

SmartSPIM: Customizable light sheet imaging system optimized for rapid volumetric acquisition of intact samples.

With sample-wide **uniform axial resolution**, **tunable imaging parameters**, and a **custom-designed imaging chamber**, our SmartSPIM light sheet microscope provides the accuracy, speed, and flexibility you need to generate the highest quality data.

SmartSPIM leverages patented **axial sweeping technology** (*Biophys J.* 2015) to provide **homogeneous axial point spread functions (PSFz) across the entire field of view (FOV)**.



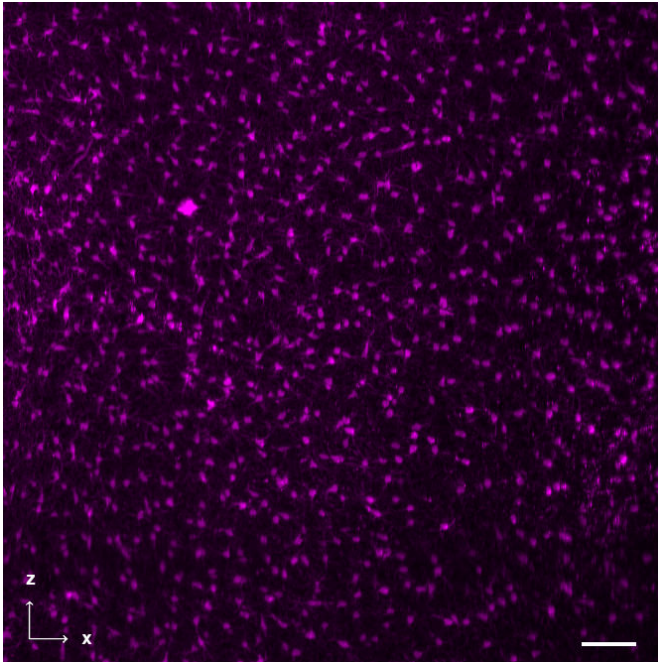
SPECIFICATIONS

Light Sheet Formation	Dynamic axial sweeping (<i>Dean et al. 2015</i>)
Specimen Lateral Size	2.5 cm x 2.5 cm (standard) 4 cm x 7.5 cm (extended)
Illumination Optics	Custom designed objectives, NA = 0.15, broadband chromatically corrected
Detection Optics	180 mm EFL tube lens Objectives: 1.63X, 3.6X, 15X, 22X
Field of View (FOV)	3.6X: 3650 μm 15X: 850 μm
Lateral Sampling	3.6X: 1.8 $\mu\text{m}/\text{pixel}$ 15X: 0.42 $\mu\text{m}/\text{pixel}$
Axial Resolution	3.6X : NA = 0.2, PSFz = 3.2-4.0 μm 15X : NA = 0.4, PSFz = 1.4-2.2 μm
Camera	2048 x 2048 sCMOS with rolling shutter synchronized to swept lightsheet
Imaging Rate	20 FPS during volumetric acquisition
Laser Lines	Up to 6, 405 - 785 nm

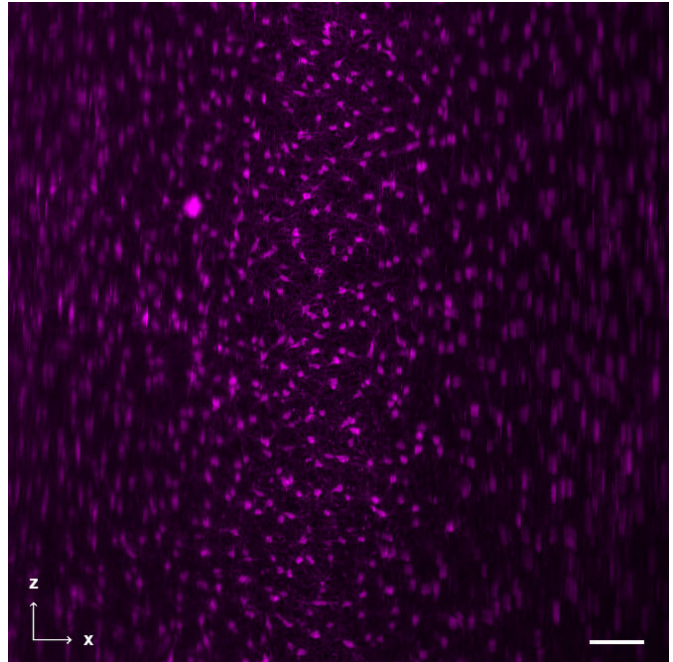
FEATURES & HIGHLIGHTS

- **Fast volumetric imaging:** At 20 fps and 1.8 μm x 1.8 μm x 4 μm voxel size, you can image a mouse brain hemisphere or comparably sized sample in **<30 minutes**.
- **Uniform axial resolution across sample:** Using a patented **axial sweeping** method, illumination optics scan the beam while synchronized to the camera's rolling shutter detection.
- **Optimal focus & illumination:** Compensates for refractive index mismatches and chromatic focal shifts. Features **custom Zemax illumination optics** for achromatic performance across FOV.
- **Compatible with a variety of samples:** Custom-designed imaging chamber can accommodate tissues from organoids to rat brains, and even entire juvenile mice! Features **dual illumination** for large samples.
- **Intuitive, streamlined user interface:** Acquisition software has real-time tile correction and is simple to operate.

WITH AXIAL SWEEPING:



WITHOUT AXIAL SWEEPING:



Microglia (IBA-1, 647 nm) in cortex of a 7-month-old wild-type C57BL/6 male mouse from Taconic Biosciences, model #B6. 3.6X magnification. Scale bar = 100 μ m.

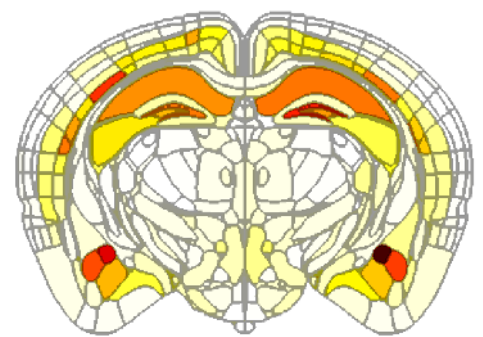
SMARTANALYTICS

SmartAnalytics is a powerful, **SmartSPIM-optimized** workstation built to handle terabyte-sized 3D image datasets. Designed for minimally-experienced users, SmartAnalytics allows you to **accurately align to the Allen Brain Atlas** for **precise cell counts** and **fluorescence localization** measurements.

Generate **publication-ready results** and export outputs such as heat maps and bar graphs directly from the software.

Leverage our **adaptable detection models** for:

- Neural activity via cFOS+ cells
- Neurological disease markers such as astrocytes, microglia, and β -amyloid deposits
- Endogenous fluorescence, common neural biomarkers (NeuN, TH, PV, etc), and more



Cells per mm^3
0 16170

Header image sample courtesy of Prof. Byungkook Lim, UCSD.