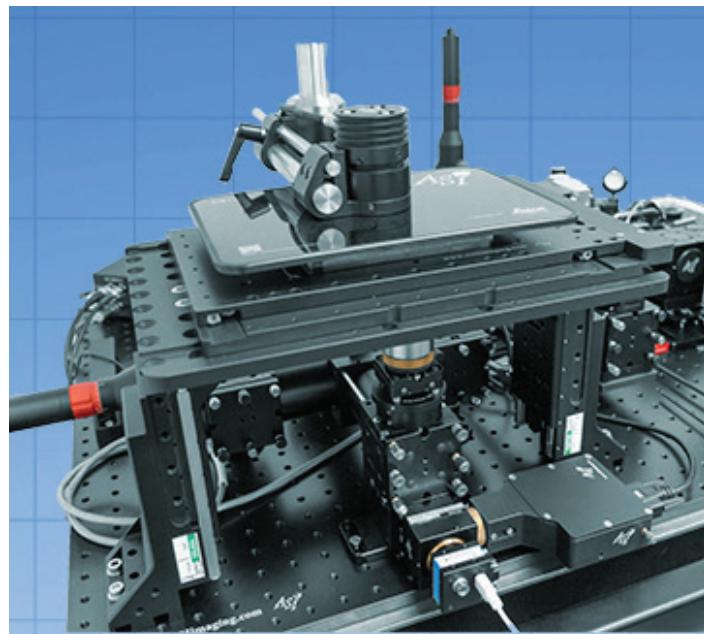
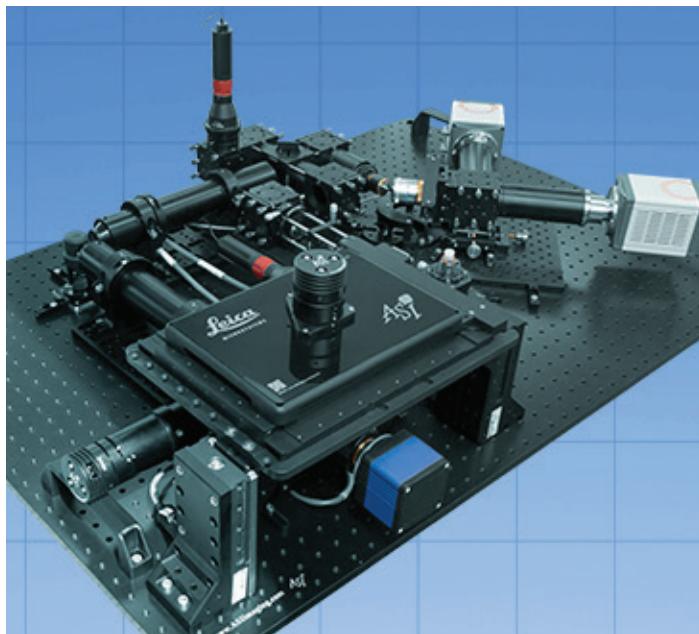




APPLIED SCIENTIFIC  
INSTRUMENTATION

# Single-Objective Light Sheet: Neuroscience Configuration



The single-objective light sheet geometry – known in the literature as OPM, SCAPE, SOPi, eSPIM, and SOLS – enables 4D fluorescence imaging of biological samples at high speed and low light dose with conventional sample mounting. In collaboration with Leica, ASI first made this transformative technology commercially available in December 2022 with a 40x cell biology configuration. Now the product line is expanding to include a 20x neuroscience configuration, well-suited to image organoids, expanded tissue, and small organisms.

Here, the single sample-facing objective is used for both oblique light sheet illumination and fluorescence detection. The illumination light sheet and detection plane can be scanned together at the sample using a **galvo (~1 ms flyback)**, and the stationary descanned image is captured by a camera. This scheme allows **volumetric imaging at camera-limited frame rates** with negligible bleaching and excellent optical sectioning. In addition, **stage scanning and tiling** can be used for light sheet imaging of extended samples or even multi-well plates!

This ASI microscope system is flexible, affordable, and easily customized to fit your needs. It is supported in Micro-Manager and compatible with most all major laser launches containing a single mode fiber output (400-750 nm) and sCMOS cameras.

## Initial NS1 Configuration

**Primary Objective:** Inverted 20x/1.0 W, 1.95 mm WD

**Total Magnification:** 13.3x

**Optic-limited Field of View:** ~850  $\mu$ m x 550  $\mu$ m

**Effective NA (theoretical):** ~0.35 in X, ~0.6 in Y

**Measured Resolution:** ~1.5  $\mu$ m lateral, ~3  $\mu$ m axial

## Planned Future Iterations

### NS2 (Higher Resolution)

anticipated lateral resolution  $\leq$ 0.5  $\mu$ m  
with FOV up to 600  $\mu$ m

### NS3 (Larger Field of View)

anticipated lateral resolution  $\leq$ 2  $\mu$ m  
with FOV up to 1 mm