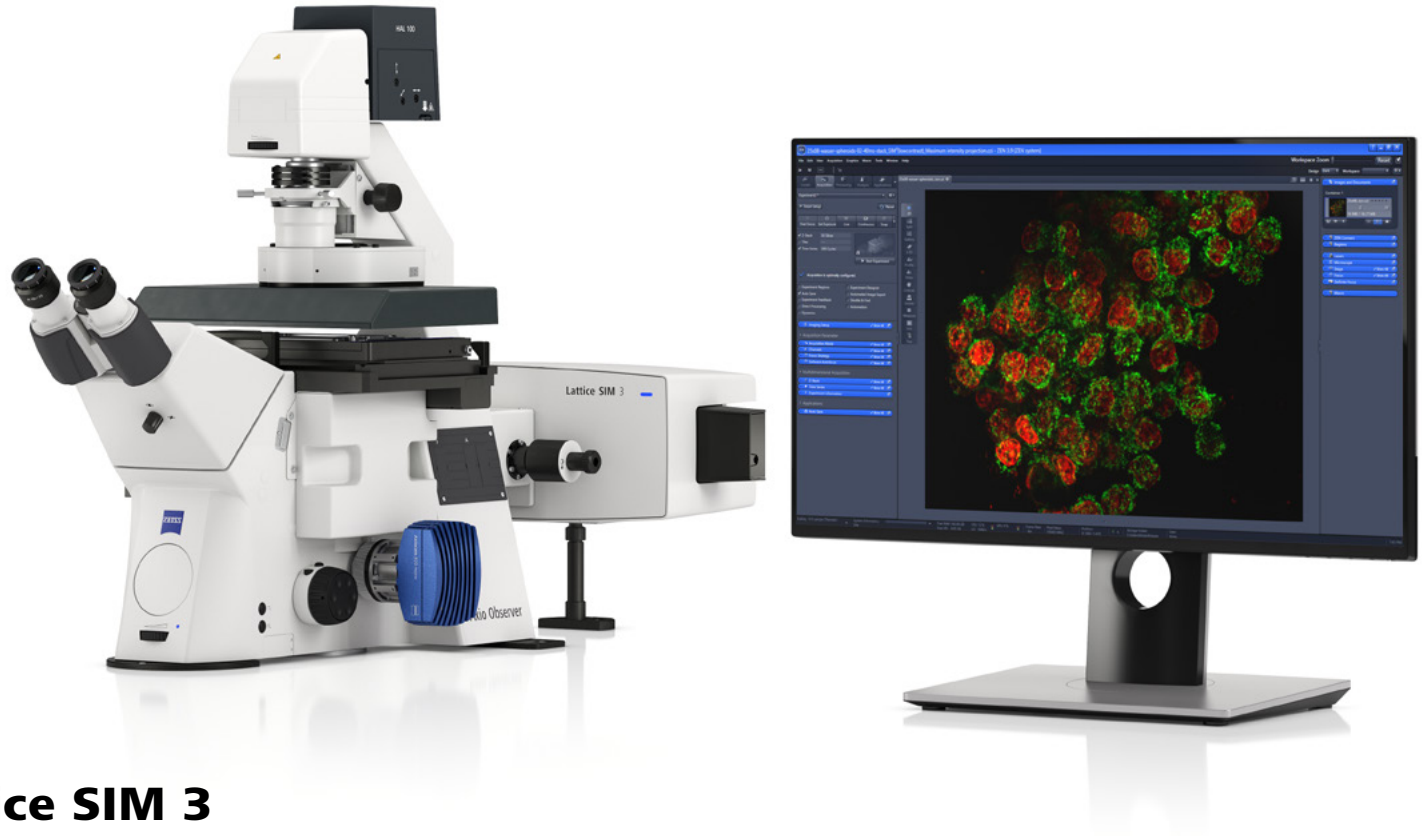
Revealing cellular behavior and inter-cellular dynamics



ZEISS Lattice SIM 3

Your Fast Optical Sectioning Solution for Studying Developing Organisms and Tissue Microstructures

zeiss.com/lattice-sim

Seeing beyond

Your Fast Optical Sectioning Solution for Studying Developing Organisms and Tissue Microstructures

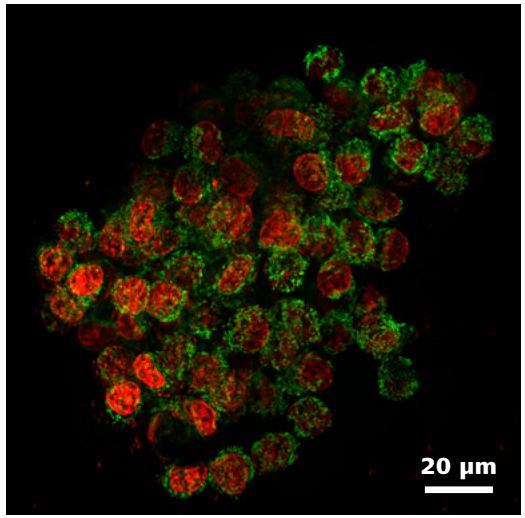
The ZEISS Lattice SIM family

Using microscopy to visualize biological structures provides insights into function. When imaging fixed structures, acquisition settings can be optimized for spatial resolution. However, when capturing dynamic events in living samples, higher acquisition speeds and low-light conditions must be balanced with resolution. The ZEISS Lattice SIM family balances sample size, imaging speed, and super-resolution capabilities based on your application – from outstanding optical sectioning of tissues and developing organisms to high-speed imaging of living cells to resolution excellence at the molecular level.

ZEISS Lattice SIM 3

ZEISS Lattice SIM 3 is designed to meet the requirements of multicellular samples, such as: developing organisms, organoids, 3D cell cultures, and tissue sections. Optimized for use with objectives from 10× to 40×, ZEISS Lattice SIM 3 exploits the full potential of the SIM Apotome technology: fast optical sectioning at superior quality, large fields of view with access to smaller regions of interest, near-isotropic resolution, and the gentlest super-resolution imaging possible. Additionally, Lattice SIM imaging and SIM² image reconstruction give you super-resolution imaging down to 140 nm.

With ZEISS Lattice SIM 3, not only do you gain unique SIM technology. You also maintain the use of standard dyes and fluorescent proteins, the ability to perform simultaneous two-color imaging with clean separation between channels, and the flexibility to choose from a variety of imaging modes to best suit the needs of your samples.



Spheroid stained for mitochondria (MitoTracker Green) and nuclei (NucRed Live 647)

Simpler. More Intelligent. More Integrated.

Capture entire model organisms and tissue sections

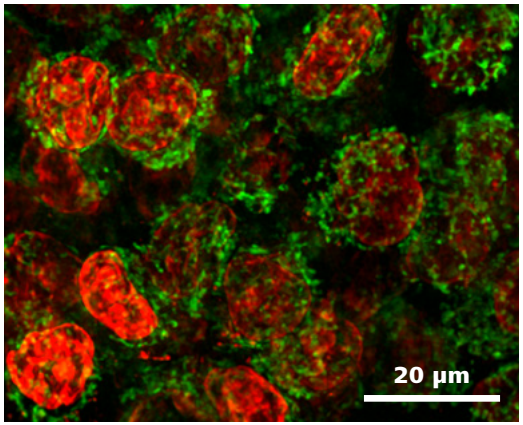
ZEISS Lattice SIM 3 fully leverages SIM Apotome technology, to provide the most outstanding optical sectioning at large fields of view with near-isotropic resolution. ZEISS Lattice SIM 3 is your system of choice for fast imaging of larger volumes, such as 3D model organisms, embryos, organoids, or tissue sections. Whether you work with living or fixed samples, ZEISS Lattice SIM 3 provides access to structured illumination microscopy of multicellular organisms with superior penetration depth.

Acquire super-resolution images as fast and gentle as widefield images

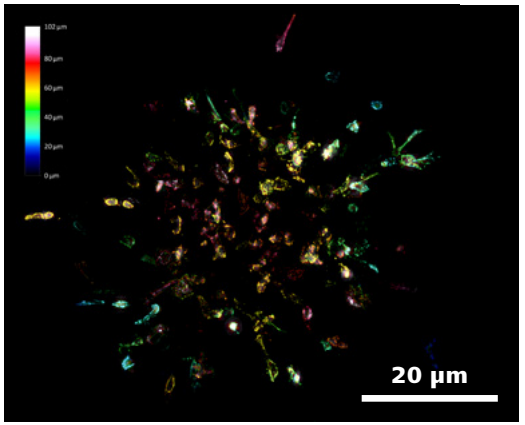
Choose between the standard SIM Apotome imaging mode for the highest available resolution (5 phase images required) or the imaging mode with reduced phases for slightly lower resolution but significantly increased speed and gentleness (only 3 phase images required). Combine SIM Apotome with the Leap mode to significantly speed up super-resolution acquisition. SIM Apotome makes even lossless acquisition possible, meaning for every reconstructed image just one raw image is needed.

Go from a large-field overview to the super-resolution details

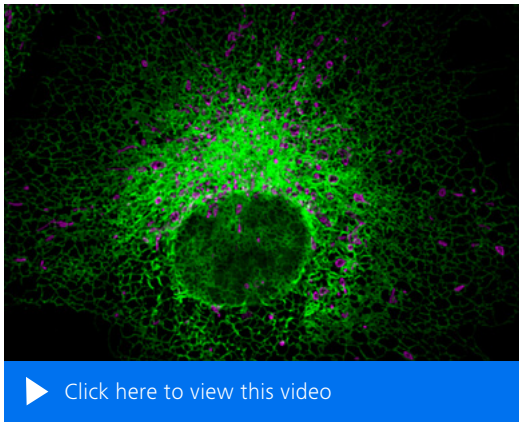
For large sample experiments, such as imaging whole organisms or simultaneous data collection of a wide area of cells – ZEISS Lattice SIM 3 offers the most advantageous combination of a large field of view and super-resolution imaging. SIM Apotome mode in combination with SIM² image reconstruction enables lateral super-resolution down to 140 nm with superior optical sectioning and sensitivity. Additionally, imaging in Lattice SIM mode with a ZEISS 25× multi-immersion objective and subsequent SIM² processing provides similar lateral resolutions with larger fields of view and more flexible adaptation to the refractive index of your sample.



Spheroid stained for mitochondria (MitoTracker Green) and nuclei (NucRed Live 647)



Spheroid invading collagen matrix; cells are expressing Lifeact-tdTomato; color-coded depth projection



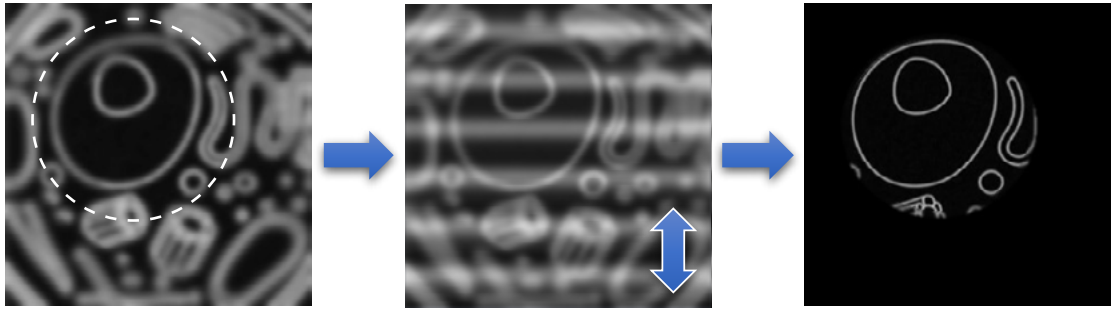
Cos7 cell expressing ER-mStayGold and stained for mitochondria using MitoTracker Red CMXRos

Your Insight into the Technology Behind It

SIM Apotome: Flexible optical sectioning
Live cell imaging with a widefield system often suffers from out-of-focus blur or background signal. These effects can decrease contrast and resolution. ZEISS Lattice SIM 3 fully leverages the benefits of the SIM Apotome technology, enabling structured illumination microscopy for low-magnification objectives to give you fast and gentle optical sectioning for your multicellular samples.

A grid pattern is used to illuminate and rapidly modulate the fluorescence signals in the focal plane. After acquiring three or five images with different grid positions (phases), these frames are combined into a resulting image which contains only information from the focal plane – your optical section.

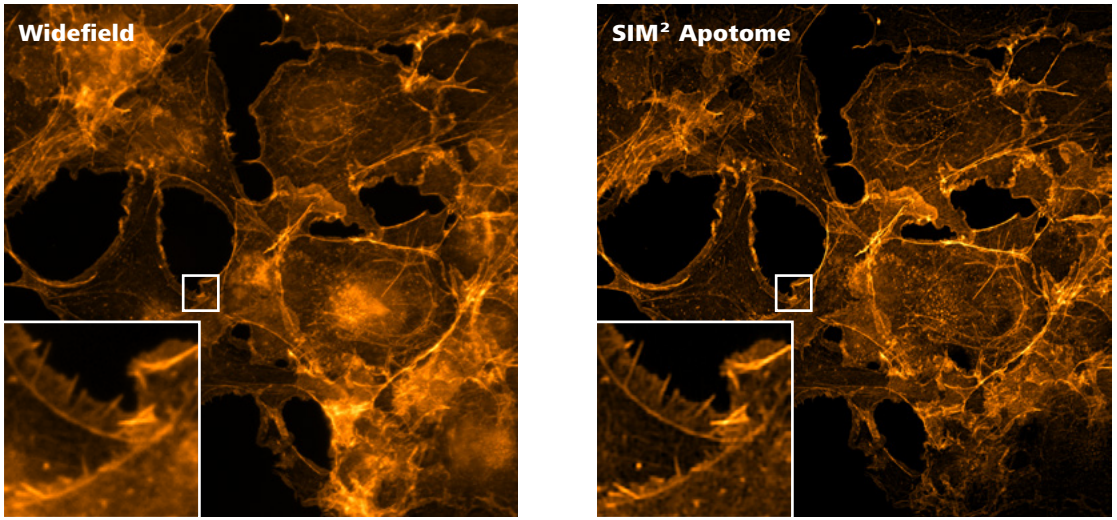
The SIM Apotome acquisition mode in combination with the SIM² reconstruction algorithm allows you to further adjust the gentleness of fast live-cell imaging with high contrast and resolution. Or use your new optical sectioning speed to increase productivity when acquiring large sample areas or large volumes at different magnifications.



Widefield image with out-of-focus light. Signal from the focal plane is encircled by a white dashed line.

SIM Apotome acquisition at 3 or 5 different grid positions

Reconstructed optically sectioned image



SIM² Apotome: Comparison of widefield (left) and SIM² Apotome (right) single plane images of Cos-7 cells stained for actin (Phalloidin Alexa Fluor 488, green). Objective: LD LCI Plan-Apochromat 25×/0.8 Imm Corr

Your Insight into the Technology Behind It

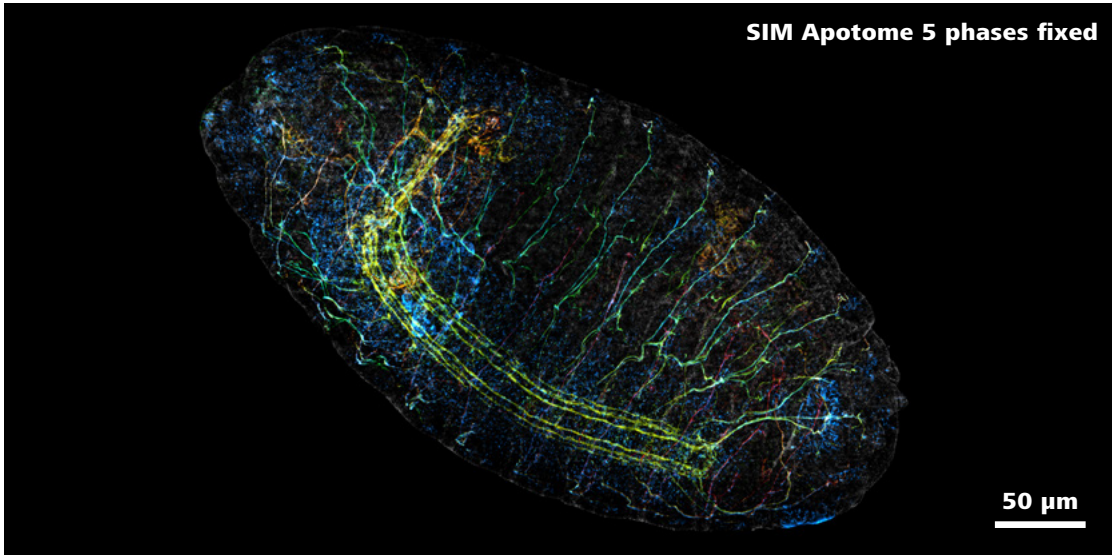
Balance your need for speed and resolution
Higher imaging speeds and decreased light exposures are a constant demand in imaging experiments. At the same time, these acquisition settings affect the resolution of the resulting images, and these parameters must be balanced with the desired outcome. To increase speed and decrease light exposure with SIM techniques, the number of phase images acquired for the reconstruction of one final frame/volume are reduced.

The robustness and flexibility of ZEISS Lattice SIM 3 structured illumination patterns plus the image reconstruction software allow a significant reduction to the number of phase images required for SIM Apotome acquisition mode, and, importantly, this only causes a slight decrease in the resolution of the final images. SIM Apotome acquisition can be operated at 3 phase images per frame, increasing the imaging speed by 66 %. The increased speed is also advantageous for fast screening of large sample areas, such as tissue sections.

In combination with the Leap mode, the reduced phase acquisition of SIM Apotome further decreases the number of phase images per final frame. SIM Apotome with reduced phases combined with Leap mode is entirely lossless and provides the same number of phase images and processed frames, enabling the gentlest super-resolution imaging possible.

Live yeast cells expressing a vacuole marker tagged with super-folder GFP. Color-coded depth projection. Cells were imaged for 12 hrs; budding events can be observed. Image courtesy of Chris McDonald, University of York, UK.

SIM Apotome volume tile scan image of Arabidopsis *root labeled for the Golgi apparatus; time series was recorded for 35 min; color-coded depth projection. Image courtesy of Peter O'Toole, University of York, UK.*



Drosophila embryo stained for Fasciclin II (color-coded depth projection) and HRP (cyan) labelling the nervous system. Image courtesy of Ines Hahn, University of York, UK.

Your Insight into the Technology Behind It

Lattice SIM:
Your 3D super-resolution technique

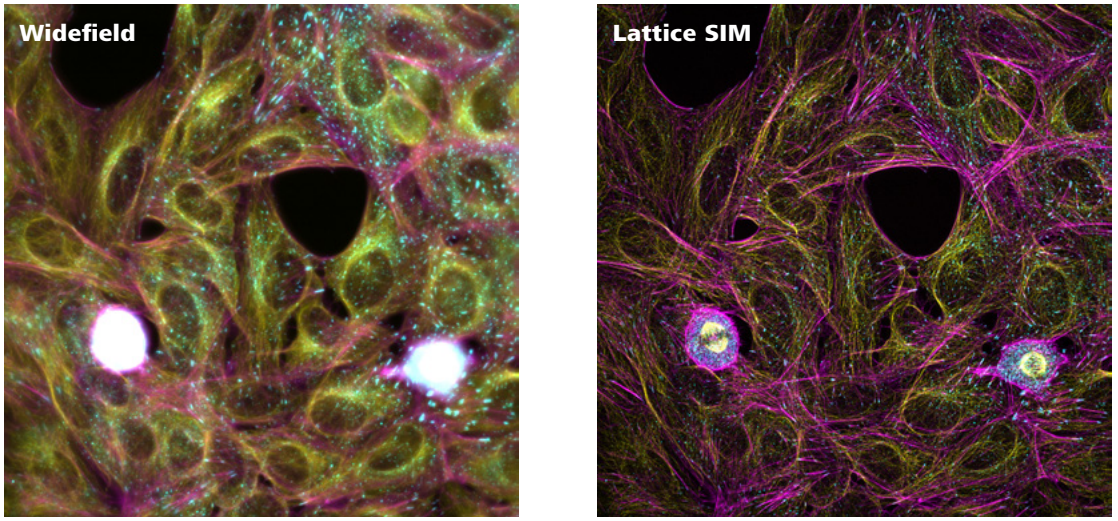
ZEISS Lattice SIM 3 also includes the Lattice SIM imaging mode optimized for use with a special 25x multi-immersion objective. The sample area is illuminated with a lattice spot pattern instead of grid lines. The lattice pattern provides higher contrast to allow deeper sample penetration and, in combination with SIM², robust image reconstruction with super-resolution down to 140 nm.

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

SIM² reconstruction:
Double your SIM resolution

Dual-iterative SIM, or SIM², is a groundbreaking image reconstruction algorithm that increases the resolution and sectioning quality of structured illumination microscopy data. SIM² is compatible with all SIM imaging modes and fully integrated in ZEISS ZEN software.

Unlike conventional reconstruction algorithms, SIM² is a two-step image reconstruction algorithm. First, order combination, denoising, and frequency suppression filtering are performed. All the effects resulting from these digital image manipulations are translated into a digital SIM point spread function (PSF). The subsequent iterative deconvolution uses this PSF. Similar to the advantages of using experimental PSF for deconvolution of hardware-based microscopy data, the SIM² algorithm is superior to conventional one-step image reconstruction methods in terms of resolution, sectioning, and robustness.



Lattice SIM: Comparison of widefield and Lattice SIM images of Cos-7 cells stained for actin (Phalloidin Alexa Fluor 488, magenta), microtubules (anti-beta-tubulin Alexa Fluor 568, yellow) and Paxillin (anti-Paxillin Alexa Fluor 647, cyan). Maximum intensity projections. Objective: 25× /0.8 Imm Corr

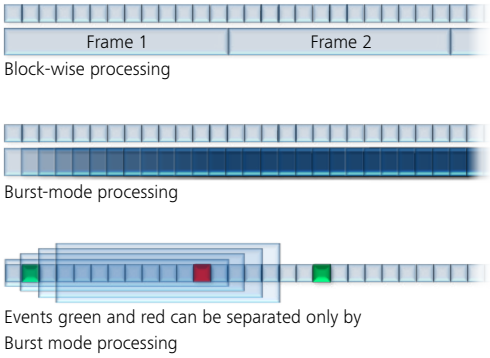
Your Insight into the Technology Behind It

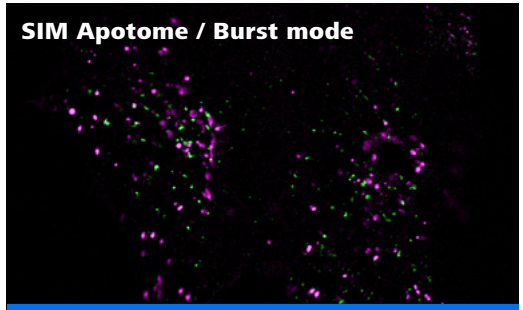
Boost the speed of SIM imaging even further

You can further increase the temporal resolution and productivity for 2D and 3D imaging by using the speed enhancement modes. The Burst mode and the Leap mode are compatible with SIM Apotome as well as Lattice SIM acquisition. Combined with SIM² image reconstruction, they enable you to capture highly dynamic processes at exceptional resolution in all three dimensions. For ZEISS Lattice SIM 3, the combination of SIM Apotome mode with reduced phases and Leap mode allows for super-resolution imaging at widefield speed, i.e., after SIM processing, you get one final super-resolution image per acquired raw image.

2D Burst mode:
Get full temporal information

Burst mode processing uses the rolling window approach to let you observe processes in your living samples at up to 255 fps. Since Burst mode is a post-acquisition step, you have the flexibility to use it with previously acquired data sets. You decide how much temporal resolution is required for your data analysis.

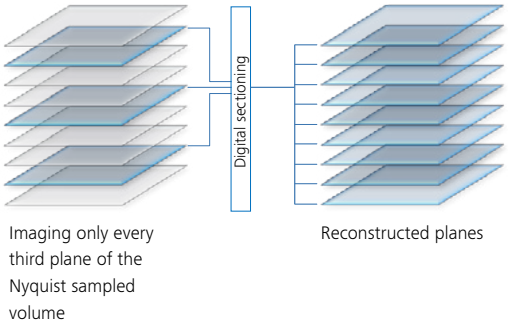




U2OS cell expressing Golgi derived vesicles (tdTomato, magenta) and Rab5a (mEmerald, green). Objective: 40×/1.4 Oil

3D Leap mode:
Digital sectioning at a new level

For demanding fast imaging in 3D, the Leap mode acquisition enables you to reduce your imaging time and lower the light exposure on your sample. This works by imaging only every third plane, for three-times higher volume imaging speed and three-times fewer light exposures. ZEN reconstructs the entire volume using a pixel reassignment approach.



U2OS cell expressing EB3-tdTomato, recorded with reduced phases. Objective: 40×/1.4 Oil

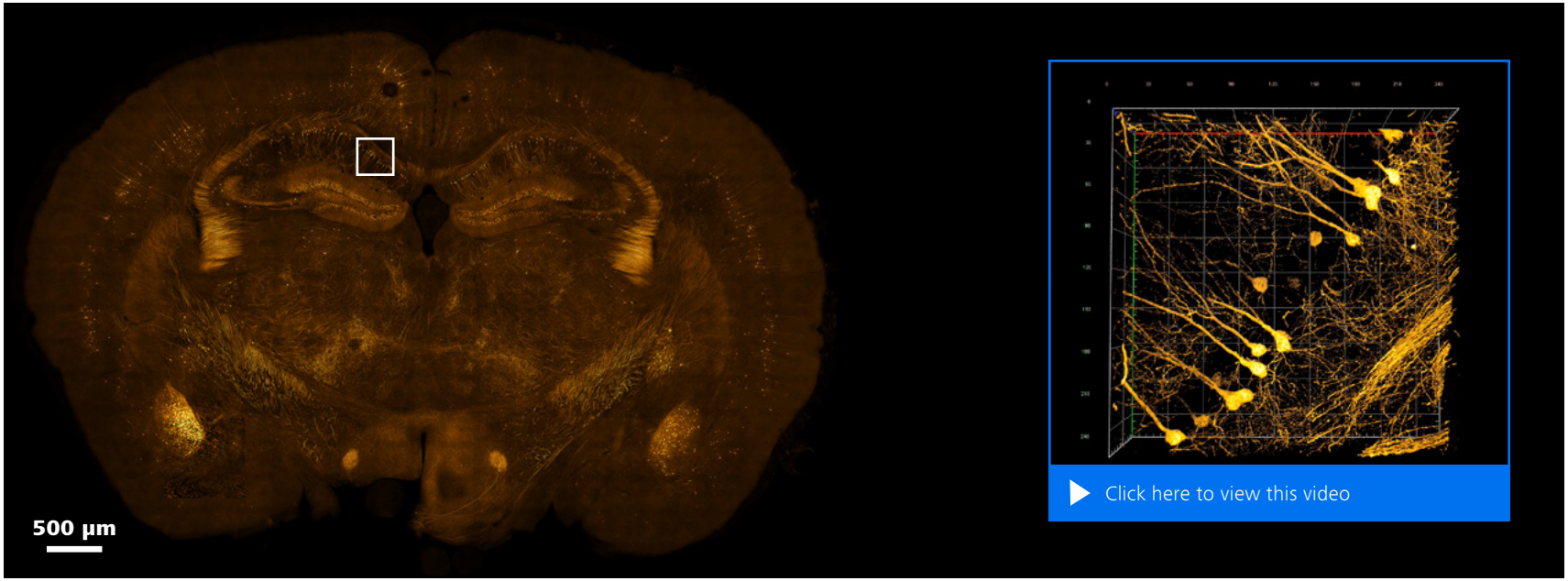
Expand Your Possibilities

ZEISS ZEN: A journey through different scales

Biological samples often contain different types of information at different length scales. Collecting low to high resolution data in the same sample not only makes you more productive, but also allows you to interconnect your findings and create more accurate biological models based on your experimental findings. With AI Sample Finder, you automatically detect your whole sample even before starting your experiment – ensuring that you won't miss any relevant areas. The ZEN Connect toolkit enables you to combine different experiments recorded with various acquisition modes or systems – placing your experiments into the spatial context of the whole sample.

ZEISS arivis Pro: Advanced image processing and 3D reconstruction

Use the efficient ZEISS arivis Pro software for visualization and quantification of large 3D and 4D data sets. ZEISS arivis Pro not only renders volume images of almost unlimited size, but also provides advanced image processing tools such as volume fusion, channel shift, conventional and machine learning based segmentation, 3D tracking, and neuron tracing. Visualize your quantitative results within ZEISS arivis Pro or export all data for further analysis. The modular structure of ZEISS arivis Pro flexibly adjusts to your needs for advanced image processing and analysis.



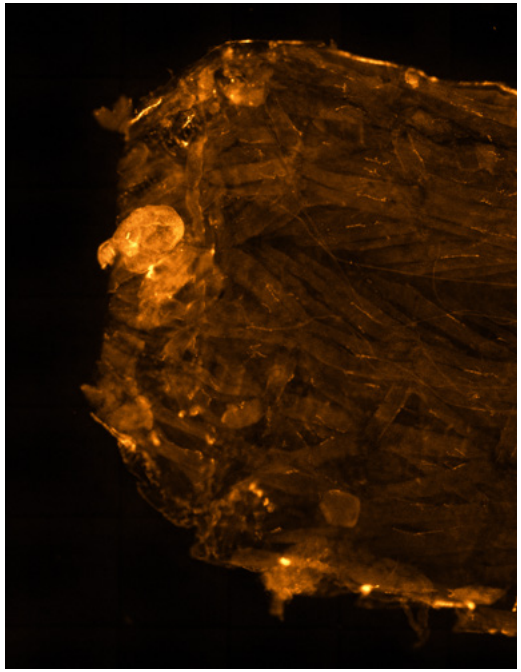
Murine brain expressing the neuronal marker Thy1-eGFP was imaged in SIM Apotome and Lattice SIM modes over a Z stack range of 170 µm. Objective for overview image (left): Plan-Neofluar 10×. Objective for inset (right): LD LCI Plan-Apochromat 25×/0.8 Imm Corr.
The ZEN Connect project combines data sets recorded with 10× SIM Apotome, 25× SIM Apotome, and 25× Lattice SIM. The volume rendering on the right-hand side shows a subset of the 25× Lattice SIM data set. Sample courtesy of Herms Lab (MCN, University of Munich, Germany).

Expand Your Possibilities

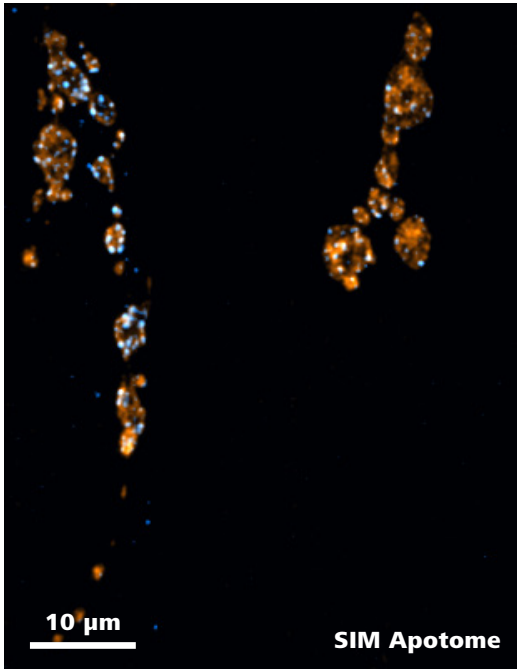
Super-resolution imaging in Neuroscience

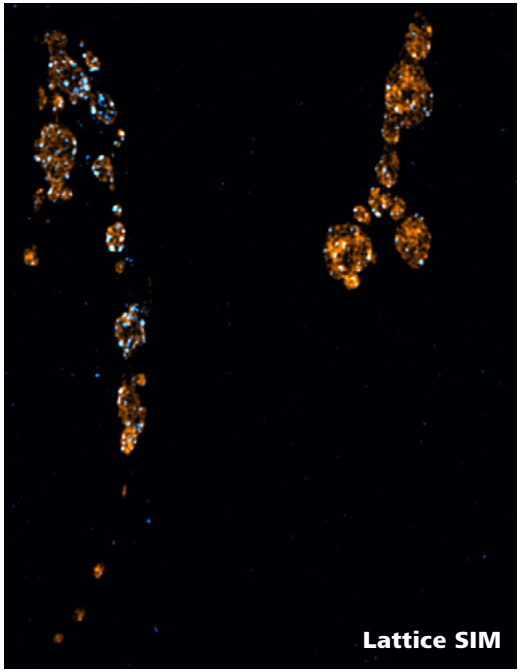
Understanding how neurons respond to damage, disease and metabolic change is critical to how we treat neuronal injury and neurodegenerative disease. The synaptic structure and in particular the actives zones where synaptic vesicles are released are key players in signal transmission and proper function of neurons. The imaging of active zones require resolution beyond what can be achieved by standard confocal microscopy.

The lab of Prof. Sean Sweeney investigates a novel mutant that is a regulator of neuronal survival and metabolic responses. Nervous system and synapses are co-labelled with synaptotagmins to observe the general structure of the synapse and distribution of the presynaptic vesicles. Super-resolution microscopy helps identify and quantify the differences in synapse structure and composition of the active zones.



Lower half of Drosophila slice stained for nervous system and synapses (Anti-HRP, orange). Objective: Plan-Neofluar 10×/0.3 Air. Image courtesy of Prof. Sean Sweeney, University of York, UK.





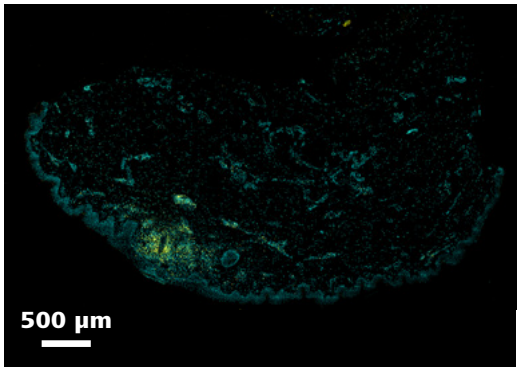
Also stained in this section are synaptotagmins (Anti-synaptotagmin, cyan). Objective: LD LCI Plan-Apochromat 25× / 0.8 Imm Corr. The same region of interest was imaged with SIM Apotome and Lattice SIM for comparison. Image courtesy of Prof. Sean Sweeney, University of York, UK.

ZEISS Lattice SIM 3 at Work

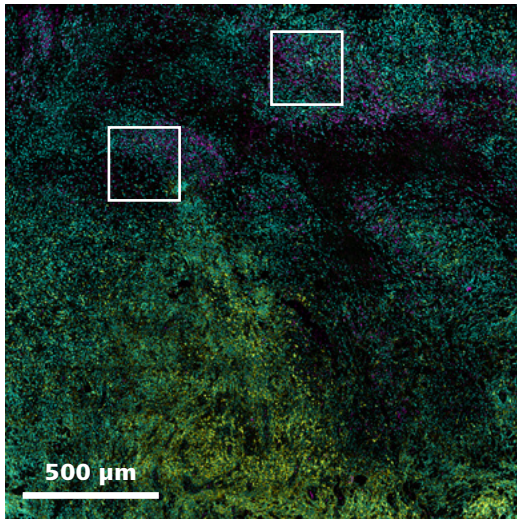
Super-resolution imaging in Immunology

Immunofluorescence of tissue sections is commonly used in immunological research to investigate distribution of and interactions between pathogens and immune cells, all with the aim to develop novel therapies for pathogenic diseases. For compelling results, it is not only crucial to image complete sections as to not miss relevant areas but also to image with enough resolution to identify and quantify individual events.

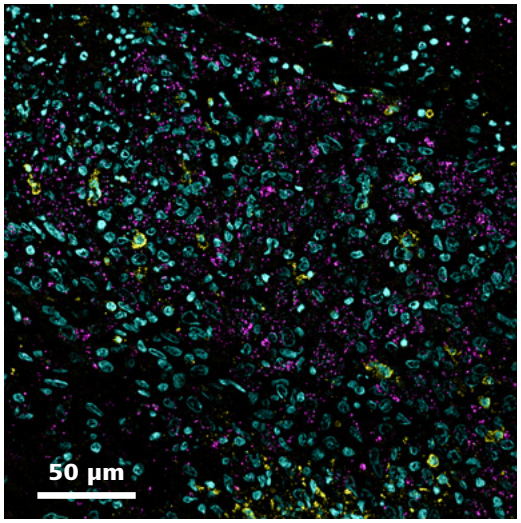
In the application example shown here, skin tissue sections were imaged with Lattice SIM 3 to investigate distribution of CD8 cells relative to Leishmania parasite infection sites. The enlarged area is a digital zoom-in only, meaning that it is possible to zoom into any region of the overview image and quantify cell nuclei, CD8 cells and Leishmania parasites.

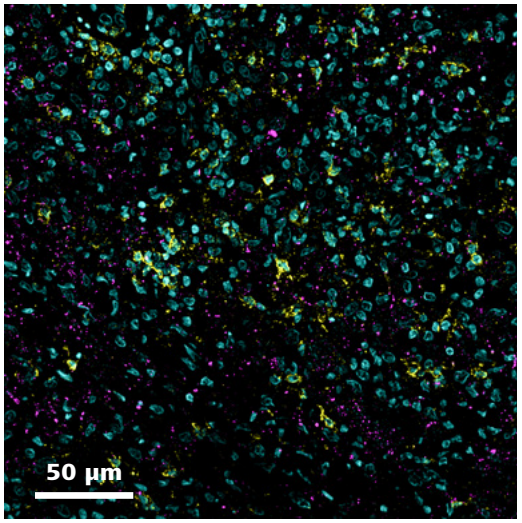


Whole section of skin tissue stained for cell nuclei (cyan) and CD8 cells (yellow). Objective: LD LCI Plan-Apochromat 25×/0.8 Imm Corr. Image courtesy: Helen Ashwin, Department of Biology, University of York, UK.



Region of interests of a skin tissue section stained for cell nuclei (cyan), CD8 cells (yellow) and Leishmania parasites (magenta). Objective: LD LCI Plan-Apochromat 25×/0.8 Imm Corr.



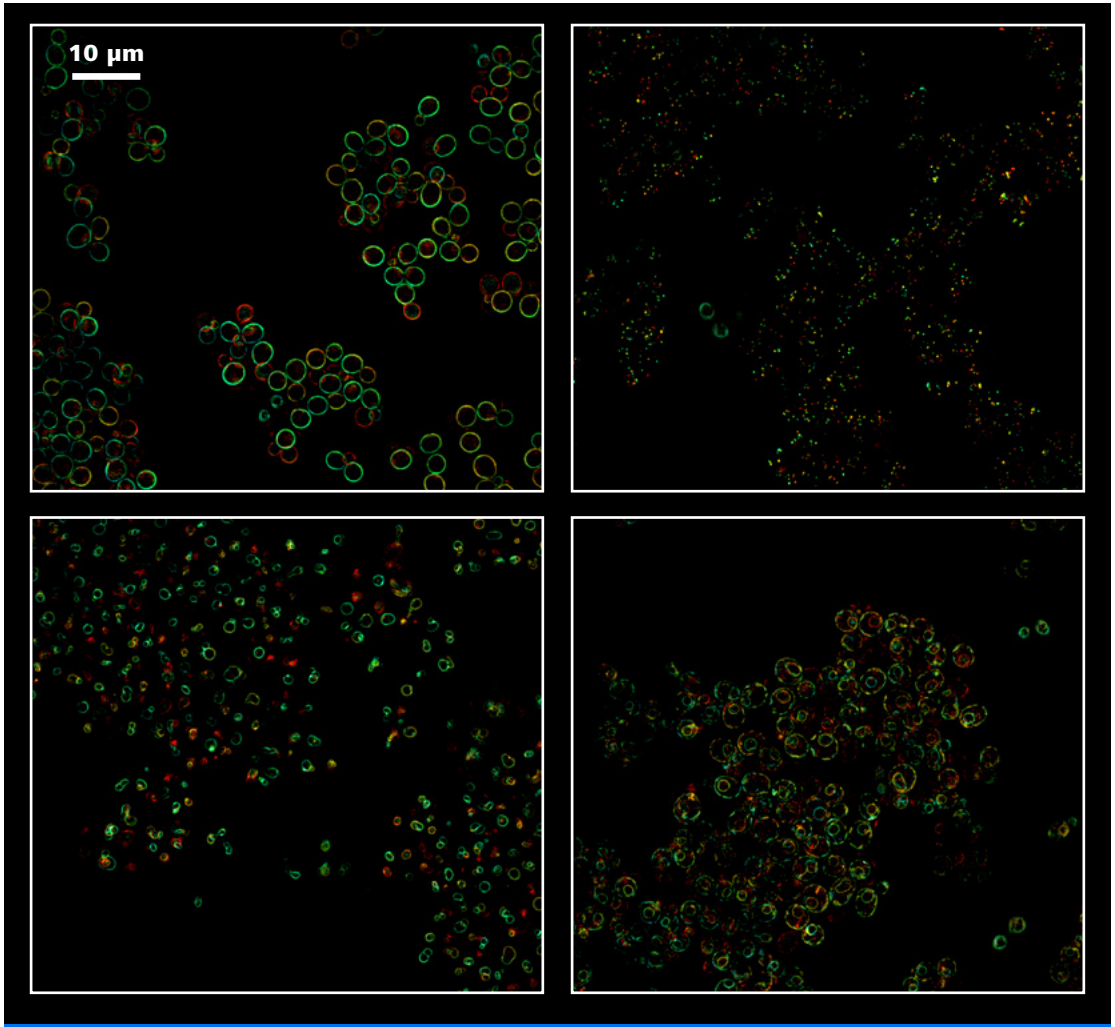


Digital zoom into the image on the left. Parasites can be visualized and quantified in each cell of the section. Image courtesy: Helen Ashwin, Department of Biology, University of York, UK.

ZEISS Lattice SIM 3 at Work

Super-resolution imaging of living yeast
Live yeast cells are among the most challenging samples in fluorescence microscopy. They are extremely light sensitive and with 4 – 5 µm in diameter smaller than most used cell lines, e.g., human or mouse. Furthermore, yeast cells grow in suspension; they can move freely in the culture dish and are of spherical shape, without clearly defined orientation. Tackling all these challenges requires extremely gentle and fast imaging combined with high resolution in all spatial dimensions.

SIM² Apotome is the perfect tool to image live yeast cells with super-resolution, yet fast and gentle enough to observe the cells over extended periods of time. The example on the right clearly demonstrates this unique capabilities of SIM² Apotome. Various subcellular compartments (surface marker, endosomes, vacuole, endoplasmic reticulum) were tagged with superfolder GFP and imaged for 12 hours. Yeast cells reproduce quickly, about once every 90 min, by a process called 'budding'. In each of the video sequences, multiple cycles of budding as well as subcellular details and dynamics can be observed.



Click here to view this video

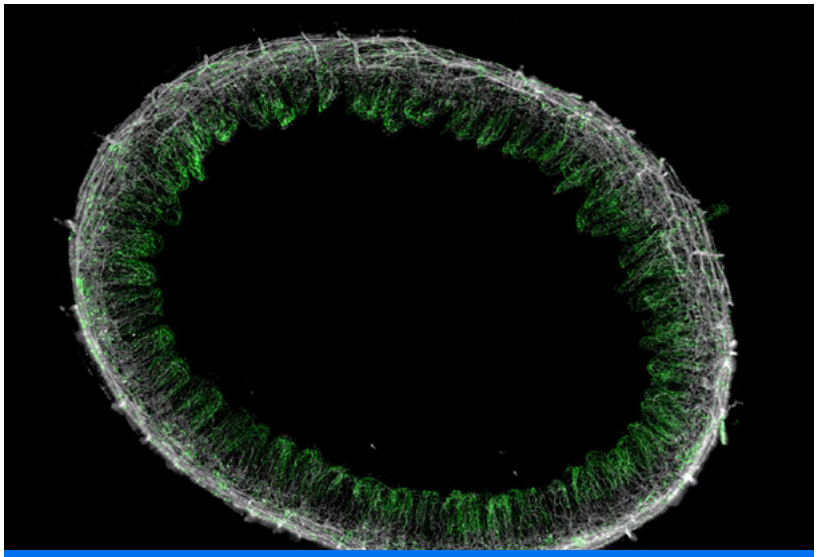
Multi-well 12-hour time lapse microscopy of live yeast cells expressing superfolder-GFP tagged proteins, color-coded depth projections. Top left: surface protein marker, top right: endosomes, bottom left: vacuole, bottom right: endoplasmic reticulum. Objective: Plan-Apochromat 40×/1.4 Oil. Image courtesy of Chris McDonald, University of York, UK.

ZEISS Lattice SIM 3 at Work

Image large volumes with finest detail even at depth

SIM Apotome combined with reduced phases and leap mode allows you to image large volumes extremely fast and efficiently. Crunch through large volumes fast by recording only one raw image per final reconstructed image. Select regions of interest, switch objectives and use Lattice SIM to gain super-resolution images with a lateral resolution down to 140 nm within the context of the whole sample.

A novel clearing and embedding technology developed by Prof. Tang and his team (Hsiao et al., Nature Communications 2023) combined with the advantages of SIM Apotome acquisition and excellent image reconstruction technology enabled us to image an entire mouse intestine section of 3 mm × 4 mm and ~200 µm thickness within a couple of minutes. Networks of blood vessels and nerves can be visualized with finest details even at depth.



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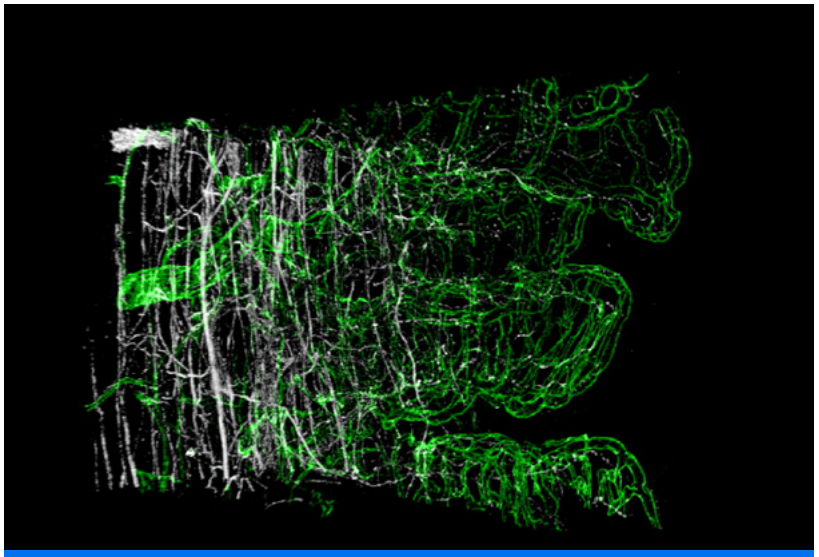


Click here to view this video

Mouse small intestine in A-ha Polymer labeled for blood vessels (Alexa Fluor 488) and nerves (Alexa Fluor 647); anti-fade labeling. Objective: Plan-Neofluar 10×/0.3 Air (left) and LD LCI Plan-Apochromat 25× Imm Corr (right). Sample courtesy of Prof. Shiue-Cheng (Tony) Tang, Institute of Biotechnology & Department of Medical Science, National Tsing Hua University, Taiwan

The Lattice SIM product family

Address all your super-resolution needs across scales

The ZEISS Lattice SIM product family gives you full access to super-resolution imaging for all research areas, from fast optical sectioning to the detection of highly dynamic processes and quantification at the molecular level.

ZEISS Lattice SIM 3

Reveal cellular behavior and inter-cellular dynamics

Lattice SIM 3 is specifically designed to meet the imaging requirements of multicellular organisms and tissue sections. This system exploits the full potential of the SIM Apotome technology: fast optical sectioning at superior quality, large fields of view with access to smaller regions of interest, near-isotropic resolution, and the gentlest super-resolution imaging possible.

ZEISS Lattice SIM 5

Reveal the vibrant sub-organelle network of life

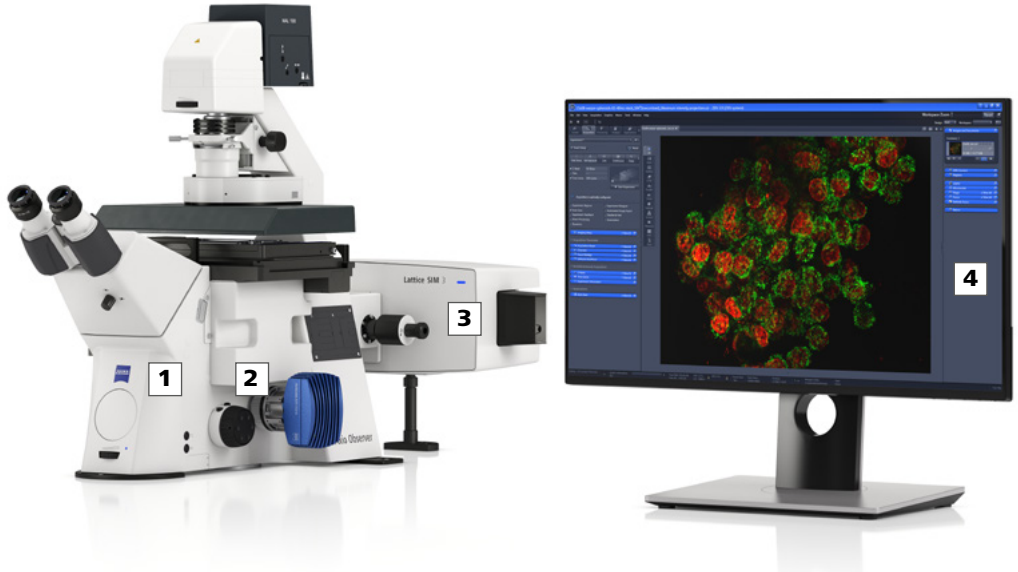
ZEISS Lattice SIM 5 has been optimized for single cell imaging as well as capturing subcellular structures and their dynamics. Powered by the Lattice SIM technology and the SIM² image reconstruction algorithm, ZEISS Lattice SIM 5 provides you with outstanding super-resolution capabilities down to 60 nm in both living and fixed cells.

ZEISS Elyra 7 with Lattice SIM

Reveal life across scales – down to molecular details

ZEISS Elyra 7 includes several microscopy techniques: Lattice SIM², SIM² Apotome, SMLM and TIRF. You can combine these techniques to multiply the insights from your specimen and to correlate the acquired data. With its focus on single molecule localization microscopy, ZEISS Elyra 7 gives you resolution excellence down to the molecular level.

Your Flexible Choice of Components



1 Microscope

- ZEISS Axio Observer 7 (inverse stand)
- Stage top incubation
- Motorized XY stepper scanning stage
- Z-Piezo stage insert
- 1 camera port for camera or Duolink

2 Objectives

- Plan-Apochromat 40×/1.4 Oil (DIC*)
- C-Apochromat 40×/1.2 W
- LD LCI Plan-Apochromat 25×/0.8 Imm Corr
- Plan-Apochromat 20×/0.8 Air
- EC Plan-Neofluar 10×/0.3 Air

3 Lattice SIM 3 Illumination and Detection

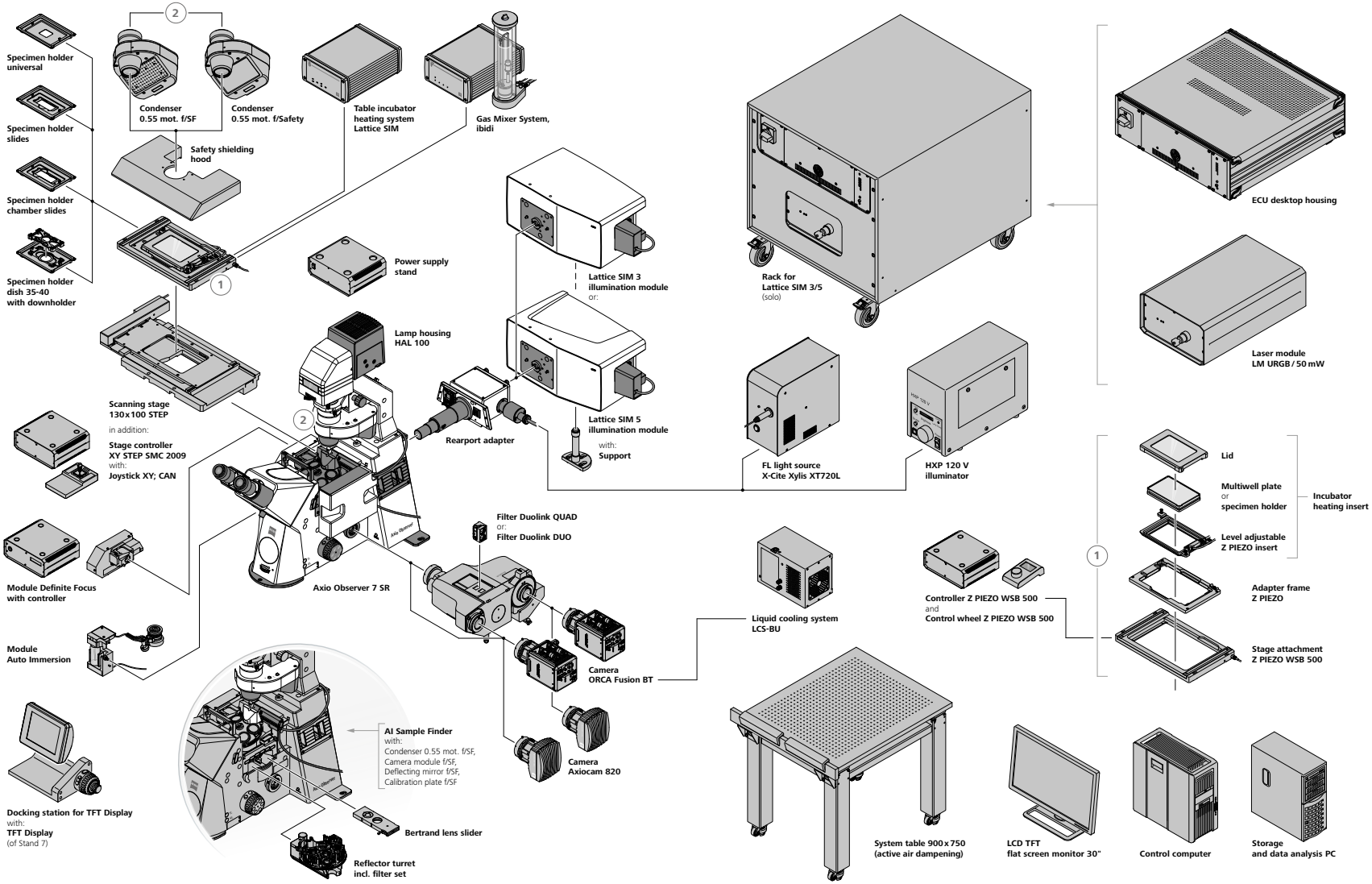
- Fiber coupled diode pumped solid state lasers
- Available lines:
  405 nm diode (50 mW),
  488 nm diode (50 mW),
  561 nm diode (SHG) (50 mW),
  640 nm diode (50 mW)
- ZEISS Axiocam 820 CMOS camera

4 Software

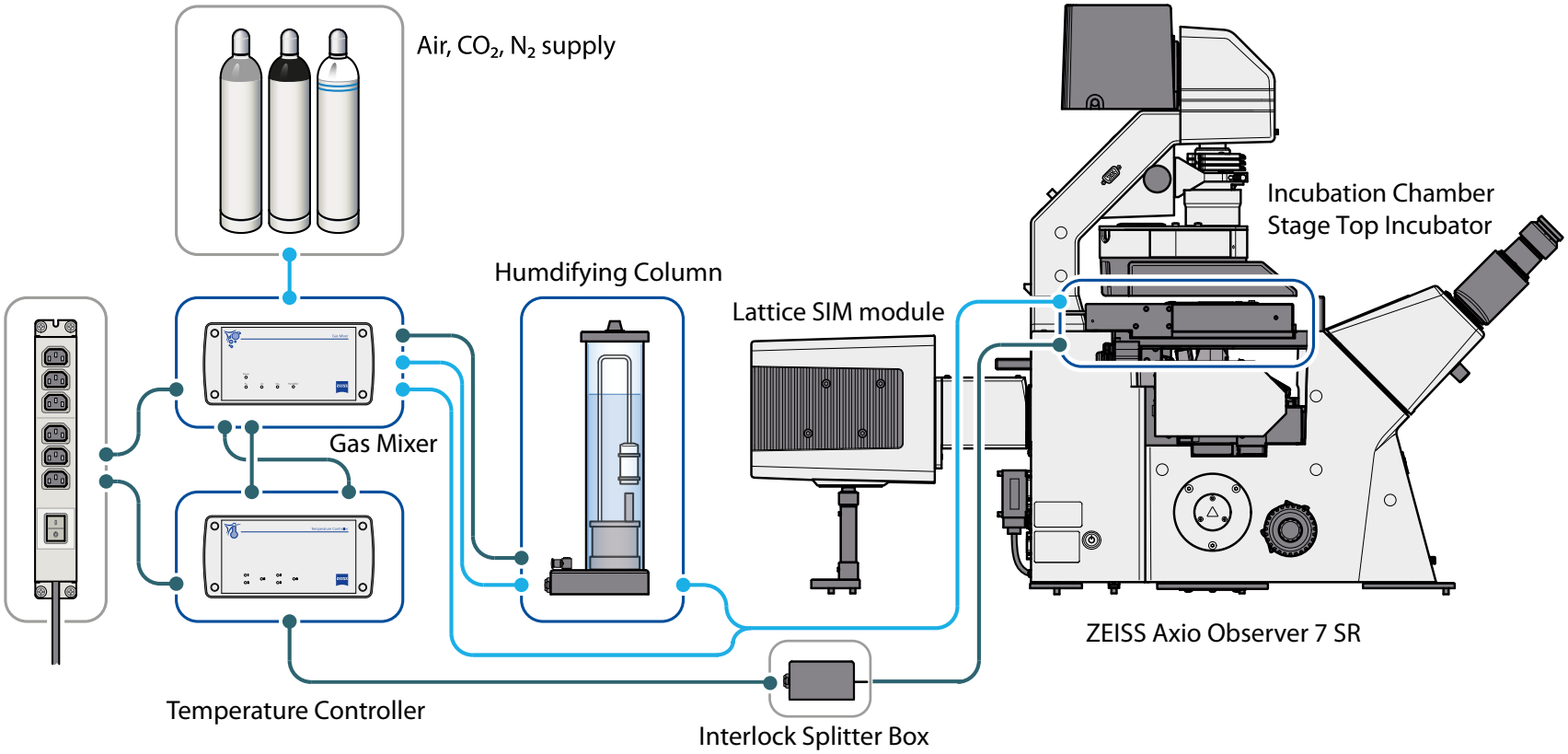
- ZEN (blue edition)
- SIM toolkit

* DIC indicates type of objective not imaging modality

System Overview



Incubation Setup



Technical Specifications

Microscope	
Stand	ZEISS Axio Observer 7, SR for Lattice SIM, motorized inverted microscope for super-resolution microscopy
Z-drive	DC servo motor, opto-electronically coded; smallest Z step: 25 nm
XY stepper scanning stage	Motorized, stepper motor with 2 mm spindle pitch; travel range: 130 mm × 100 mm; max. speed: 50 mm/s; Resolution: 0.1 µm; reproducibility: ± 1 µm; absolute accuracy: ± 5 µm; Suitable for mounting frames K 160 × 110 mm and Z-Piezo stage insert; compatible with objectives' autocorr
Z-Piezo stage insert	For XY scanning stage; max travel range: 500 µm; smallest Z step size: 5 nm; Level-adjustable stage insert for frame inserts (sample holders) and multi-well plates; Sample holders available for 3"×1" standard slides, LabTek chambers; 35 – 40 mm glass-bottom dishes; Universal stage insert for various carrier formats

Optical Filters	
Filter sets reflector turret	Flexible filter set available for simultaneous multi-channel acquisition; Filter set with four precisely mounted ACR-coded filter modules for super-resolution microscopy on a motorized six-position turret; Two positions in the turret compatible with standard Push & Click filter modules, e.g., for visual sample observation
Dual filter set for Duolink	Filter sets are optimized for one color (SOLO), dual color (DUO) and four color (QUAD) applications
Filter slider	Manual filter slider with Bertrand lens; fits into the slit below the objective turret

Lasers	
Laser module	Laser coupling with polarization-maintaining single mode fiber (no adjustment of laser coupling by users required)
Laser lines	405 nm (50 mW), 488 nm (50 mW), 561 nm (50 MW), 640 nm (50 mW); 405, 488 & 642 nm: diode lasers (DL); 561 nm: frequency doubled diode laser (FDDL); Direct modulation @ 500:1

Cameras	
CMOS	ZEISS Axiocam 820 mono; sensor pixel count: 4512×4512 = 20 megapixel, effective: 3072×3072; pixel size: 2.74 µm×2.74 µm; QE: up to 86 % (@460 nm); binning: 1×1, 2×2 (default), 4×4; gain: 1× (min), 2×, 4× (opt), 8×, 16× (max); active cooling, regulated sensor temperature: 25 °C; bit depth: 14 Bit; frame rate: 28 fps, 75 fps (2×2 binning) @ full frame

Technical Specifications

Lattice SIM 3	
Illumination module	Illumination module attached to rear port of microscope stand; fully motorized SIM imaging; Two different grating frequencies for SIM Apotome for best match to objective and wavelength; one grating for Lattice SIM; Motorized exchange of gratings in multi-color SIM Apotome; fast piezo actuated phase stepping of gratings.
Camera	Up to two CMOS cameras (ZEISS Axiocam 820) mounted on right side port
Imaging modes	Widefield mode for illumination with thermal light source or LED; laser widefield mode for illumination with laser; Lattice SIM mode using two-dimensional lattice grid; SIM Apotome mode using one-dimensional line grid
Objective lenses (Lattice SIM)	LD LCI Plan-Apochromat 25×/0.8 Imm Corr DIC*, ACR[1] coding
Objective lenses (SIM Apotome)	Plan-Apochromat 40×/1.4 Oil; C-Apochromat 40×/1.2 W; LD LCI Plan-Apochromat 25×/0.8 Imm Corr DIC*; Plan-Apochromat 20×/0.8 Air; EC Plan-Neofluar 10×/0.3 Air
Resolution (Lattice SIM/Lattice SIM²)	Lateral resolution (XY): down to 210 nm/140 nm (typical experimental FWHM values with objective lens LD LCI Plan-Apochromat 25×/0.8 Imm Corr DIC*; with sub-resolution beads of 100 nm diameter and excitation at 488 nm; resolution is sample and SNR dependent)
Resolution (SIM/SIM² Apotome)	Lateral resolution (XY): down to 320/265 nm for 25× (typical experimental FWHM values with sub-resolution beads of 100 nm diameter and excitation at 488 nm; resolution is sample and SNR dependent)
Multi-color (Lattice SIM and SIM Apotome)	Detection of up to four different fluorescent labels (sequential detection) and simultaneous dual-color detection with Duolink
Max. field of view (Lattice SIM)	204.3 × 204.3 µm², full-frame recording (1536 × 1536 effective px) with LD LCI Plan-Apochromat 25×/0.8 Imm Corr DIC*
Max. field of view (SIM Apotome)	163.44 × 163.44 µm², full frame recording (1536 × 1536 effective px) with Plan-Apochromat 40×/1.4 Oil; 261.51 × 261.51 µm², full frame recording with LD LCI Plan-Apochromat 25×/0.8 Imm Corr DIC*; 255.58 × 255.58 µm², full frame recording with Plan-Apochromat 20×/0.8 Air; 653.8 × 653.8 µm², full frame recording with EC Plan-Neofluar 10×/0.3 Air
Acquisition speed (Lattice SIM)	19 SIM image frames per second at 512 × 512 px resolution and 1 ms exposure time (13 phase images per one SIM image) 28 SIM image frames per second at 512 × 512 px resolution and 1 ms exposure time (9 phase images per one SIM image)
Acquisition speed (SIM Apotome)	51 sectioned frames per second at 512 × 512 px resolution and 1 ms exposure time (camera limited) (5 phase images per one sectioned image); 85 sectioned frames per second at 512 × 512 px resolution and 1 ms exposure time (camera limited) (3 phase images per one sectioned image)
Leap mode and Burst mode	Leap and Burst modes are combinable with both Lattice SIM and SIM Apotome. Leap mode increases the frame rate by a factor of 3 for 3D image acquisition. Max. 255 image frames per second at 512 × 512 px resolution and 1 ms exposure time are available for 2D data after Burst processing.
Data recording and analysis (Lattice SIM and SIM Apotome)	Full software control of SIM imaging; Multi-tracking: sequential multi-channel data acquisition with freely configurable change of gratings (SIM Apotome), or one common grating (Lattice SIM), filters and excitation lasers between tracks; Simultaneous dual-color imaging with one grating; Lattice SIM and SIM 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 2D time series data sets for Lattice SIM and Apotome mode to increase effective frame rates by a factor of 15 and 5, respectively.

* DIC indicates type of objective not imaging modality

[1] ACR (Automatic Component Recognition); Lattice SIM systems and ZEN imaging software automatically recognize ACR-coded components.

Technical Specifications

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, super-resolution); 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
SW packages	Required: ZEN module Lattice SIM; ZEN toolkit Advanced Acquisition; ZEN toolkit 3D Optional: ZEN toolkit Deconvolution; ZEN toolkit 2D ; ZEN toolkit Connect; ZEN toolkit AI; ZEN toolkit Developer; Vision package

Accessories	
Definite Focus	Holding focus to compensate axial drift, typical z-position accuracy: 30 nm; Specified limits of Definite Focus 3: 0.2 × DOF (Depth of field: DOF ≈ λ/NA^2).
Incubation	Stage top incubation with safety lock
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 81 TByte storage capacity	Direct streaming of data and parallel processing while streaming of data possible

Certified Quality System ISO 13485 mdc

Lattice SIM 3 meets the requirements according to IEC 60825-1:2014 and it a laser class 1 device.
Interlocks on customer interfaces prevent access to the laser radiation.

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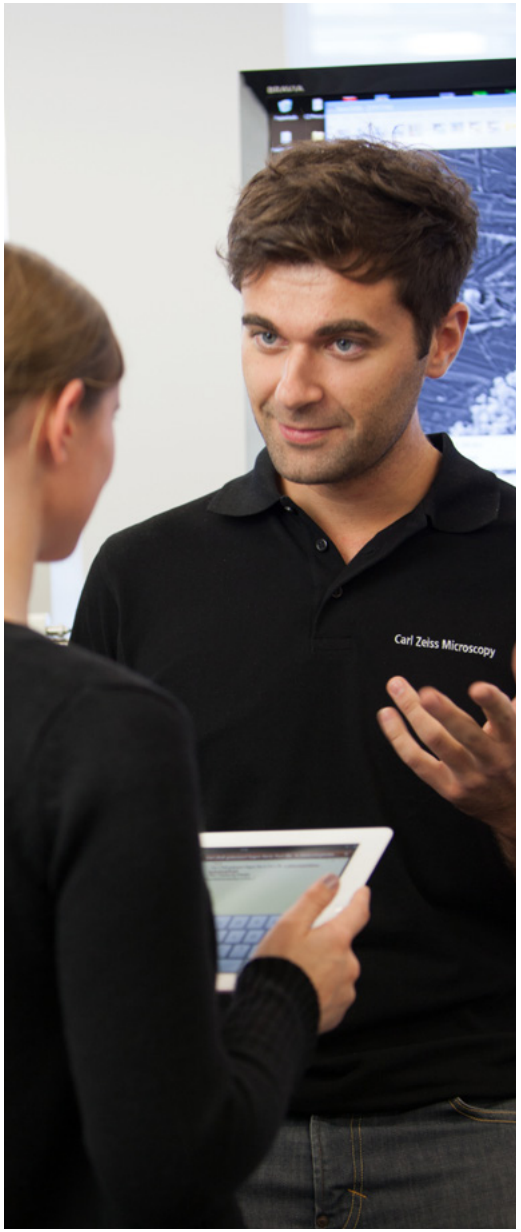

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