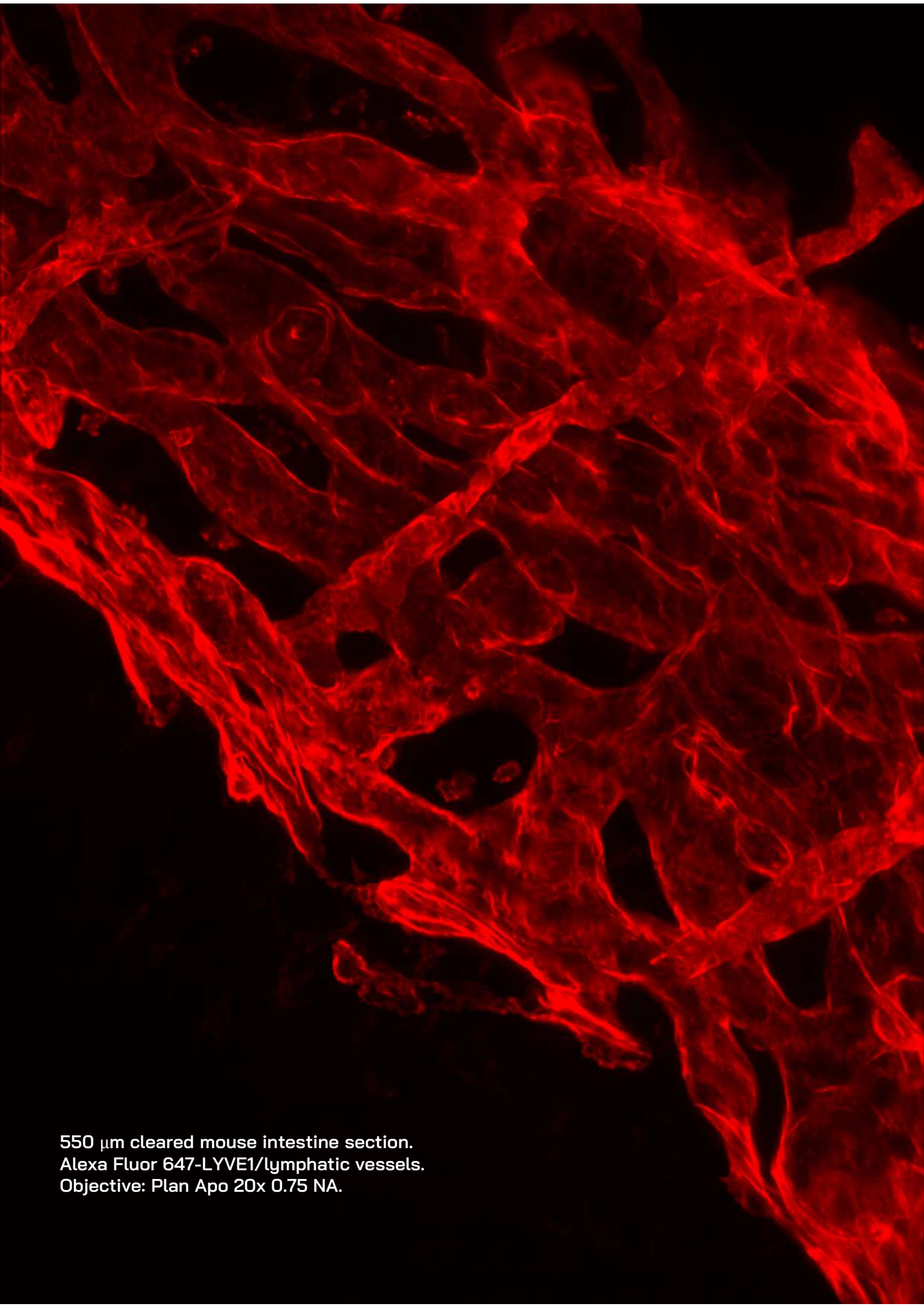
impetux
The Force of Light

# 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.

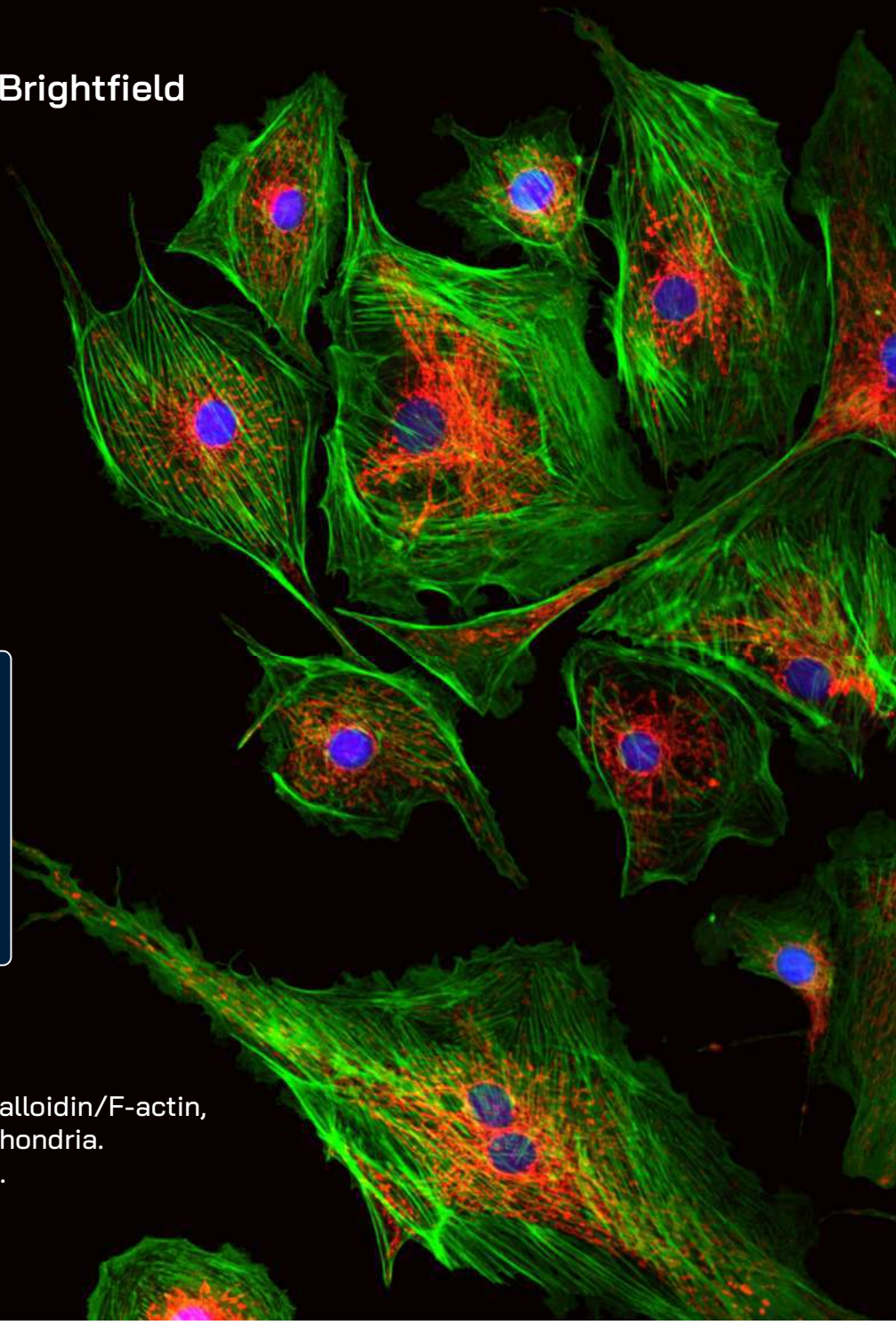
### Flexibility
Confocal – Widefield – Brightfield
Instant mode switch
Adjustable sectioning
ROI illumination

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

**230 fps**

**23.1 mm FOV**

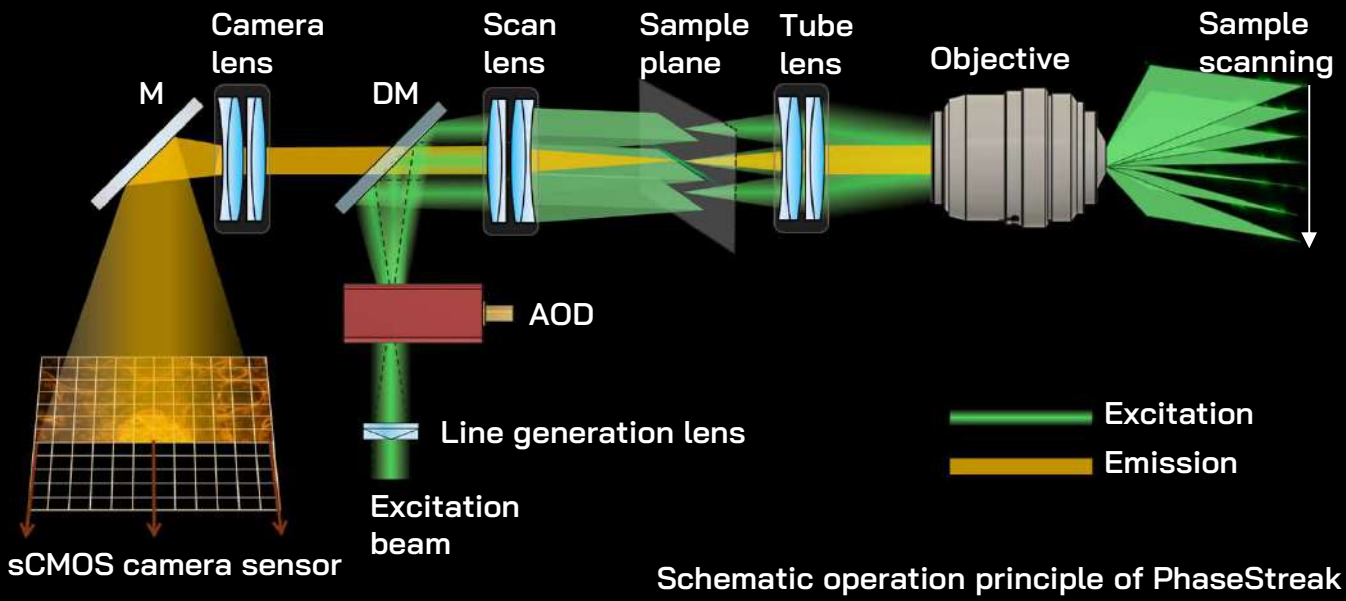
**>300 μm deep**



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

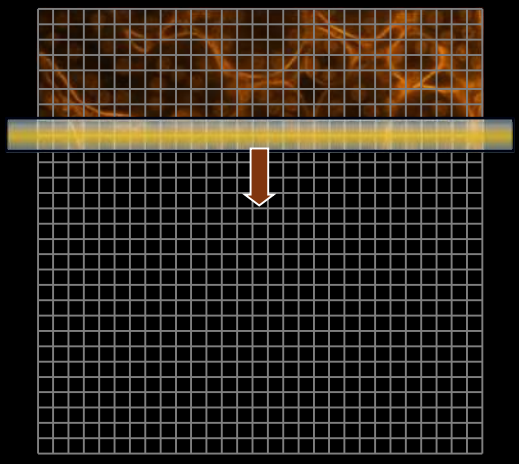
# Solid-State Architecture

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.




Schematic operation principle of PhaseStreak

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

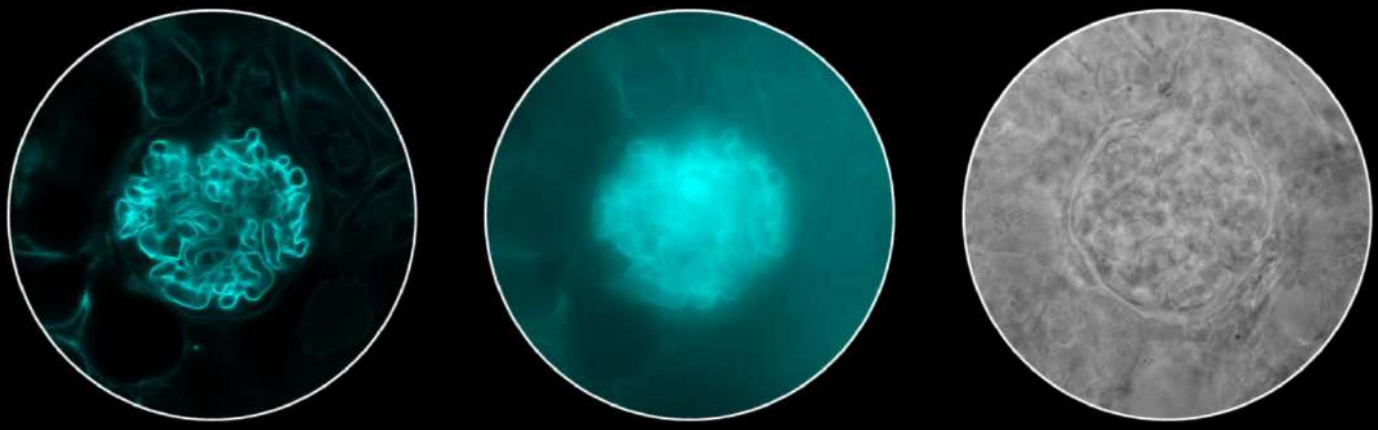
**Adjustable sectioning**
Tuning the rolling shutter width in 1 click

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

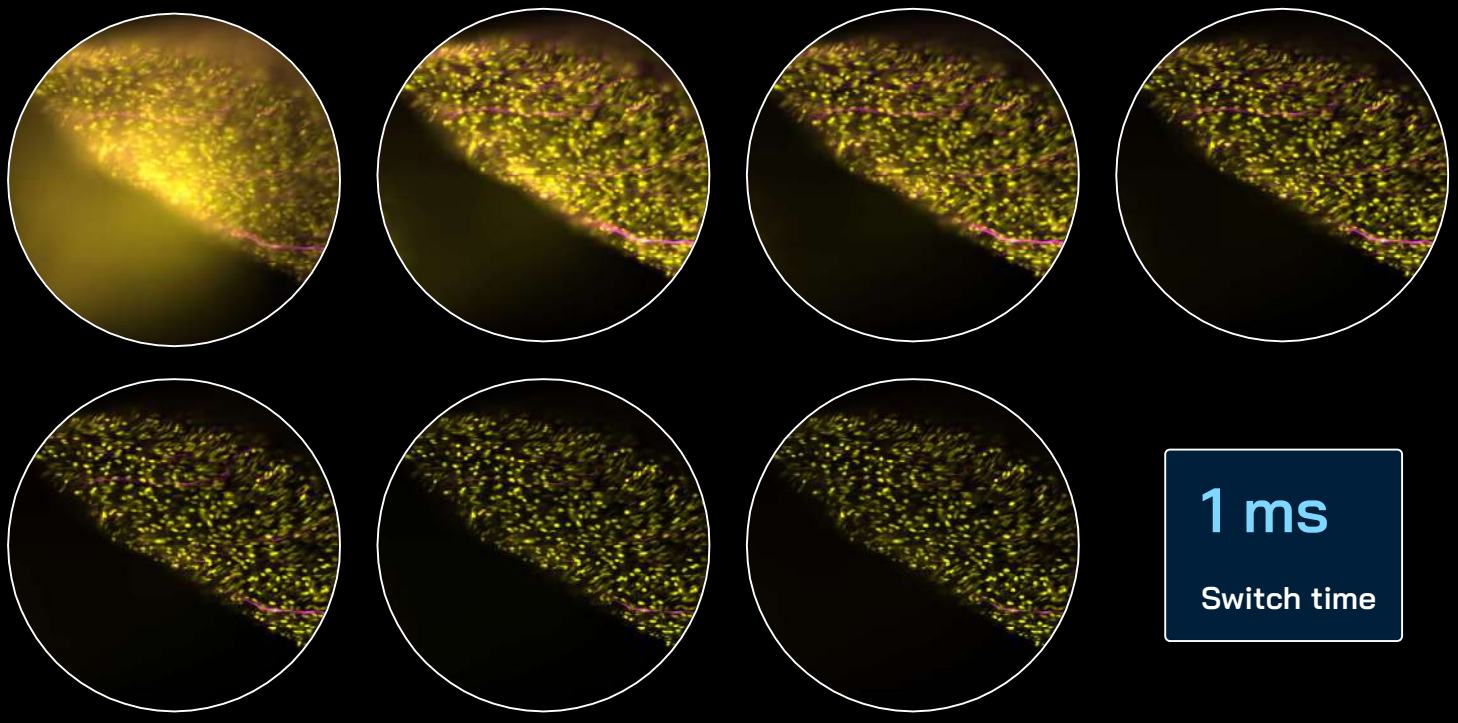
The programmable AOD scanning and camera detection schemes enable the instantaneous switch between imaging modes and sectioning adjustment with just 1 click.

CONFOCAL | WIDEFIELD | BRIGHTFIELD



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

## ADJUSTABLE SECTIONNG



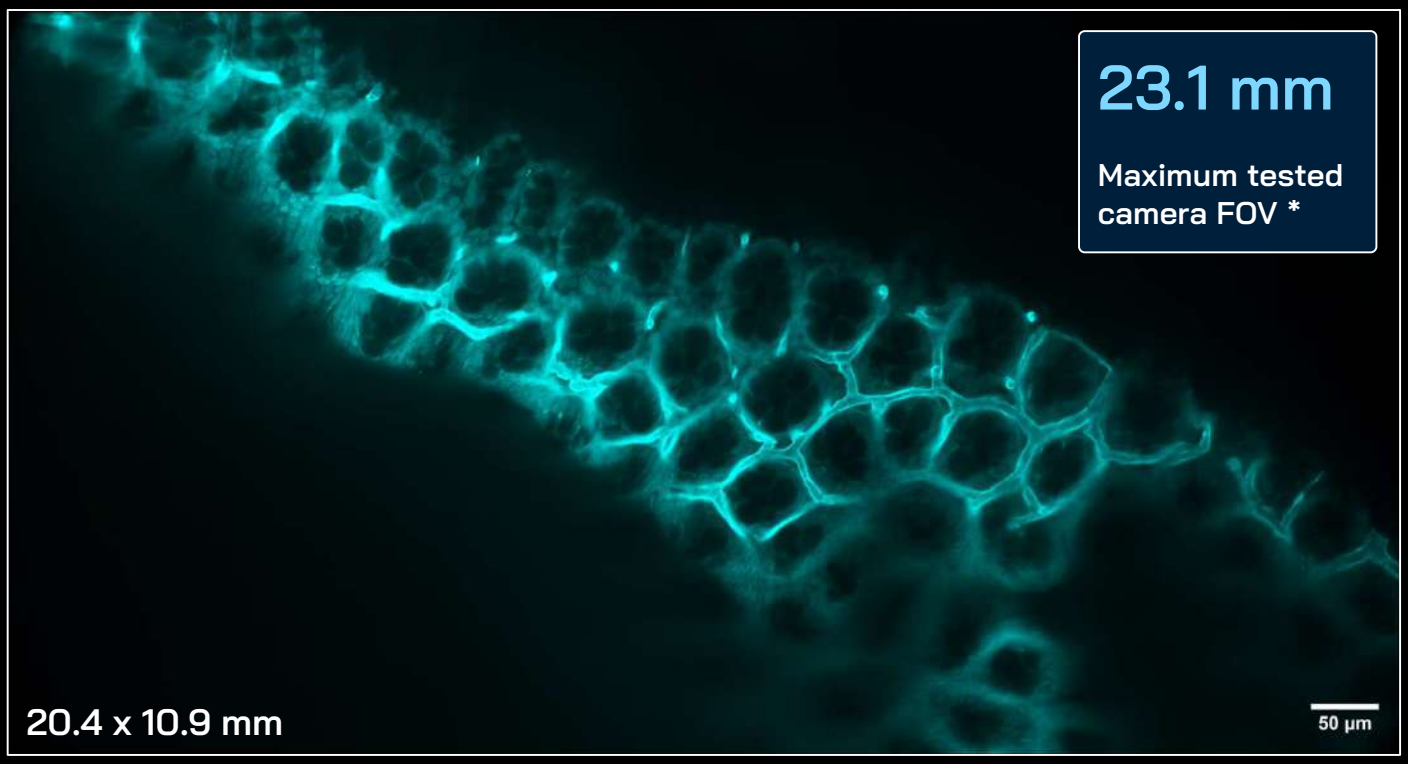
**1 ms**
Switch time

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 × 2368 pixel sensor area corresponding to 23.1 mm diagonal FOV. On Tucsen 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 Tucsen Aries 6506 camera in Speed mode over 2400 × 2048 pixels, corresponding to 20.5 mm FOV.

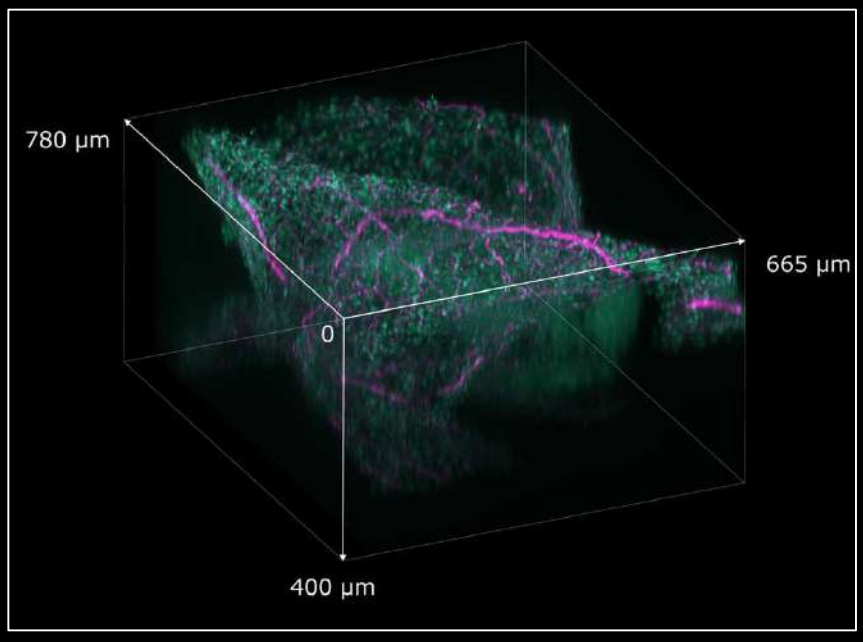
*** Assuming a homogenous spatially distributed background.

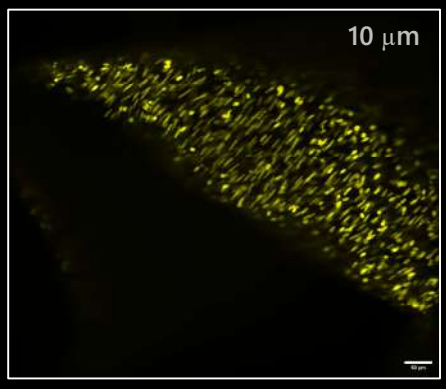
# See Deeper
# Preserve Contrast

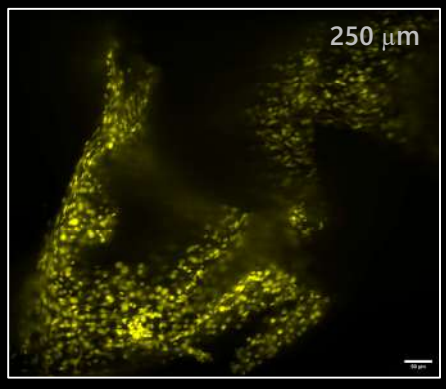
As imaging depth increases, scattering and out-of-focus fluorescence progressively reduce contrast. PhaseStreak combines selective confocal detection with efficient signal collection to preserve image clarity throughout thick samples.

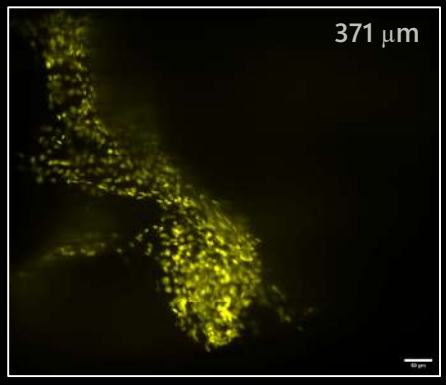
Compared with spinning disk systems, rejects out-of-focus light more effectively from deep within the sample, keeping contrast as samples get thicker.

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

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

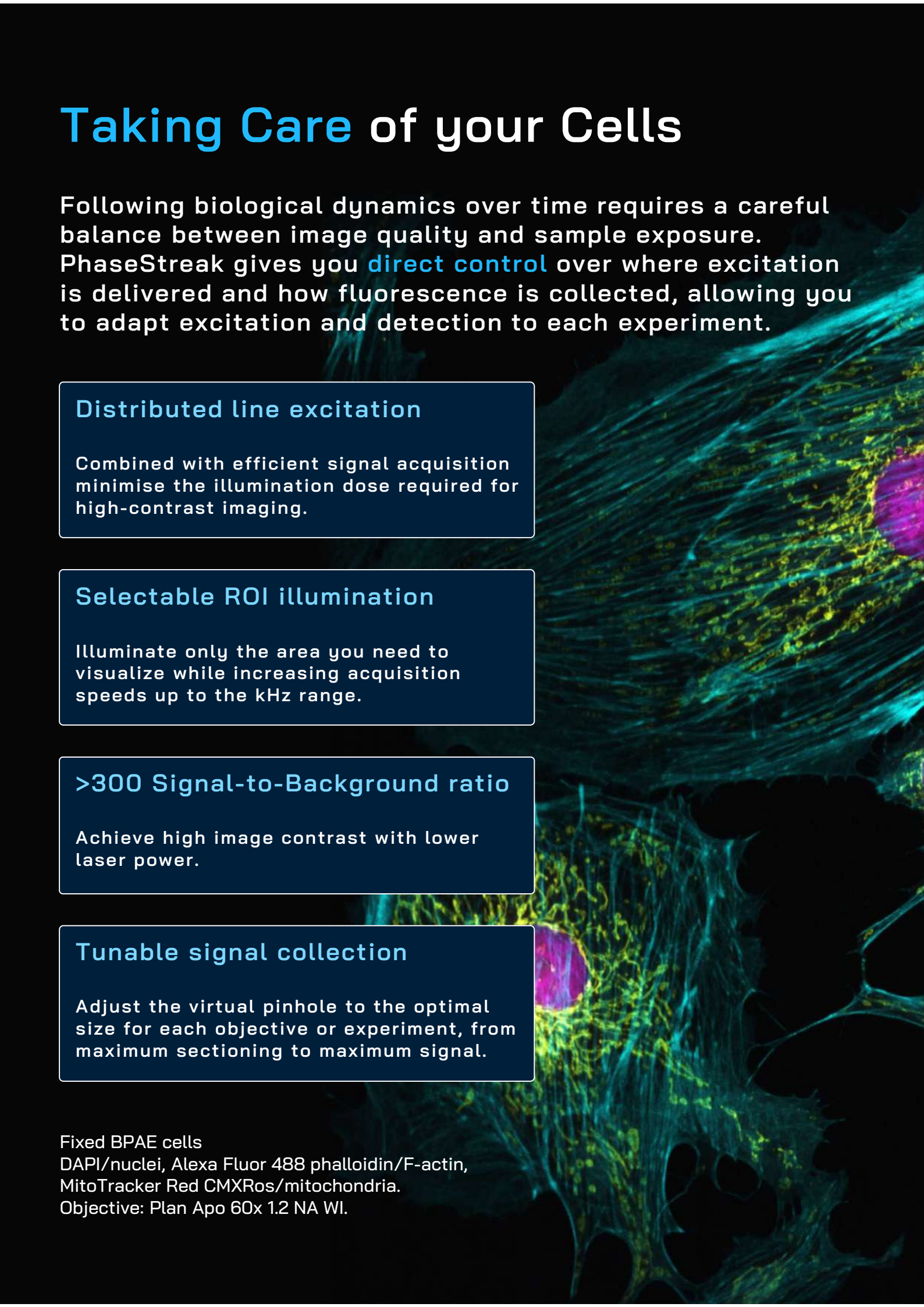
Illuminate only the area you need to visualize while increasing acquisition speeds up to the kHz range.

## >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 WI.

# 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

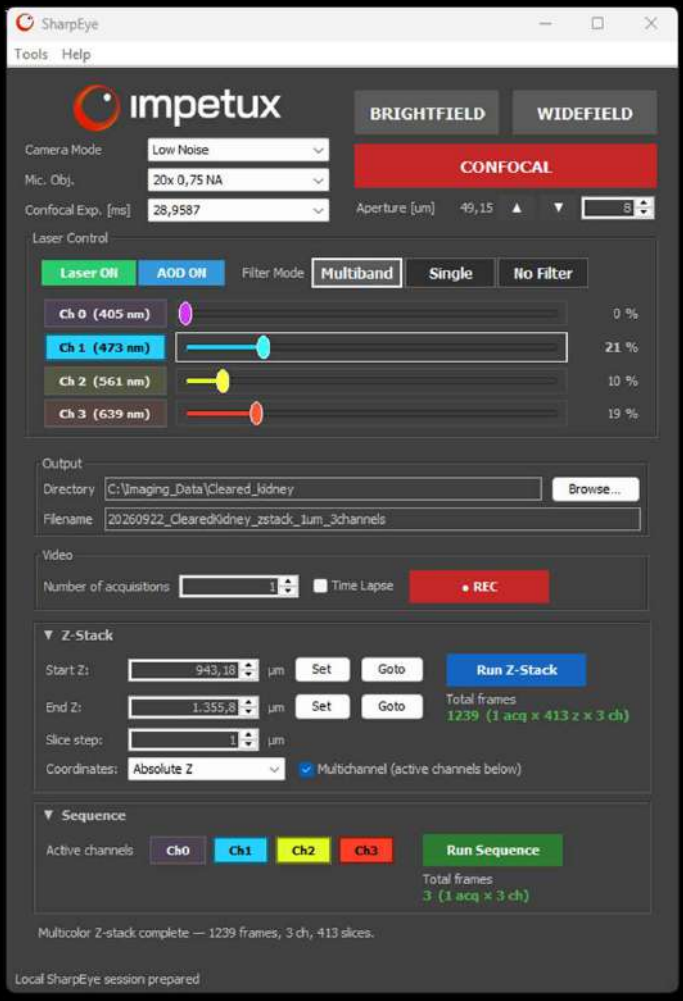
Configure sequential multichannel acquisition controlling the power of the 4 laser lines independently.

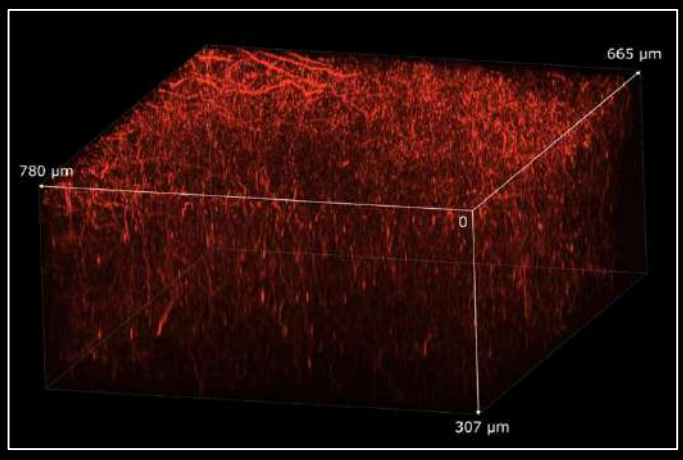
## Automated workflows

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 SENSOCELL+ 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.

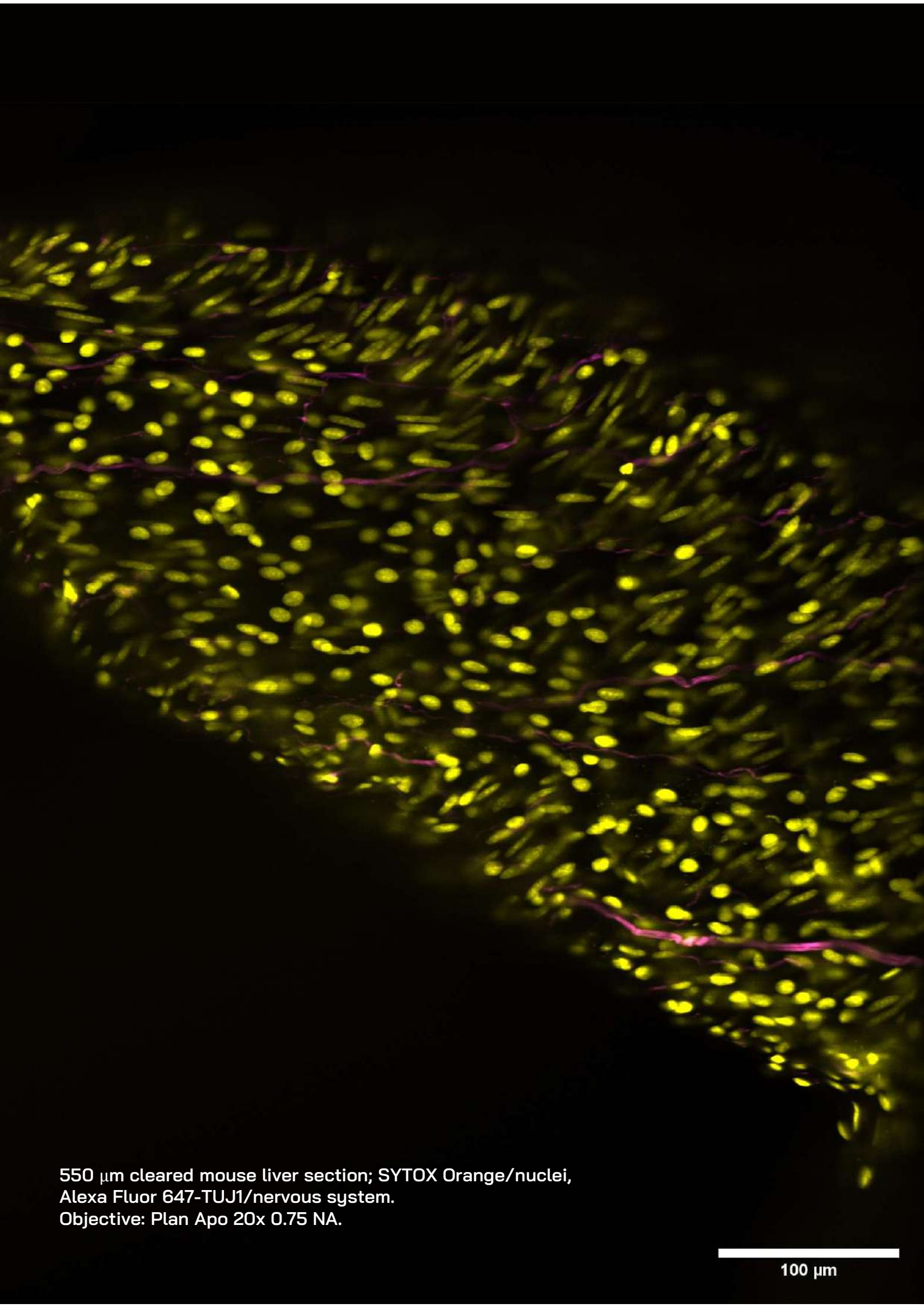
# Manipulate. Measure.
# See biology respond.

### SENSOCELL+ platform for Quantitative Mechanics

Combine PhaseStreak with our SENSOCELL+ 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 SENSOCELL+ 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.

# 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 SENSOCELL+ 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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The Force of Light

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With the support of:

Plan de Recuperación, Transformación y Resiliencia

Funded by the European Union NextGenerationEU

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