# TURNKEY MICROSCOPE SOLUTION

The **FEMTO3D ATLAS PLUG & PLAY** microscope is a turnkey multiphoton solution: following a smooth delivery to the laboratory, it is ready to operate within an hour. The system can be easily moved within and between laboratories, adapting to your ever-changing needs. While compact in size, the microscope is equipped with the latest 3D acousto-optic (AO) technology for ultra-fast in vivo 3D imaging and 3D photostimulation.
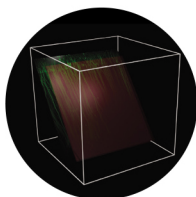
The **FEMTO3D ATLAS PLUG & PLAY** combines high-tech science and engineering in 3D measurements. It performs and goes beyond all that galvo- and resonant scanner based imaging can do and extends all that freely to three dimensions, providing an all-in-one solution in two-photon microscopy.
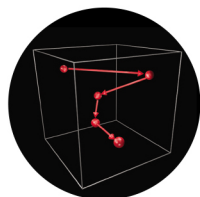
3D random-access ROI scanning with 30 kHz
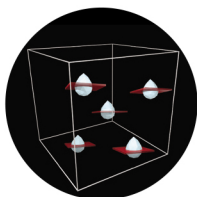
3D chessboard scanning

High-speed arbitrary frame scanning with 40 fps

ROLLS OUT OF THE BOX
Compact and arrives ready to operate

FUNCTIONAL REAL-TIME 3D IMAGING
Calcium imaging, voltage imaging

DEEP PENETRATION
Low phototoxicity, high optical quality

UNIQUE FLEXIBLE IMAGING METHODS
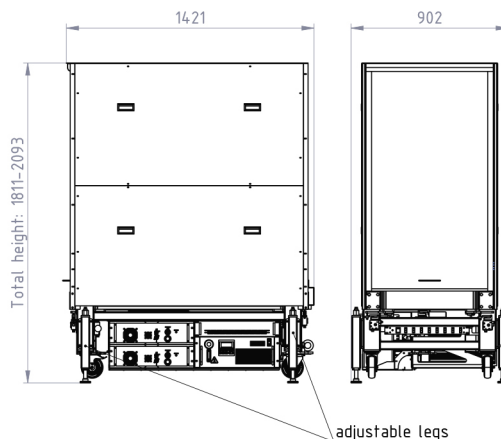Supporting neurobiological applications

NETWORK IMAGING
Of over 2000 soma distributed in 3D

DENDRITIC IMAGING
And spine mapping without interruption

DURING BEHAVIOR
Real-time 3D motion correction

1421

902

Total height: 1811-2093

adjustable legs

In collaboration with **SPARK LASERS**

FEMTO 3D ATLAS
Plug & Play

Ready to operate within one hour	Compact size 1421 x 902 x 1811 mm (L x W x H)

THE TURNKEY SOLUTION

ACOUSTO-OPTIC TWO-PHOTON MICROSCOPE FOR ULTRA-FAST *IN VIVO* 3D IMAGING AND 3D PHOTOSTIMULATION

THINKING AHEAD
FEMTONICS
MICROSCOPY

$$\text{signal} \times \text{speed} = \frac{\text{ROI volume}}{\text{total volume}} > 10^{6\,*}$$

This can result in
- A **thousand times higher SNR**
- A **million times higher scanning speed**

*Compared to raster scanning (see Szalay et al., 2016);

MULTIPLE SCALE IMAGING simultaneously at the smallest and largest scales: image networks, axons, dendrites and spines at the same time!

Compact system

3D region scanning

FEMTO 3D ATLAS
Plug & Play

Real-time motion correction

High-speed arbitrary frame scanning

Voltage imaging

3D photostimulation with imaging

- *In vivo* functional imaging down to over 850 µm depth
- Typically 500 µm × 500 µm × 650 µm scanning volume *in vivo* (with a 20x, NA=1.0 obj.)
  (In case of excellent labelling it can be exteded to 800 µm x 800 µm x 1050 µm while keeping the good central resolution)
- Automatic wavelength tuning between 750 - 1050 nm
- Integrated beam stabilization
- Integrated dispersion compensation unit for maximally effective excitation
- Diffraction limited, submicrometer resolution in the center (<450 nm)
- Scanning speed up to 50 kHz to any points in 3D
- 3D SCANNING MODES:
  random-access point, trajectory, tilted frame, volume, ribbon, snake, chessboard, multi-cube scanning
- Simultaneous 3D imaging with 3D photostimulation
- Real-time 3D Motion Correction to eliminate motion artifacts arising from tissue movements

VOLTAGE IMAGING

The rapidly evolving voltage sensor technology determines the next decade of bio-imaging: they have faster kinetics than calcium sensors and can provide superior temporal resolution, capable of detecting spikes at frequencies greater than 100 Hz. Combined with the high sampling rate of the Atlas Plug & Play (up to 30kHz), they are suited for detecting ultrafast transients, such as action potentials (APs). The AO technology also surmounts mechanical distortion and jumping delay between ROIs, spending recording time only at structures of interest. The Atlas Plug & Play powerd by the AO technology, with real-time motion correction, is currently the only imaging device which can keep up with the speed of firing neurons.

Ca²⁺ sensor

10% ΔF/F

Voltage sensor

10% ΔF/F

Electrophysiology

100 ms

5x action potentials (AP)
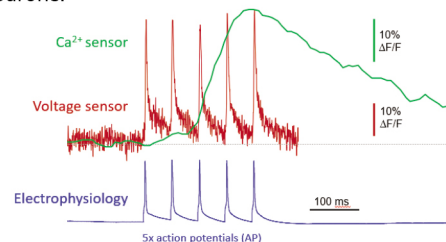
REAL-TIME 3D MOTION CORRECTION

Drawing reliable conclusions from data collected from behaving animals can be challenging, as artifacts arising from tissue movements can be difficult to discern from real activity signals. The **Femtonics FocusPinner** real-time 3D motion correction feature has been developed to eliminate motion artifacts during data acquisition not just along the axes of the imaged plane but also along the optical axis. By combining it with the scanning modes of the Atlas Plug & Play, neuronal activity data can be aquired without motion artifacts while the animal is performing tasks in virtual reality. **FocusPinner** will allow you to profit from unprecedented signal-to-noise ratio and save time by avoiding post-hoc processing.

t_1 t_1
t_2 t_2
t_3 t_3