Apotome mode allowed simultaneous dual color acquisition.

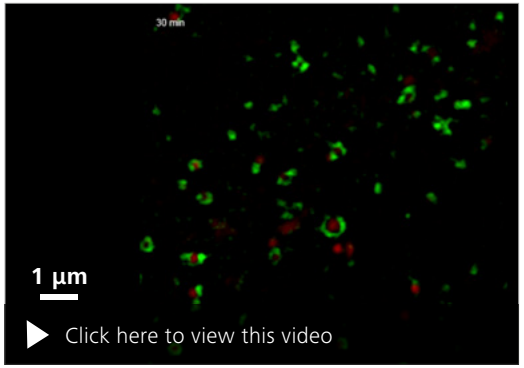
Tailored Precisely to Your Applications

Typical applications, typical samples	Task	ZEISS Elyra 7 offers
Live cell Imaging	Reveal mechanistic details in live cells, e .g. moving organelles, vesicle trafficking, membrane reorganization.	Lattice SIM allows fast, gentle and light-efficient imaging.
		Lattice SIM: One-pass image acquisition over the full FOV (rather than multiple rotations) increases speed and reduces laser dosage.
		Lattice SIM / SMLM: Samples stay in focus over time with Definite Focus 2.
	Resolve structural details in 3D and multiple colors.	Lattice SIM: Digital sectioning allows faster acquisition by reducing the number of z-slices while preserving the optical sectioning capability.
		Lattice SIM / SMLM: Acquire two channels simultaneously and up to four colors (Lattice SIM) with optimized resolution for each wavelength. Duolink and optimized filter concept allow fast and aligned multiple-channel acquisition.
	Discover fast cellular processes in the context of whole cells.	Lattice SIM: Large FOV to capture a whole cell in one image.
	Observe fast dynamics of fine structures without perturbing the specimen.	Lattice SIM: Light-efficient illumination enables gentle observation of fast dynamics.
		Incubation: Fully integrated incubation controls, temperature optimized oils, water immersion objective with correction collar.
	Track many molecules and retrieve diffusion behavior.	SMLM: Particle tracking over a large FOV allows for collection of diffusion information in entire cells. Camera limited temporal resolution.
	Study molecular level structural changes of sub-minute-scale dynamic processes, e.g. mechanisms of focal adhesions, reorganization of tubulin, vesicle shuttling.	SMLM: Powerful lasers across the visible spectrum and multi-emitter analysis reduce acquisition times and allow measurement of dynamics on the sub-minute timescale.
	Perform not only superresolution but also conventional live-cell imaging experiments such as recording membrane dynamics, cell division, cell migration.	Apotome mode, TIRF and conventional widefield fluorescence microscopy provide versatility.
Large evolving organisms, such as *Drosophila, C. elegans, Arabidopsis*, Zebrafish, etc.	Resolve structural detail in 3D with high penetration depth.	Lattice SIM: Water objectives for deep tissue imaging.
		Benefit from additional options such as optical sectioning, DIC, phase contrast.
		Apotome mode for fast optical sectioning.
	Resolve structural details in 3D over large areas.	Lattice SIM: Tiling and stitching to cover large areas; level-adjustable stage to avoid sample tilt.

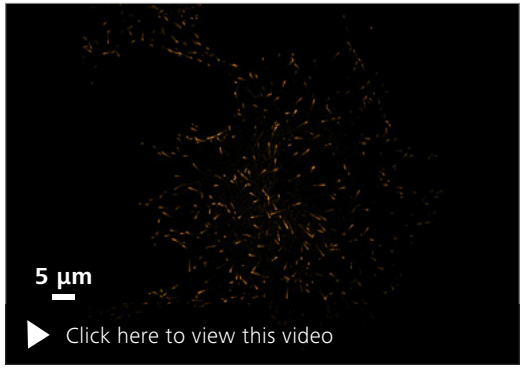
Tailored Precisely to Your Applications

Typical applications, typical samples	Task	ZEISS Elyra 7 offers
Fixed specimens	Probe the structural organization of a whole cell with the advantage of fluorescence specificity and superresolution.	Lattice SIM: Large FOV to captures a whole cell in one image. Lattice SIM provides faster acquisition speed for higher throughput.
	Investigate arrangement of cellular components and proteins.	Lattice SIM: Adapted grating, acquires four colors with optimized resolution for each wavelength.
	Explore interaction of molecules.	Lattice SIM / SMLM: Drift compensation and adaptive color alignment of all channels.
	Reveal the ultrastructure of organelles.	3D-SMLM: Best-in-class z capture range with consistent localization precision. Stackable to >10 µm using piezo stage.
	Probe the ultrastructure of molecular assemblies.	SMLM: Fast laser switching and/or Duolink for dual color acquisition.
		SMLM: High laser power densities across the visible spectrum; fine tuning of activation laser power (PALM).
	Put protein localization into structural context.	Lattice SIM / SMLM Correlative methods with ZEN Shuttle & Find and ZEN Connect.

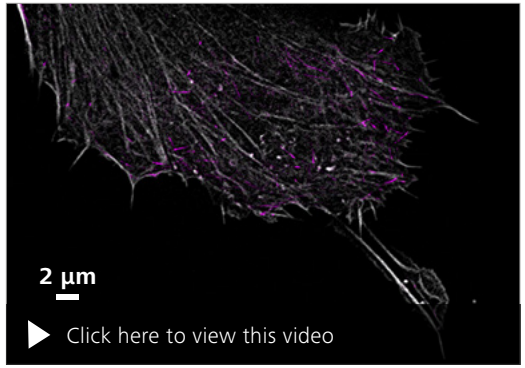
ZEISS Elyra 7 at Work



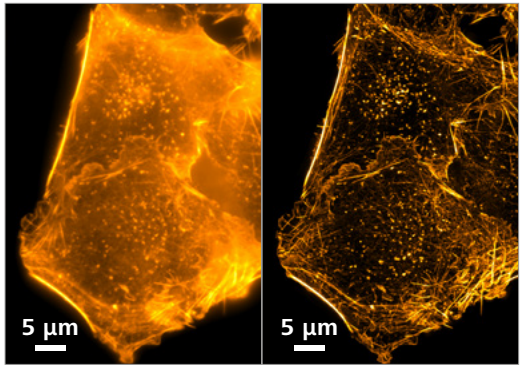
Lattice SIM: Observe cellular processes over long time periods without perturbing your specimen. U2Os cell expressing an mEmerald-GFP tagged endosomal transport marker (Rab5a) and tdTomato tagged golgi and golgi associated transport marker. Simultaneous dual-color acquisition over a period of 30 minutes.



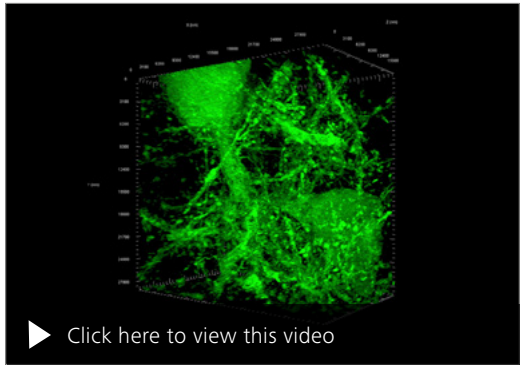
Lattice SIM: Put high resolution details in the context of a whole cell. Cos7 cell expressing EB3-tdTomato.
Sample courtesy of M. Sauer, University of Würzburg, Germany.



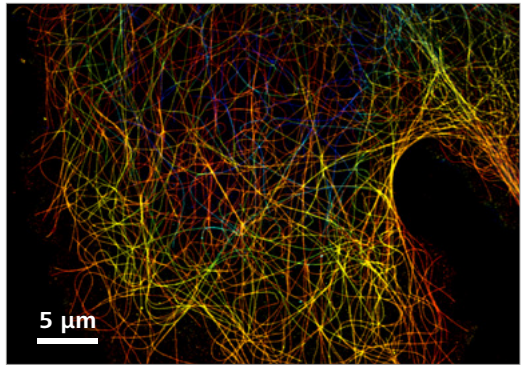
Lattice SIM: Resolve fast dynamics without photobleaching. U2Os cell expressing Lifeact-9 (labelling actin) and EB3-mEmerald-GFP (labeling growing ends of microtubules). Sequence of 100 images taken simultaneously in 2 colors. The motion of EB3 and Lifeact is followed with little appreciable photobleaching over the course of several minutes.



Lattice SIM: Observe the finest details. Actin labeled with Phalloidin. Widefield image (left) and Lattice SIM image (right) showing the two fold resolution improvement of Lattice SIM.



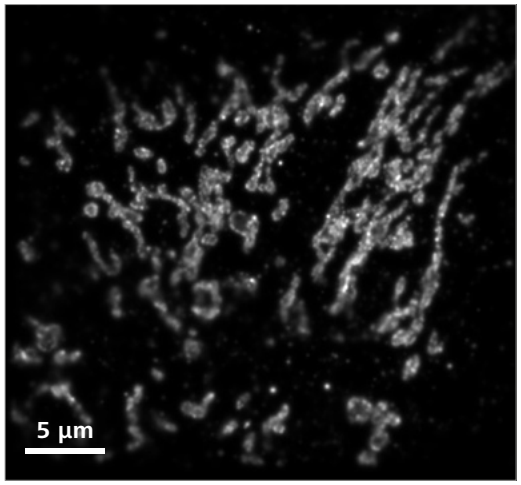
Lattice SIM: 3D volume image of Thy1-GFP neurons in a mouse brain section. A ~20 µm z-stack was acquired inside of the tissue section. Sample courtesy of Herms lab, DZNE, Munich, Germany.

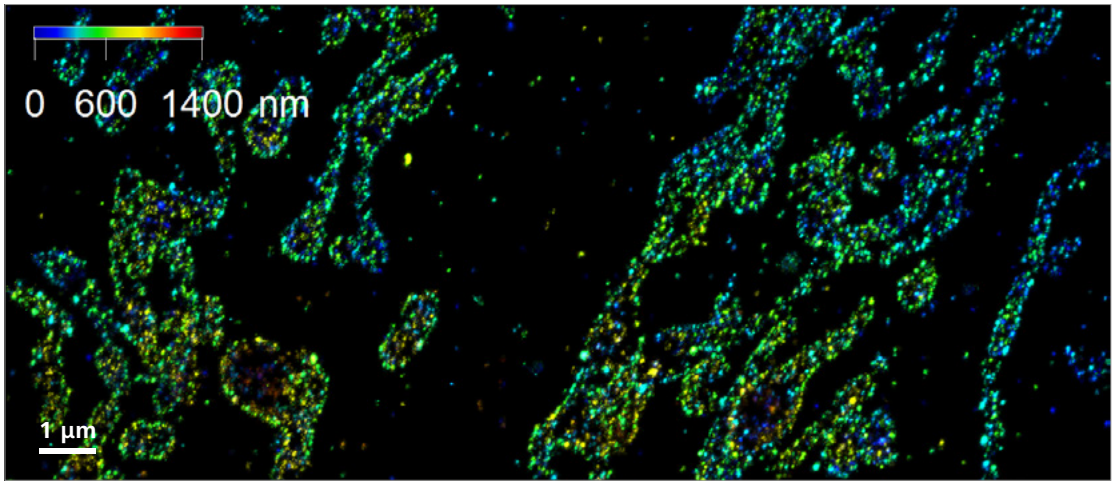


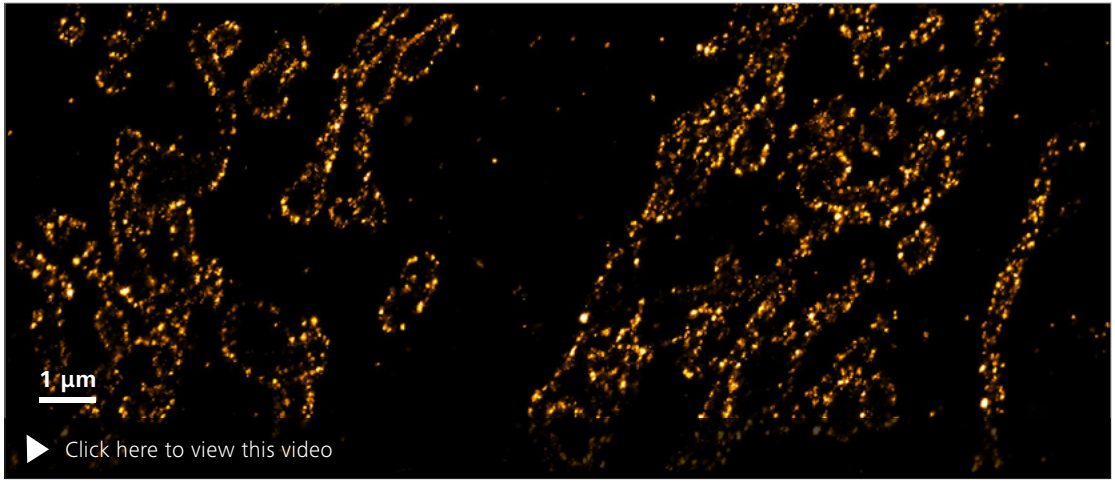
Lattice SIM: 3D image of microtubules, color coded for depth.

ZEISS Elyra 7 at Work

SMLM is based on the ability to detect only one fluorophore at a time per diffraction limited area. Most often this is accomplished by using fluorophores which blink. Point Accumulation for Imaging in Nanoscale Topography (PAINT) is an alternative labeling approach in which “blinking” is accomplished through binding and unbinding of the fluorophores to the target of interest. This allows the use of bright dyes and eliminates bleaching, thus greatly improving SMLM results.

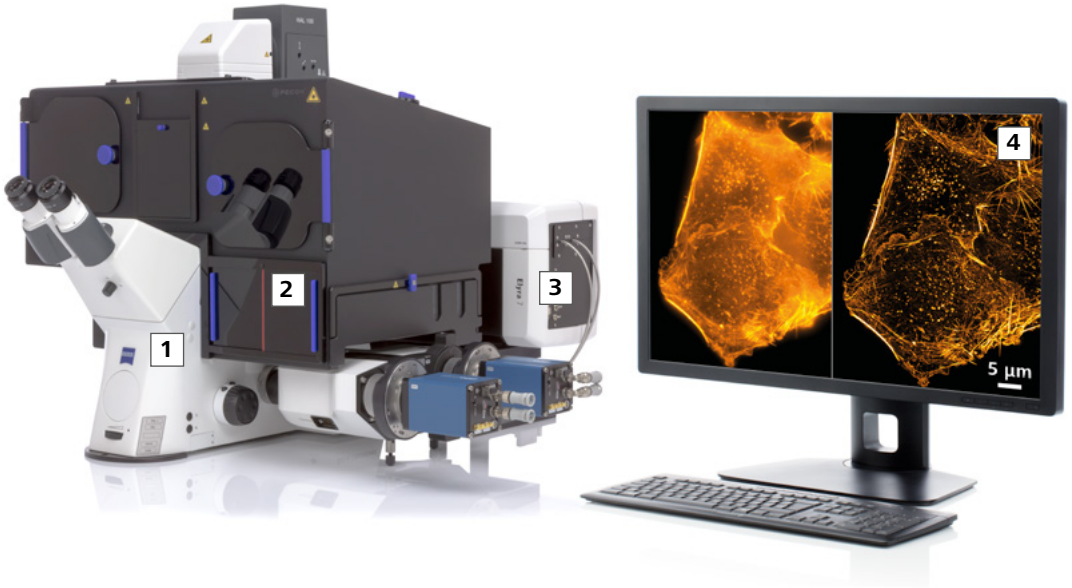






SMLM: 3D PAINT image of mitochondrial membranes in BSC1 (kidney epithelial cells). The outer membrane protein TOMM 20 was labeled using Ultivue – I2-650 imaging strand. Widefield image (left), 3D PAINT image color coded for z-depth (top right). Individual z-plane showing mitochondrial membrane structure (bottom right).

Your Flexible Choice of Components



1 Microscope

- Axio Observer 7 (inverse stand)
- Incubator XL dark and top stage incubation
- Motorized Piezo XY scanning stage
- Z-Piezo stage insert
- 2 camera ports or one camera port with Duolink

2 Objectives

- C-APOCHROMAT 63×/1.2 Water (DIC)
- Plan-APOCHROMAT 63×/1.4 Oil (DIC)
- Plan-APOCHROMAT 100×/1.46 Oil (DIC)
- Plan-APOCHROMAT 100×/1.57 Oil HI Corr (DIC)
- alpha Plan-Apochromat 63×/1.46 Oil
- C-Apochromat 40×/1.2 W
- Plan-Apochromat 40x/1.4 Oil (DIC)

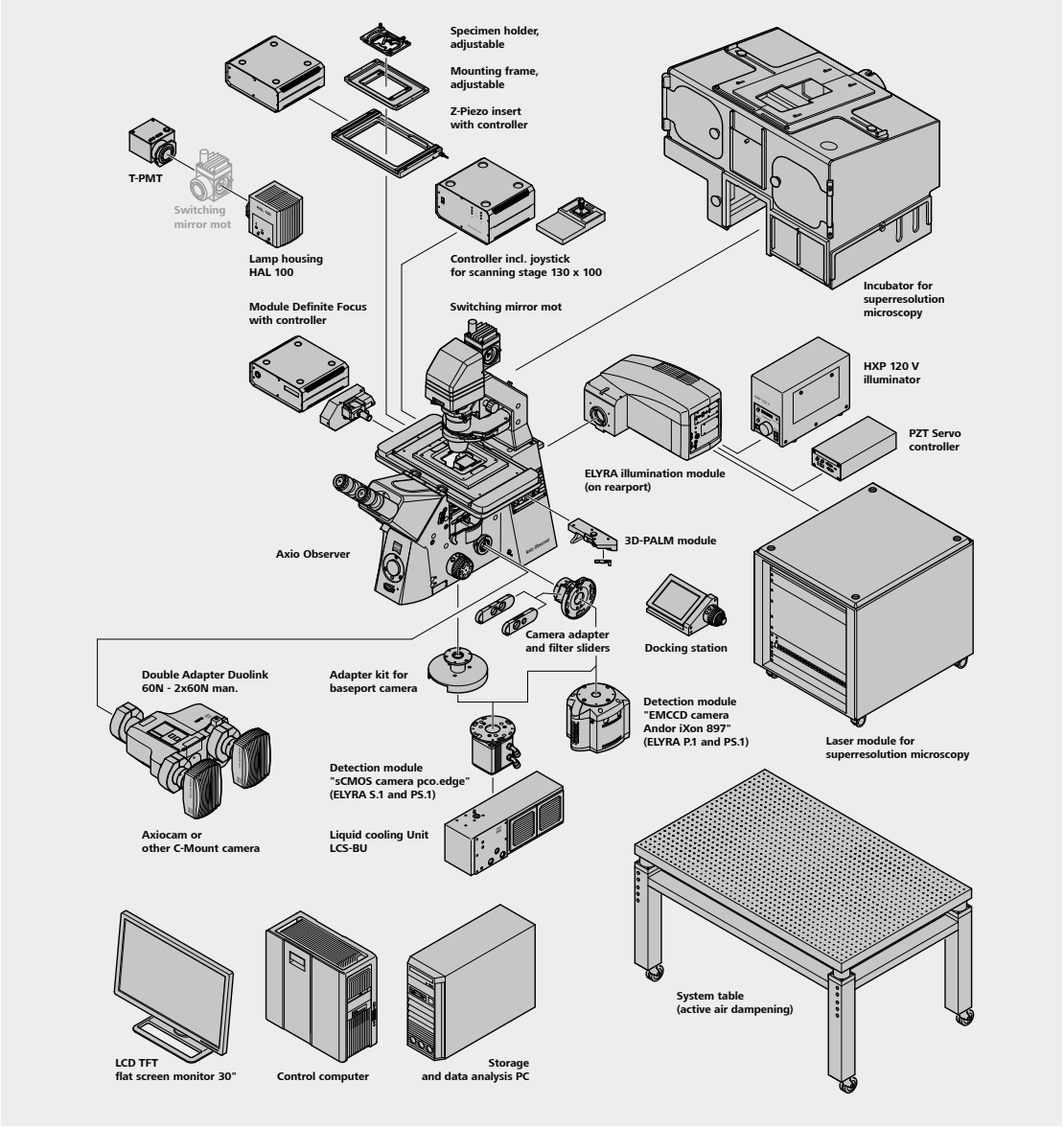
3 ZEISS Elyra 7 Illumination and Detection

- Fiber coupled solid state or diode pumped solid state lasers
- Available lines:
  405 nm diode (50 mW),
  488 nm OPSL (100 or 500 mW),
  561 nm OPSL (100 or 500 mW),
  642 nm diode (150 or 500 mW)
- Lasers shared between Lattice SIM and SMLM
- Andor iXon 897 EM-CCD camera (SMLM)
- PCO edge sCMOS camera
  (Lattice SIM, SMLM, Apotome mode)

4 Software

- ZEN (black edition)
- Lattice SIM/Apotome module
- PALM/dSTORM module
- 3D-PALM module

System Overview



Technical Specifications

Microscope	
Stand	Axio Observer 7, motorized inverted microscope for superresolution microscopy
Z-drive	DC servomotor, opto-electronically coded; smallest Z step 25 nm
XY Piezo Scanning Stage	motorized; range 130 mm × 100 mm; max sped 100 mm/s; resolution 0.2 µm; reproducibility: ±1 µm; absolute accuracy ±5 µm; suitable for mounting frames K 160 × 110 mm and Z-Piezo Stage insert
Z-Piezo Stage insert	for XY scanning stage, max travel range 100 µm; smallest Z step size 5 nm, sample holders available for standard 3''×1'' slides LabTek chambers, multiwell plates and 36 mm glass-bottom dishes; level-adjustable and universal stage insert available for standard slides, glass-bottom dishes and LabTek™ chambers.

Optical Filters for Lattice SIM and SMLM	
Filter sets reflector turret	Four exchangeable filter sets available for multi-channel Lattice SIM and SMLM; each filter set with four precisely mounted ACR-coded[1] filter modules for superresolution microscopy on a motorized six-position turret; two positions in each turret compatible with standard Push & Click filter modules, e.g. for visual sample observation.
Dual filter sets for Duolink optimized for dual color and double dual color applications	Filter sets are optimized for dual camera applications, maximum sensitivity, minimal cross-talk and reduced autofluorescence.
Filter slider	Manual filter slider with two positions (for emission filters or a Bertrand lens); fits into camera adapter of the microscope's side port; emission filters exchangeable for customizing detection conditions.

Lasers	
Laser module for Elyra 7	Laser coupling with polarization-maintaining single mode fiber (no adjustment of laser coupling by users required).
Laser Lines	405 nm (50 mW), 488 nm (100 mW or 500 mW), 561 nm (100 mW or 500 mW), 642 nm (150 mW or 500 mW); 405 laser can be attenuated by up to 100000 fold (used for activation and back-pumping); high power lasers (500 mW) can be 10 fold attenuated (488, 561, 642)

Cameras	
Camera for SMLM	Andor iXon 897 back-thinned EMCCD camera; pixels: 512 × 512; pixel size: 16 µm × 16 µm; QE: 90 % (camera specifications by Andor)
Camera for Lattice SIM and SMLM	pco.edge sCMOS camera; effective pixels: 1280 × 1280; pixel size 6.5 µm × 6.5 µm; QE: 82 %; dynamic range 15 bit (camera specifications by PCO)
	Liquid cooling system for EMCCD and sCMOS cameras

Technical Specifications

Elyra 7 for SMLM	
Illumination module	Fully motorized Epifluorescence (EPI), high inclined and laminated optical sheet (HILO) and total internal reflection illumination (TIRF); simultaneous TIRF illumination with VIS and 405 nm laser lines; individual triggering of lasers for synchronizing dye activation and illumination to camera read-out and transfer times; motorized TIRF angle adjustment; motorized TIRF field adjustment with three field size options
3D-PALM module	Double phase ramp in pupil plane of back aperture of objective providing for phase ramp imaging localization microscopy (PRILM); z capture range typically 1.4 µm; multi-plane acquisition possible to extend z range
Cameras	EMCCD camera (mounted to right side port of microscope); or up to two pco.edge sCMOS cameras (mounted to the right side port of microscope) 100x objectives to be used for EMCCD camera with 1.6x tube lens; 63x objectives to be used for sCMOS camera with 1x tube lens
Objective lenses (SMLM)	alpha "Plan-APOCHROMAT" 100×/1.46 Oil DIC, alpha "Plan-APOCHROMAT" 100×/1.57 Oil-HI DIC Corr (2D-PALM), alpha "Plan-Apochromat" 63×/1.46 Oil, alpha "Plan-APOCHROMAT" 63×/1.4 Oil DIC, C-APOCHROMAT 63×/1.2 W Corr DIC (3D-PALM) ACR[1] coding (optional; Objectives with NA> = 1.46 suitable for TIRF and HILO illumination)
Imaging modes	Widefield (WF) mode (sample illumination with arc lamp), Laser WF mode (sample illumination with laser), SMLM mode for single-molecule localization microscopy
Field of view (SMLM)	Maximal field of view 51.1 × 51.1 µm (with alpha Plan-APOCHROMAT 100× / 1,46 Oil DIC, 1.6x tube lens, full chip recording); 81.1 × 81.1 µm (with Plan-Apochromat 63× / 1.4 OIL DIC, 1.6x tube lens, full chip recording); HP field 2 × smaller, uHP field 2 × √2 smaller than TIRF field
Localization precision (SMLM)	Typically 20 nm – 30 nm lateral, 50 nm – 80 nm axial, given sufficient signal-to-noise
Multi-color imaging (SMLM)	Detection of up to two different fluorescent labels (simultaneous with Duolink or quasi simultaneously by fast sequential laser switching)
Acquisition speed (SMLM)	EMCCD: TIRF (SMLM) and widefield mode: up to 30 frames per second (full frame mode, 512 × 512 pixels); >100 frames per second in sub-array mode; sCMOS (dSTORM) and widefield mode > 200 frames per second (512 × 512 pixels)
Data recording and analysis (SMLM)	Full software control of SMLM imaging; software holding focus based on fiducial markers; Definite Focus z-drift control
	Online SMLM processing for simultaneous data acquisition and analysis; manual editing of parameter settings for optimal results in SMLM with different fluorophores; feature-rich rendering of SMLM localization tables; export and import of localization tables for custom filtering; correction algorithms for lateral and axial drift; chromatic aberration correction (based on fiducial markers or prominent structures)
	Multi-emitter fitting algorithms allow to analyze overlapping signals with high precision. Up to 10 times higher labeling densities are possible speeding up acquisitions by the same factor.

Technical Specifications

Elyra 7 for Lattice SIM and Apotome mode	
Illumination module	Fully motorized Lattice SIM imaging; five different grating frequencies for Lattice SIM for optimal matching of illumination pattern to laser wavelength and objective lens; motorized exchange of gratings in multi-color Lattice SIM; fast piezo actuated phase stepping of gratings.
Camera	Up to two sCMOS cameras mounted on right side port
Imaging Modes	Widefield modes for illumination with X-Cite 120 and lasers, Lattice SIM using two dimensional grid SIM mode (two- and three-dimensional Lattice SIM), Apotome mode using one dimensional grid for z-sectioning
Objective lenses (Lattice SIM)	Plan-APOCHROMAT 63×/1.40 Oil DIC, C-APOCHROMAT 63×/1.20 W Corr alpha "Plan-Apochromat" 63×/1.46 Oil, ACR(1) coding (optional)
Objective lenses (Apotome mode)	Plan-Apochromat 40×/1.4 Oil; C-Apochromat 40×/1.2 W;
Resolution (Lattice SIM)	Lateral resolution (XY): 120 nm, axial resolution (Z): 300 nm (typical experimental FWHM values with objective lens Plan-APOCHROMAT 63×/1.40 Oil DIC, subresolution beads of 40 nm diameter and excitation at 488 nm)
Multi-color (Lattice SIM and Apotome mode)	Detection of up to four different fluorescent labels (sequential detection) and simultaneous dual color detection with DuoLink
Max. Field of view (Lattice SIM)	81.25 × 81.25 µm (processed: 78.32 × 78.32 µm), full-frame recording (1280 × 1280 effective px) with Plan-APOCHROMAT 63×/1.40 Oil DIC
Max. Field of view (Apotome mode)	128 × 128 µm, full frame recording (1280 × 1280 effective px) with Plan-Apochromat 40× / 1.20 Oil
Acquisition speed (Lattice SIM)	17 SIM image frames per second at 512 × 512 resolution and 1 ms exposure time (15 phase images per one SIM image)
Acquisition (Apotome mode)	50 sectioned frames per second at 512 × 512 resolution and 1 ms exposure time (camera limited) (5 phase images per one sectioned image) in Block mode processing; 255 SIM image frames per second at 512 x 512 resolution and 1 ms exposure time (15 phase images per one SIM image) in Burst mode processing
Data recording and analysis (Lattice SIM and Apotome mode)	Full software control of Lattice SIM imaging; Multi-tracking (sequential multi-channel data acquisition with freely configurable change of gratings (Lattice SIM), or one common grating (Apotome mode), filters and excitation lasers between tracks); Simultaneous dual color imaging with one grating; Lattice SIM and Apotome mode imaging in user-defined sub-array regions (ROI imaging); Leap mode for 3 times faster imaging with excellent sectioning; Extension of imaged area possible with tile scanning and stitching. Burst mode processing for 2 D time series data sets for Lattice SIM and Aptotome mode to increase effective frame rates by a factor of 15 and 5, respectively.

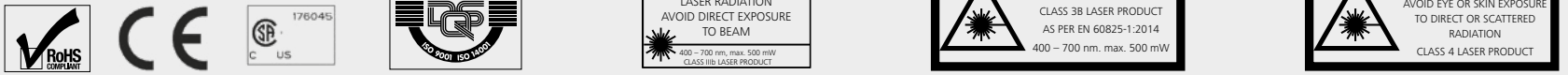
(1) ACR (Automatic Component Recognition); Elyra 7 systems and ZEN imaging software automatically recognize ACR-coded components.

Technical Specifications

Elyra 7 for combined Lattice SIM and SMLM)	
System information	All imaging modes combined in one system
Illumination module	Sample illumination in all widefield and superresolution modes by a single, highly integrated illumination module (with same set of lasers and a single Elyra laser module).
Cameras	Cameras for SMLM: Andor iXon 897 back-thinned EMCCD camera mounted to right side port of microscope. Camera for Lattice SIM: pco.egde sCMOS camera mounted to base port of microscope or Camera for combined SMLM and Lattice SIM: up to two pco.edge cameras mounted to the right side port of the microscope.

Software	
Standard	ZEN imaging software (64-bit); operating system: Microsoft Windows 10
	Full software control of image data recording in all imaging modes (including widefield, superresolution); Software-controlled switching between imaging modes. Full software control of data recording (multi-channel imaging, time series, z-stack) Saving and restoring of user-specific configurations for data recording.
Optional packages	ZEN 3D XL; in ZEN Blue ZEN StitchArt plus (extension of field of view by tile scanning and subsequent stitching of tiles with 2D and 3D data); ZEN Connect; ZEN Shuttle & Find

Accessories	
Definite Focus	Holding focus to compensate axial drift, typical z-position accuracy with an Elyra system: 30 nm. Specified limits: 100 nm for 63× objectives; 90 nm for 100× objectives.
Incubation	Large chamber incubation with Incubator XL dark S1, also prevents exposure to ambient light
	Stage-top incubation possible with z-piezo stage insert
Duolink for attachment of two cameras of the same type	Allows attachment of two cameras of the same type to the microscope.
Storage PC with 32 TByte storage capacity	Direct streaming of data and parallel processing while streaming of data possible



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