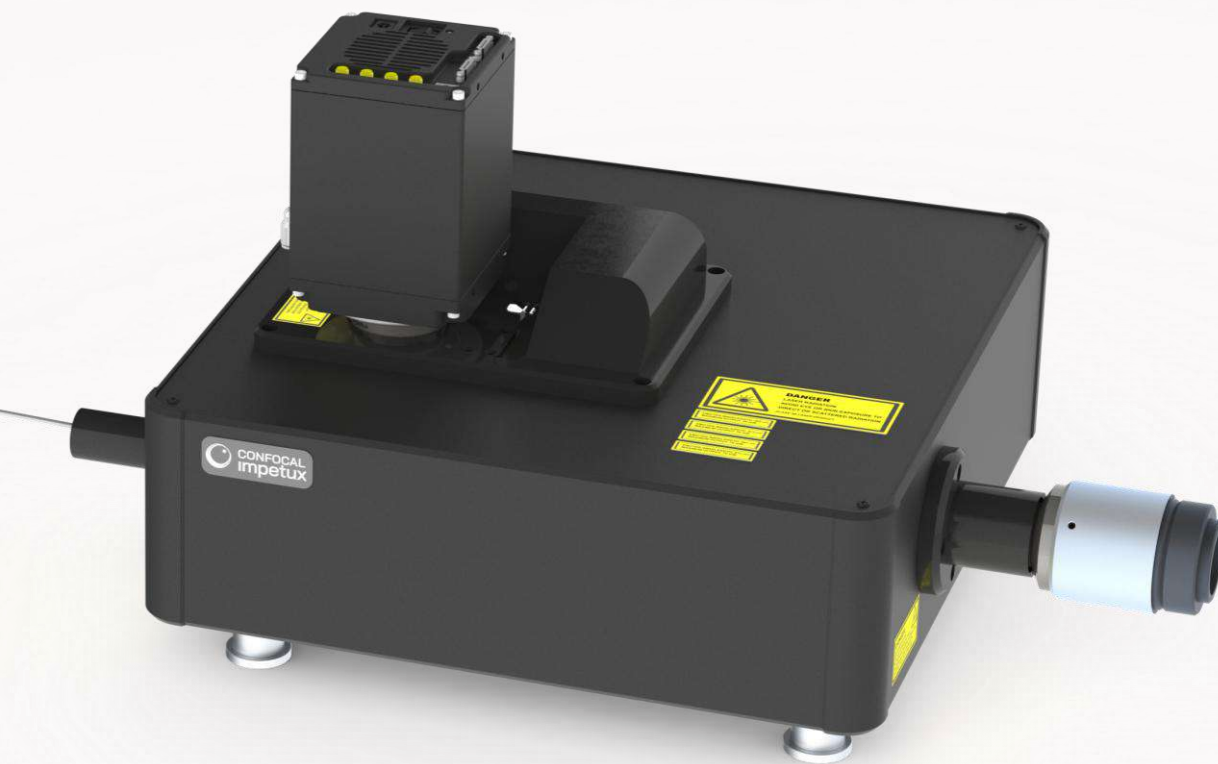
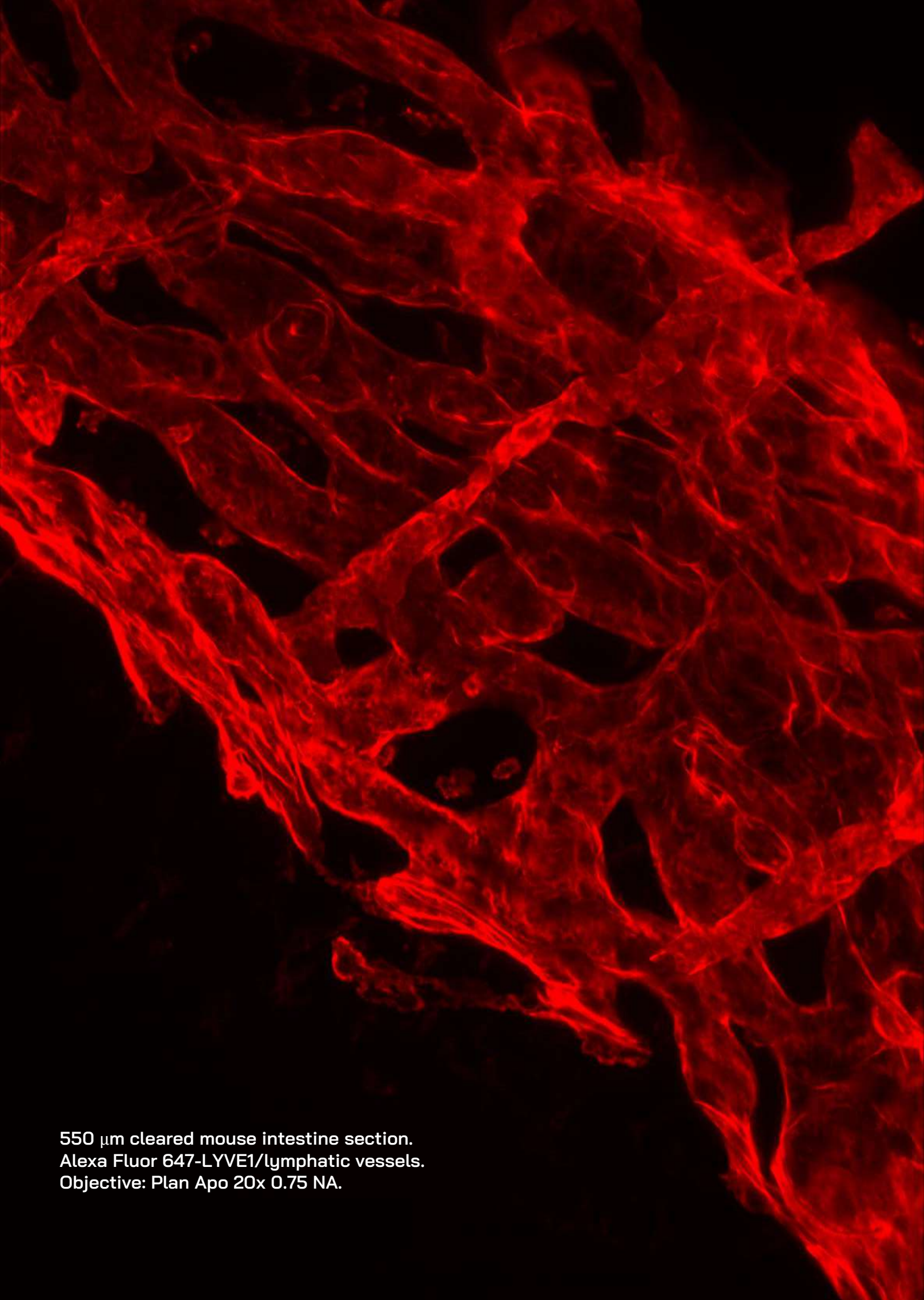


PhaseStreak

Solid-State Line Scanning Confocal



Rethinking Confocal Imaging for
Speed and Flexibility



550 μm cleared mouse intestine section.
Alexa Fluor 647-LYVE1/lymphatic vessels.
Objective: Plan Apo 20x 0.75 NA.

Fast, Deep Confocal Imaging Beyond Mechanical Constraints

PhaseStreak introduces a **solid-state** approach to confocal microscopy, combining fast, deep imaging with direct control over illumination and optical sectioning **without mechanical scanning elements or physical pinholes**.

Flexibility

Confocal – Widefield – Brightfield
Instant mode switch
Adjustable sectioning
ROI illumination

Stability

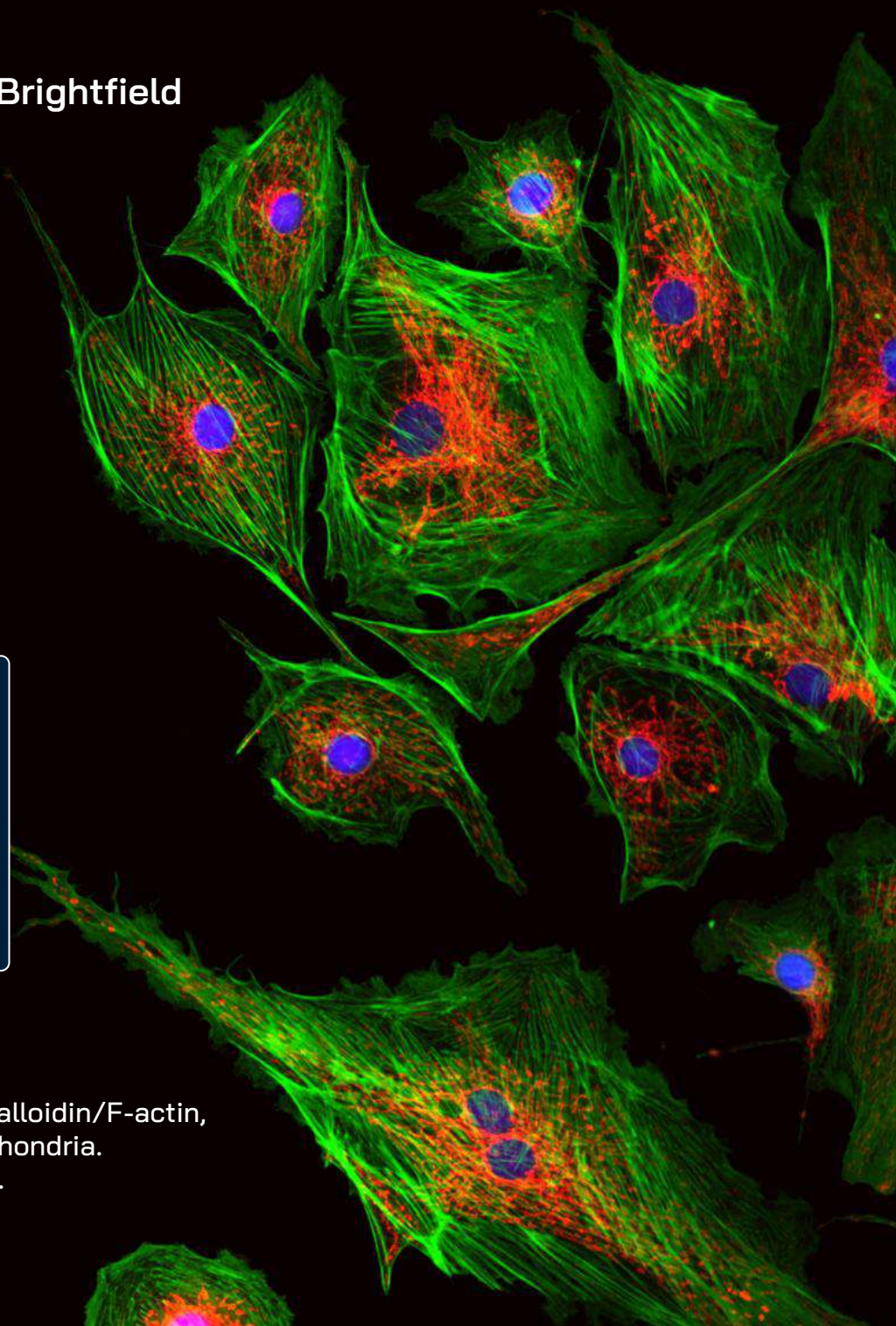
No moving parts
No physical pinholes
Impervious to dust and
optical misalignments

230 fps

23.1 mm FOV

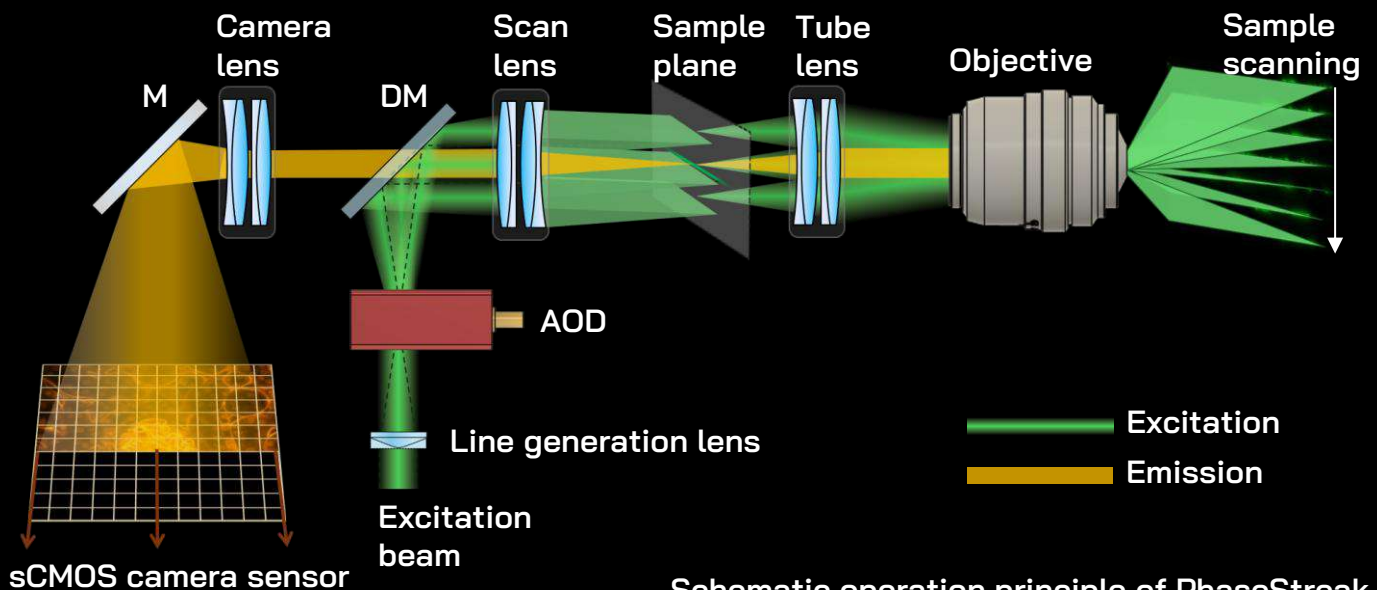
>300 μm deep

Fixed BPAE cells;
DAPI/nuclei, Alexa Fluor 488 phalloidin/F-actin,
MitoTracker Red CMXRos/mitochondria.
Objective: Plan Apo 20x 0.75 NA.

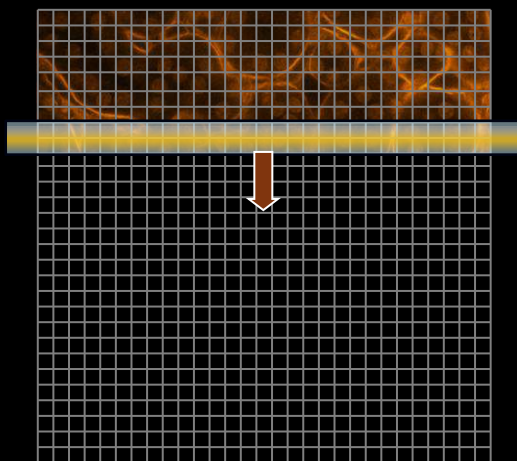


Solid-State Architecture

PhaseStreak scans a focused excitation line across the sample using an **acousto-optic deflector synchronised with the rolling shutter** of a high QE sCMOS camera used as detector.



The active sensor rows form an **electronically adjustable confocal detection slit**, that suppresses out-of-focus fluorescence and enables optimizing the balance between background rejection and signal collection for each sample.



AOD-based scanner

Fast, precise and inertia-free beam control

A single clear emission path

For all modes, with >85% transmittance

Adjustable sectioning

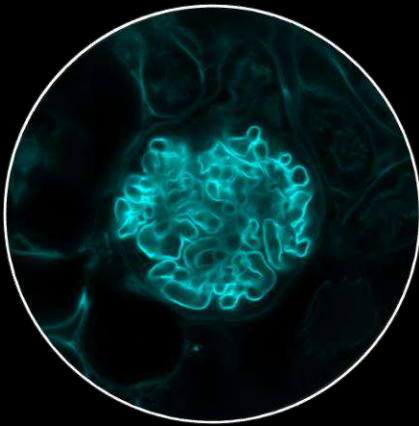
Tuning the rolling shutter width in 1 click

Low maintenance by design. Without mechanical scanners or physical pinholes, PhaseStreak minimizes alignment drift, mechanical wear and avoids pinhole contamination issues.

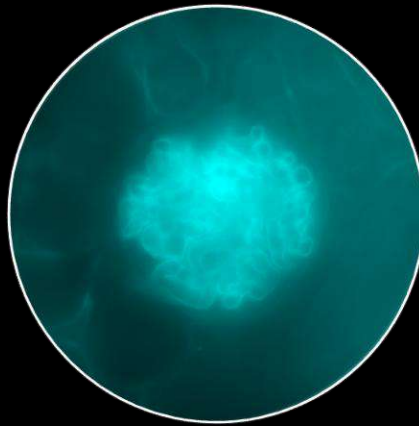
3 Modes. 1 Clear Optical Path

The **programmable** AOD scanning and camera detection schemes enable the **instantaneous switch** between imaging modes and sectioning adjustment with just 1 click.

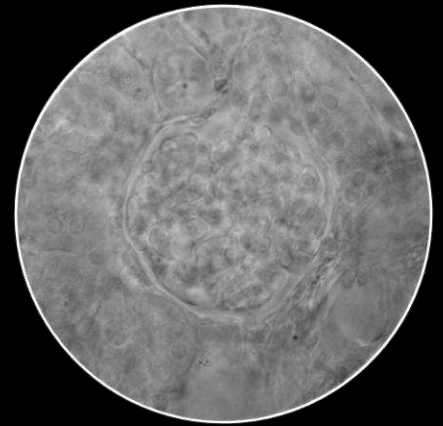
CONFOCAL



WIDEFIELD

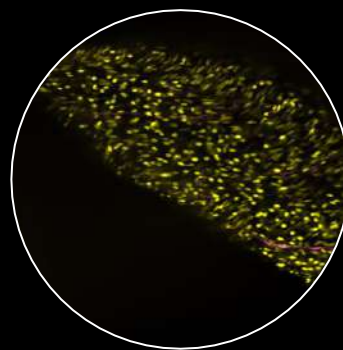
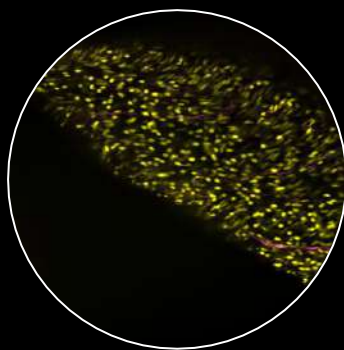
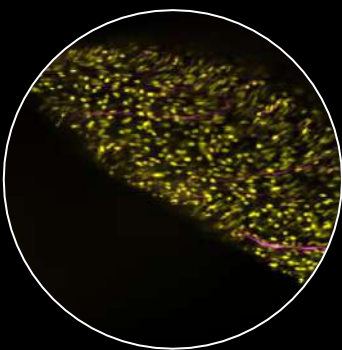
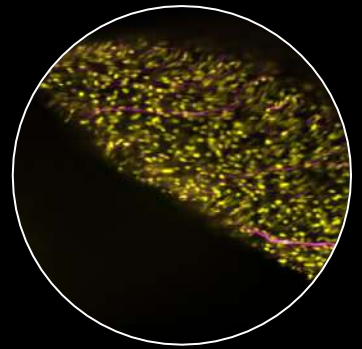
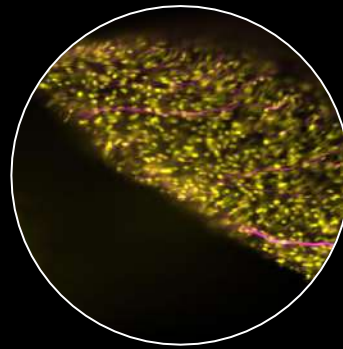
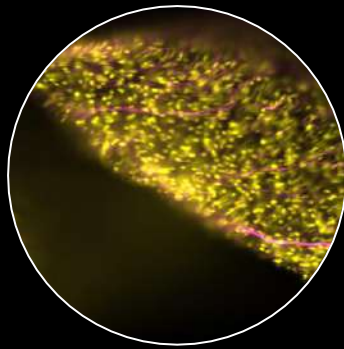
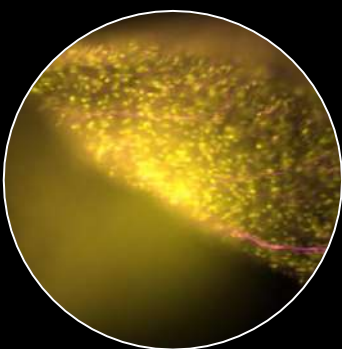


BRIGHTFIELD



550 μm cleared mouse kidney section. Alexa Fluor 488-WGA/blood vessels. Objective: Plan Apo 60x 1.2 NA WI

ADJUSTABLE SECTIONING



1 ms

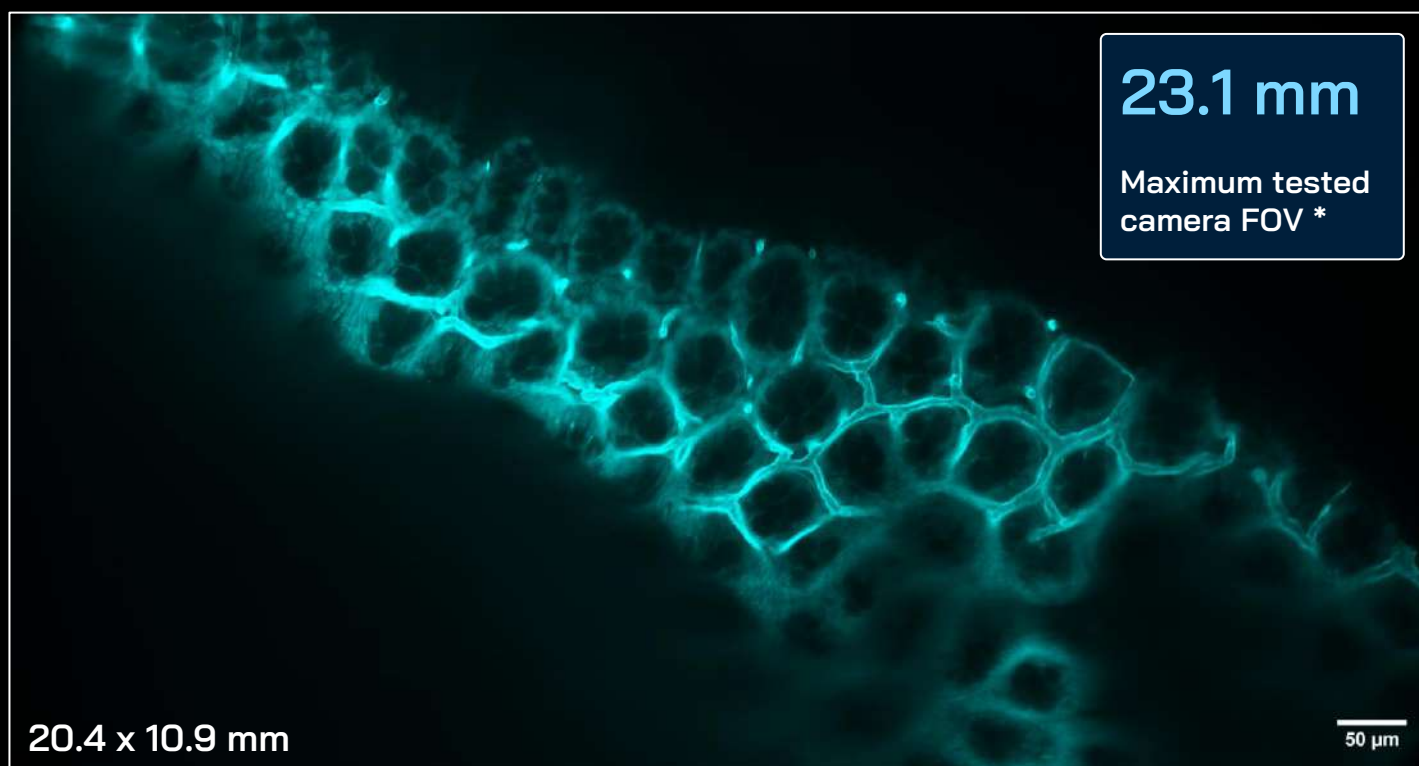
Switch time

550 μm cleared mouse liver section; SYTOX Orange/nuclei, Alexa Fluor 647-TUJ1/nervous system. Objective: Plan Apo 20x 0.75 NA

Clarity over a Large FOV

PhaseStreak's line-scanning approach, combined with highly efficient sCMOS detection, offers an excellent balance of background rejection, signal collection and speed.

PhaseStreak allows **imaging large sample areas** covering most modern sCMOS camera sensors.



550 μm cleared mouse liver section SYTOX Orange/nuclei. 540 x 1.000 μm image.
Objective: Plan Apo 20x 0.75 NA.

230 fps

Imaging acquisition**

99,7 %

Background rejection***

> 300

Signal-to Background ratio

* Demonstrated with a Hamamatsu ORCA-Fire camera over its full 4432 x 2368 pixel sensor area corresponding to 23.1 mm diagonal FOV. On Tucsens Aries 6510 / Teledyne Kinetix, the system can cover up to 20.4 x 13.3 mm FOV, corresponding to 24.4 mm diagonal.

** Camera-limited acquisition: demonstrated confocal imaging at 230 fps using a Tucsens Aries 6506 camera in Speed mode over 2400 x 2048 pixels, corresponding to 20.5 mm FOV.

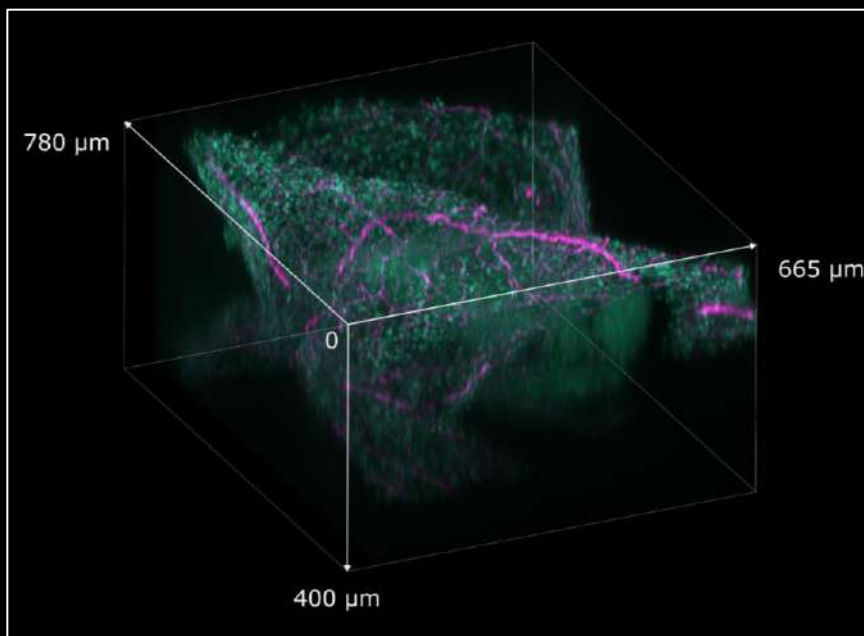
*** Assuming a homogenous spatially distributed background.

See Deeper Preserve Contrast

As imaging depth increases, scattering and out-of-focus fluorescence progressively reduce contrast. PhaseStreak combines **selective confocal detection with efficient signal collection** to preserve image clarity throughout thick samples.

Compared with spinning disk systems, **rejects out-of-focus light more effectively from deep within the sample**, keeping contrast as samples get thicker.

Compared with point scanning, line scanning provides much **higher acquisition speeds**.

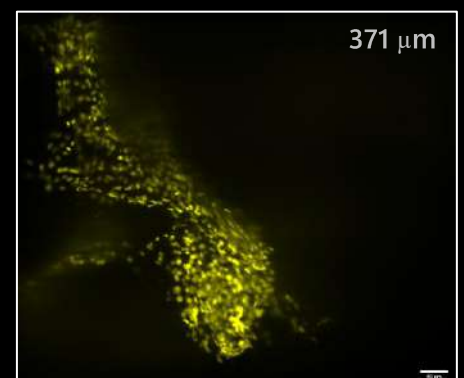
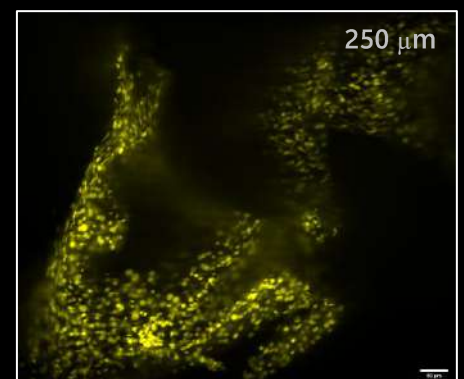
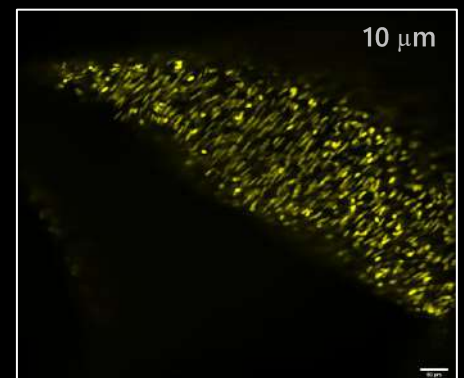


Top: 3D volumetric image of blood vessels and nervous system of a cleared mouse liver tissue down to 400 μm.

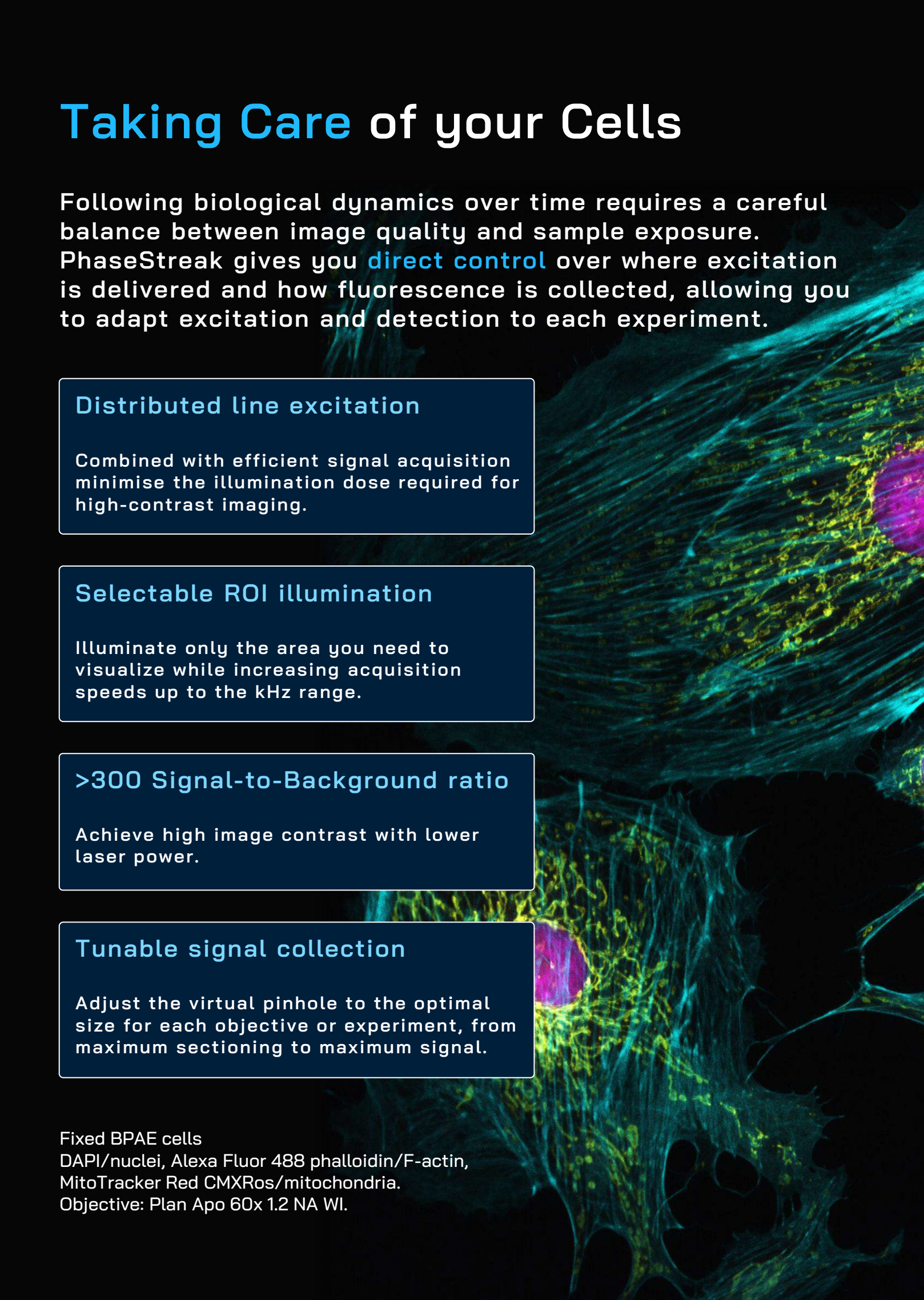
Right top to right bottom: confocal plane images of nuclei taken at different depths of 10 μm, 250 μm and 371 μm. Scale bar is 50 μm.

Sample: 550 μm cleared mouse liver section; Alexa Fluor 488-WGA/blood vessels, SYTOX Orange/nuclei, Alexa Fluor 647-TUJ1/nervous system.

Objective: Plan Apo 20x 0.75 NA.



Taking Care of your Cells

A fluorescence microscopy image of cells. The image shows a network of cells with blue-stained nuclei, green-stained F-actin filaments, and red-stained mitochondria. The cells are spread out, with some showing more prominent structures than others.

Following biological dynamics over time requires a careful balance between image quality and sample exposure. PhaseStreak gives you **direct control** over where excitation is delivered and how fluorescence is collected, allowing you to adapt excitation and detection to each experiment.

Distributed line excitation

Combined with efficient signal acquisition minimise the illumination dose required for high-contrast imaging.

Selectable ROI illumination

Illuminate only the area you need to visualize while increasing acquisition speeds up to the kHz range.

>300 Signal-to-Background ratio

Achieve high image contrast with lower laser power.

Tunable signal collection

Adjust the virtual pinhole to the optimal size for each objective or experiment, from maximum sectioning to maximum signal.

Fixed BPAE cells
DAPI/nuclei, Alexa Fluor 488 phalloidin/F-actin,
MitoTracker Red CMXRos/mitochondria.
Objective: Plan Apo 60x 1.2 NA WL.

SharpEye Software

A **user friendly and self-contained** interface offering automated acquisition workflows combining streamlined operation with the flexibility of the μ -Manager ecosystem.

Instant mode switching

Switch between confocal, widefield and brightfield imaging in one click.

Electronic sectioning control

Adjust the confocal detection aperture and tune signal collection directly from the interface.

Multicolor acquisition

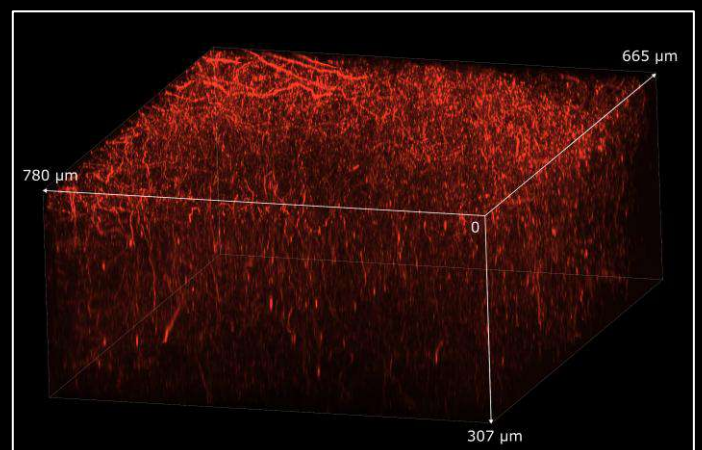
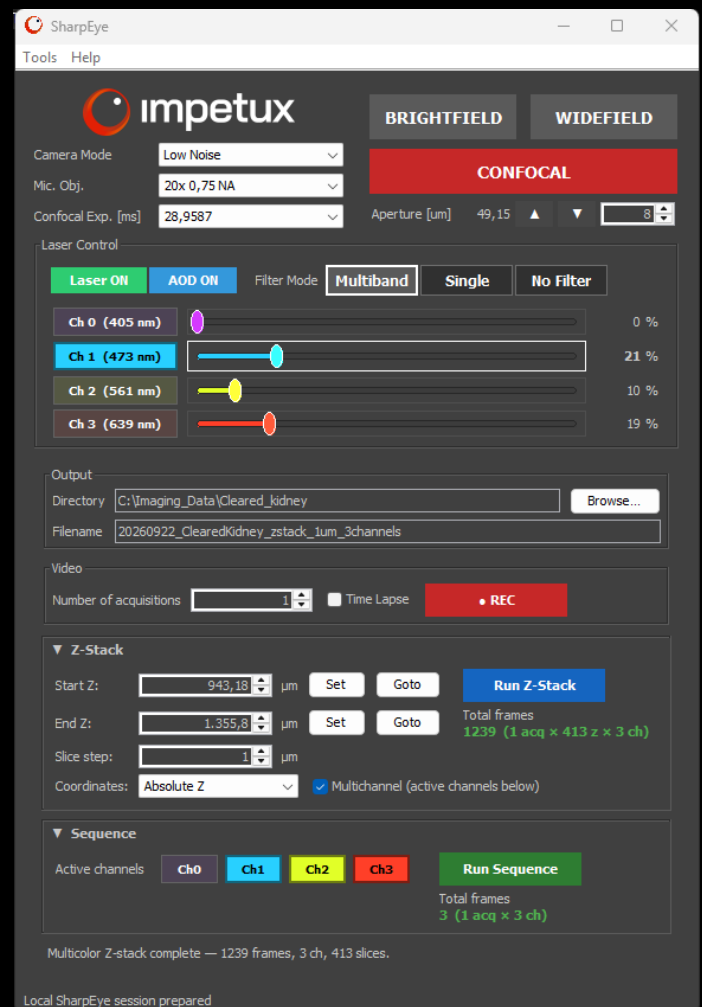
Configure sequential multichannel acquisition controlling the power of the 4 laser lines independently.

Automated workflows

Configure and run multichannel Z-stacks, time-lapse recordings and acquisition sequences.

Fiji/Image J environment

Compatible with established library of Fiji/ImageJ visualisation and analysis workflows.



3D Z-stack visualization of cleared brain tissue with SharpEye.

System Integration

PhaseStreak integrates via the **camera port of compatible inverted microscopes** and can also be combined with SENSOCCELL+ optical tweezers enabling sample manipulation and correlated force and fluorescence measurements.

Add Confocal imaging to your existing microscope

Upgrade your current microscope station with PhaseStreak and turn it into a Confocal Imaging platform combining speed, high penetration capacity and the flexibility to adapt to multiple sample and user requirements.

Explore Turnkey options for an integrated platform

If you are looking for a ready-to-go setup, get in touch and we will help you building the right configuration adjusted to your experimental and research needs.

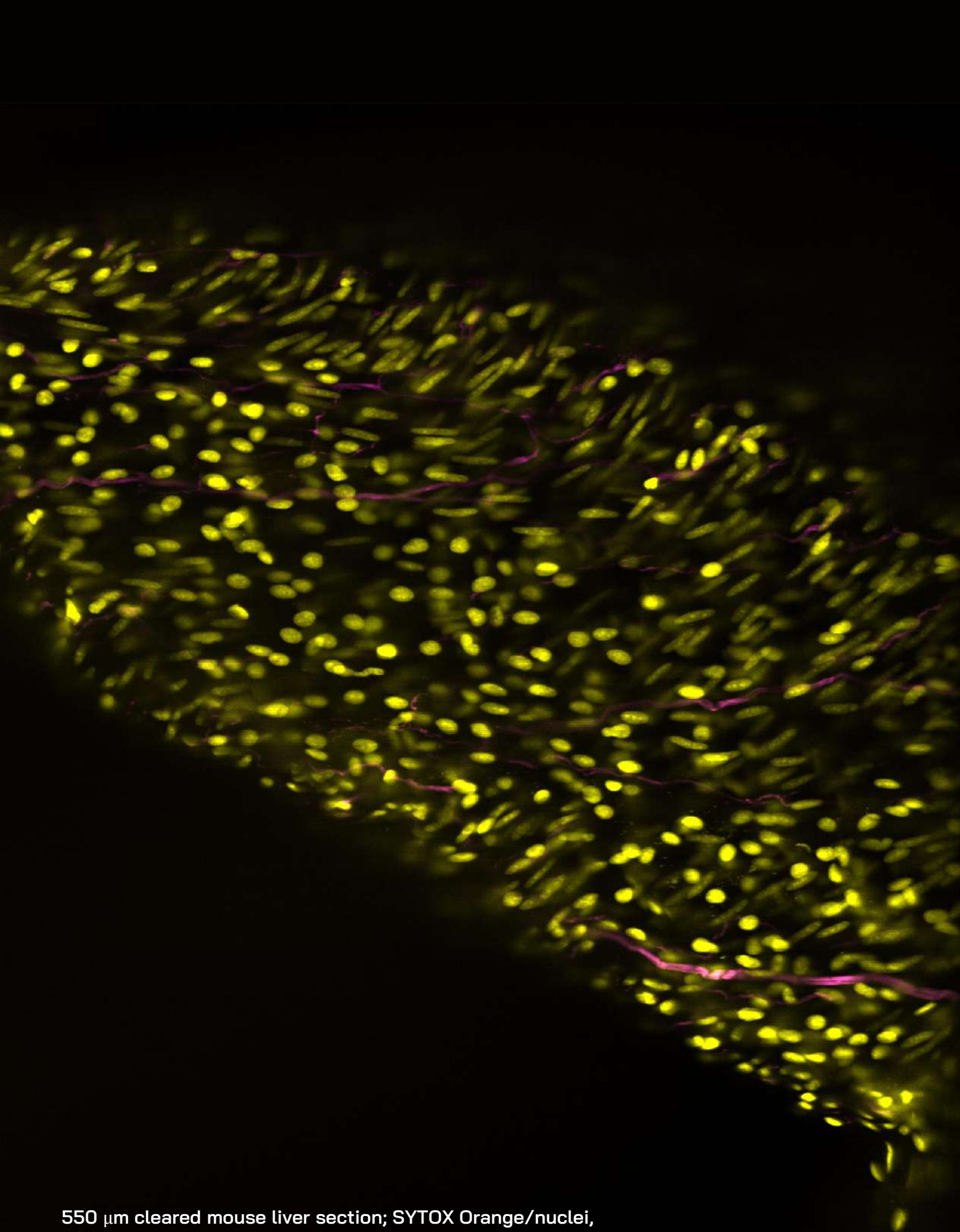
Manipulate. Measure. See biology respond.

SENSOCCELL+ platform for Quantitative Mechanics

Combine PhaseStreak with our SENSOCCELL+ optical tweezers and build your own Quantitative Confocal Microscopy platform enabling sample manipulation capabilities, calibration-free force measurements and fluorescence-correlated quantitative assays from single molecules to cells and living organisms.



PhaseStreak integrated with SENSOCCELL+ optical tweezers on an inverted microscope at the Jan Brugués Lab, TU Dresden, Germany.



550 μm cleared mouse liver section; SYTOX Orange/nuclei,
Alexa Fluor 647-TUJ1/nervous system.
Objective: Plan Apo 20x 0.75 NA.

100 μm

Specifications

Imaging modalities	Confocal, Widefield and Brightfield
Operation principle	AOD-based line-scanning illumination schemes and camera-based detection
FOV	23.1 mm
Speed	Camera-limited. Demonstrated speed up to 230 fps at 20.5 mm FOV
Laser	4 excitation lines: 405/473/561/639 nm
Camera	Camera-based detection (sCMOS with >90% QE)
Filter wheel	Motorized filter wheel (6 positions)
Resolution	Diffraction-limited resolution
Multicolor imaging	Simultaneous color imaging in sequential mode for up to 4 colors
Objectives	From 20x to 100x

Key Features

SharpEye Software: automated acquisition workflows in a single interface built around μ -Manager
Deep imaging at high speed: several hundreds of microns penetration capacity
Fully adjustable sectioning capacity, from confocal to widefield in just 1 click
Cell friendly: distributed line excitation and efficient and adjustable use of light reduce light dose
Illumination ROI selection: excite only what you want to observe
Minimal maintenance: no periodic pinhole cleaning or complex realignment routines required
Solid-state scanner: induces no mechanical inertia, wear or vibration artifacts
No physical pinholes: eliminates complex alignment routines and pinhole-contamination issues
Add-on for inverted microscopes or turnkey configuration
Seamless integration with SENSOCCELL+ optical tweezers



Visible laser radiation. Avoid eye or skin exposure to direct or scattered radiation. Intended for use by trained users in research laboratory environments. Read the corresponding manual before using the equipment.



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impetux@impetux.com



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