# technologies

Illuminating life like never before.

### **SmartSPIM**

### Light sheet imaging for rapid volumetric acquisition of intact samples

Generate high-quality data with SmartSPIM's sample-wide uniform axial resolution, tunable imaging parameters, and custom-designed imaging chamber. SmartSPIM leverages patented axial sweeping technology to provide homogeneous axial point spread functions (PSFz) across the entire field of view (FOV).



β-amyloid deposits (magenta) and astrocytes (cyan) at 3.6X (left) and 15X (right) in 5xFAD mouse brain from Drs. David Elliott and Jonathan Epp, University of Calgary.

#### **FEATURES & HIGHLIGHTS**

- Fast volumetric imaging: Image a mouse brain hemisphere or comparably sized sample in <30 minutes (at 20 fps, 1.8 μm x 1.8 μm x 4 μm voxel size).
- **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 and illumination:** Compensates for refractive index mismatches and chromatic focal shifts. Custom Zemax illumination optics enhance achromatic performance across FOV.
- **Compatible with many samples:** Custom-designed imaging chamber accomodates tissues from organoids to rat brains, to entire juvenile mice, with dual illumination for large samples.
- **Intuitive user interface:** Streamlined acquisition software features real-time tile correction.



#### 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 6.5 cm (extended)
Illumination Optics	Custom designed objectives, NA = 0.125, 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 µm/pixel 15X: 0.42 µm/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

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#### **DIVERSE TISSUE AND SAMPLE TYPES**

Acquire high-resolution images of various intact samples (left to right: organoids, GI tract, spinal cord).



Day 50 dorsal forebrain organoid from STEMCELL Technologies.



Mouse duodenum from Dr. Suhail Chaudhry, Icahn School of Medicine.



Mouse spinal cord from Dr. Helen Lai, UT Southwestern.

#### **UNIFORM AXIAL RESOLUTION**



Generate informative, high-quality data across the entire sample.

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

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