

# DEEP FUNCTIONAL IMAGING

## FEMTO 3D ATLAS

### HOW TO SEE DEEP STRUCTURES WITH 2P?

#### ► DEEP TISSUE MEASUREMENT

In vivo two-photon microscopy allows examination of deeper tissue layers, **surpassing the surface limitation** of confocal microscopy, without photodamage.

#### ► ENHANCED IMAGING DEPTH

Reducing high numerical aperture (NA) photon scattering with a narrower laser beam improves two-photon excitation efficiency, leading to better imaging quality at greater depths.

#### ► OPTIMIZED LASER FOCUS

A motorized beam expander with a sliding lens mechanism ensures effortless, wavelength-independent **adjustment of the beam diameter** without misalignment.

#### ► ADVANCED IN VIVO DEEP FUNCTIONAL IMAGING (DFI)

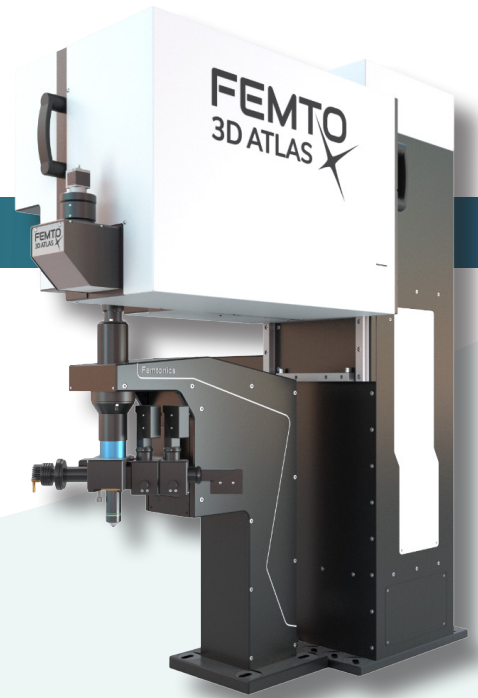
With proper staining and an optimized beam diameter, DFI enables exploration of tissue depths **even at 1 millimeter**, visualizing neural mechanisms in vivo.

#### ► SUPERIOR IMAGING INTENSITY AND QUALITY

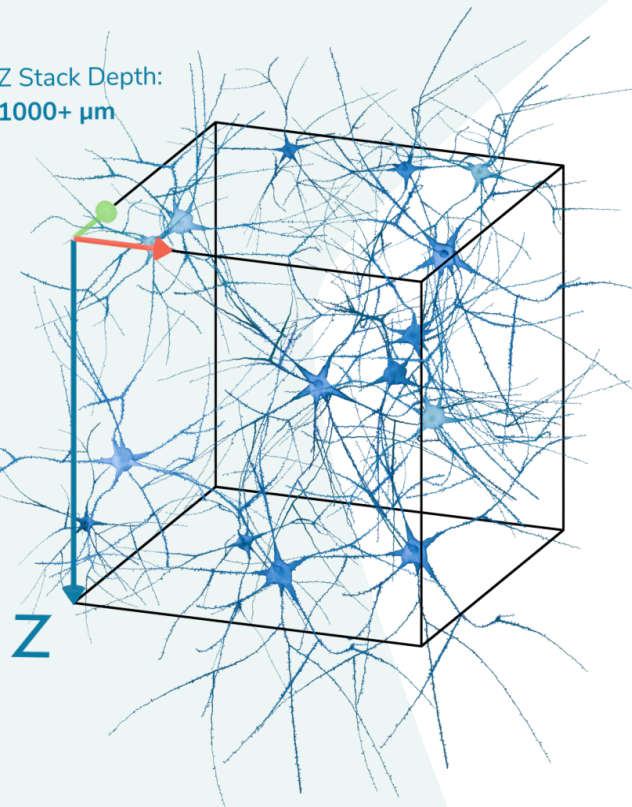
Higher signal-to-noise ratio (SNR) and spatial resolution are achievable with increased intensity **without excessive laser power**, allowing for longer acquisition times and detailed imaging without tissue damage, as demonstrated in hippocampal imaging.

#### ► INCREASED SNR DURING FUNCTIONAL IMAGING

The more intensity we get, the more information we can collect during imaging. With focused beams and **advanced intensity compensation**, the quality of the image can increase significantly.



Z Stack Depth:  
1000+  $\mu\text{m}$



# WHY THE FEMTO3D ATLAS IS THE BEST FOR DEEP IMAGING?

## High quality deep measurements

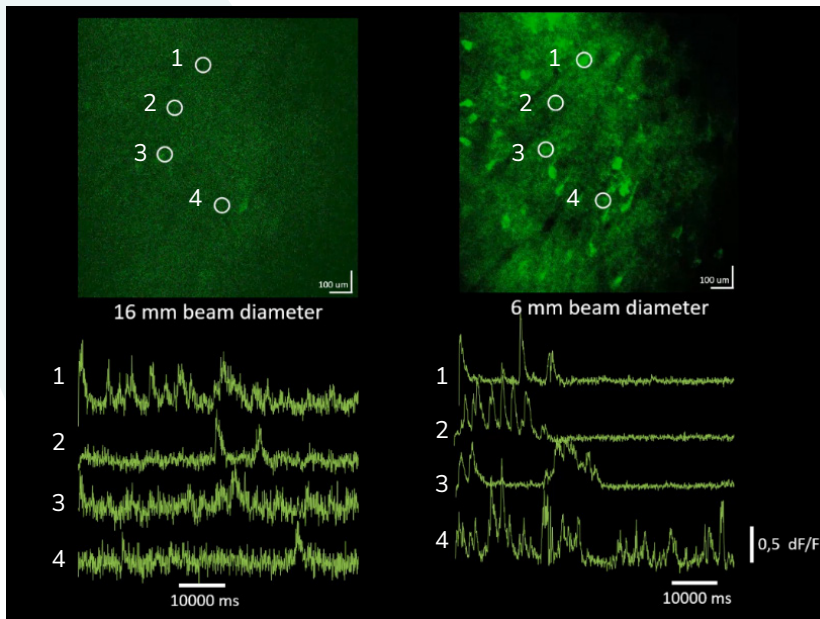
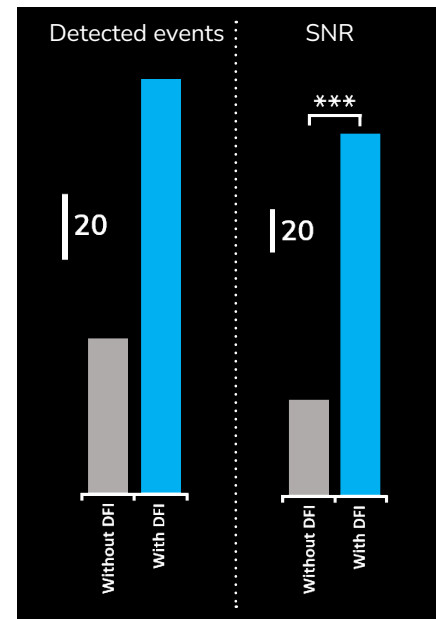


Figure 1: Increased SNR with DFI in the hippocampal CA1 region. Calcium imaging in transgenic GCaMP6 mouse. The measurements were taken under the same conditions, except for the beam diameter.



Number of  
detected  
events

Signal to  
noise ratio

## Full cortical column imaging

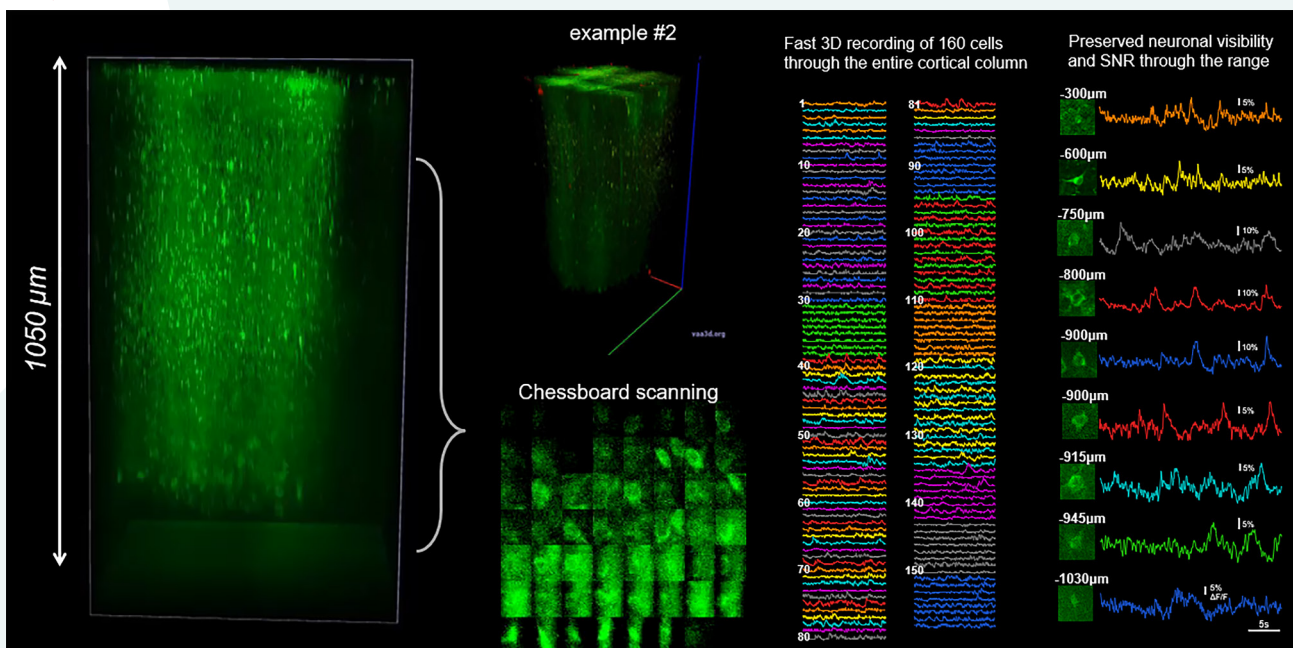


Figure 2: Scan in transgenic GCaMP6 mouse of the entire cortical column (left) and 160 cells with the chessboard technique. The high spatiotemporal resolution is maintained in all depths of the measurement. Some examples from different depths were taken out to show the maintained quality of the signals (right).



Femtonics Ltd. HQ  
www.femtonics.eu  
sales@femtonics.eu



WP-DFI-240618

### Learn more:



**Zoltán Szadai PhD**

HUN-REN, Institute of Experimental Medicine, 3D Functional Network and Dendritic Imaging Research Group, Budapest  
BrainVisionCenter Research Institute and Competence Centre, Budapest



**Dénes Pálfi PhD**

Application Specialist  
Femtonics