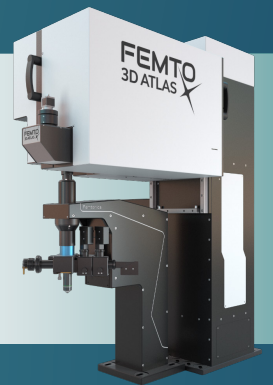


VOLTAGE IMAGING ON A 2P ACOUSTO-OPTIC (AO) SYSTEM

FEMTO 3D ATLAS



WHY MEASURE VOLTAGE ON THE FEMTO3D ATLAS?

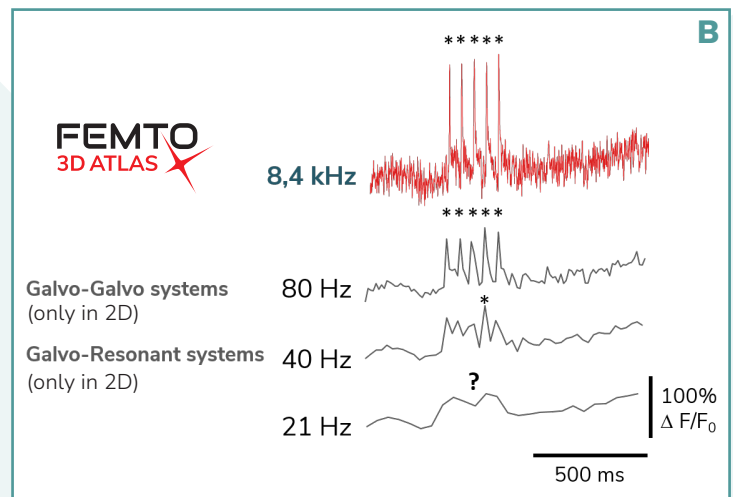
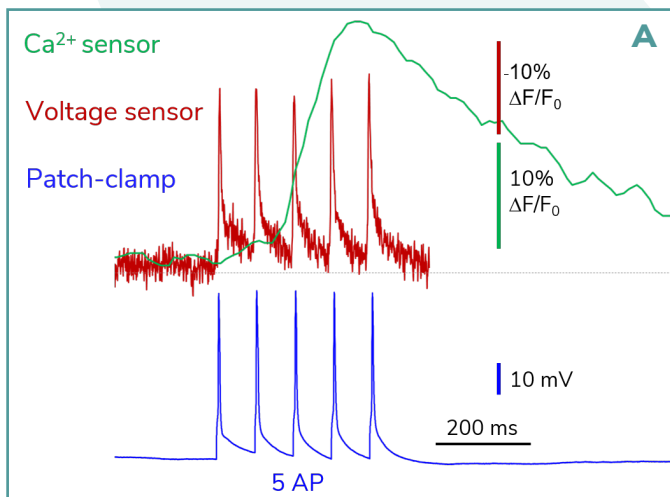


Figure 1: Visualizing the speed of the signal and the proof of necessity for acousto optical scanning technology. A) Green: Ca²⁺ from a PV interneuron sampled at 30 Hz Red: JEDI2p sampled at 8.4 kHz. Blue: Patch clamp electrophysiological recording of 5 evoked action potentials sampled at 20 kHz. B) Same measurement down-sampled to 80, 40 and 21 Hz.

- ✓ Easy validation procedures with in vitro electrophysiology
- ✓ No aliasing
- ✓ Novel results with the new voltage indicators JEDI2P, ASAP etc.

WHY 3D NETWORK VOLTAGE IMAGING WITH THE FEMTO3D ATLAS?

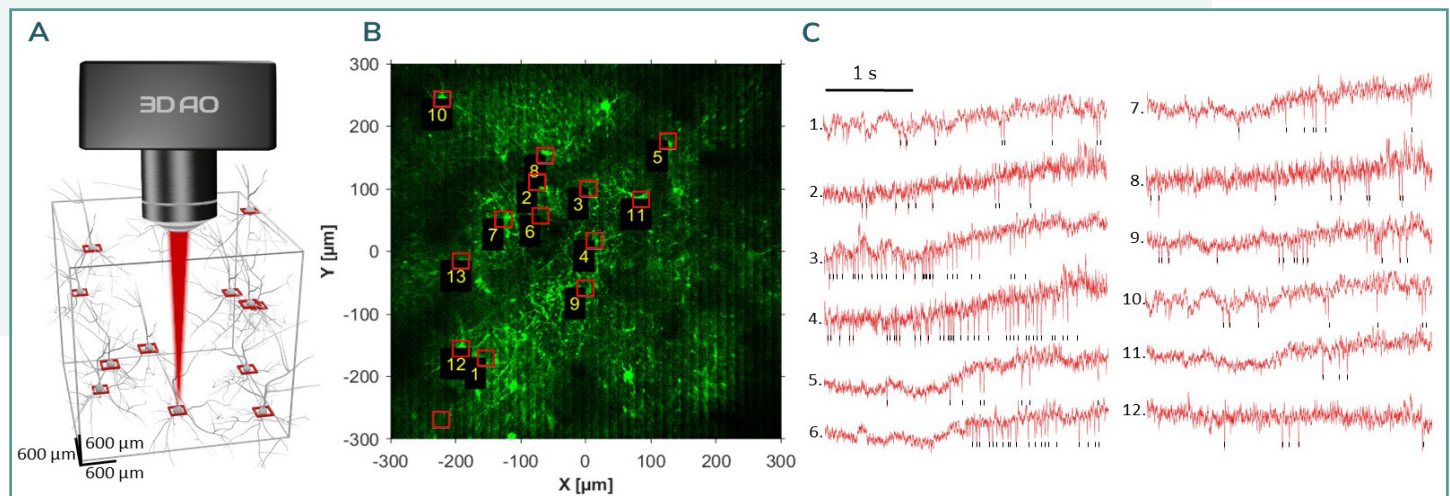


Figure 2: A) Chessboard ROIs in 600 x 600 x 600 μm volume. B) ASAP labelling in the in M1 region, red squares mark the recorded areas with low resolution. C) Voltage traces from 12 neurons in head-fixed conditions recorded with 400 Hz speed

HIGH SNR DENDRITIC VOLTAGE MEASUREMENTS?

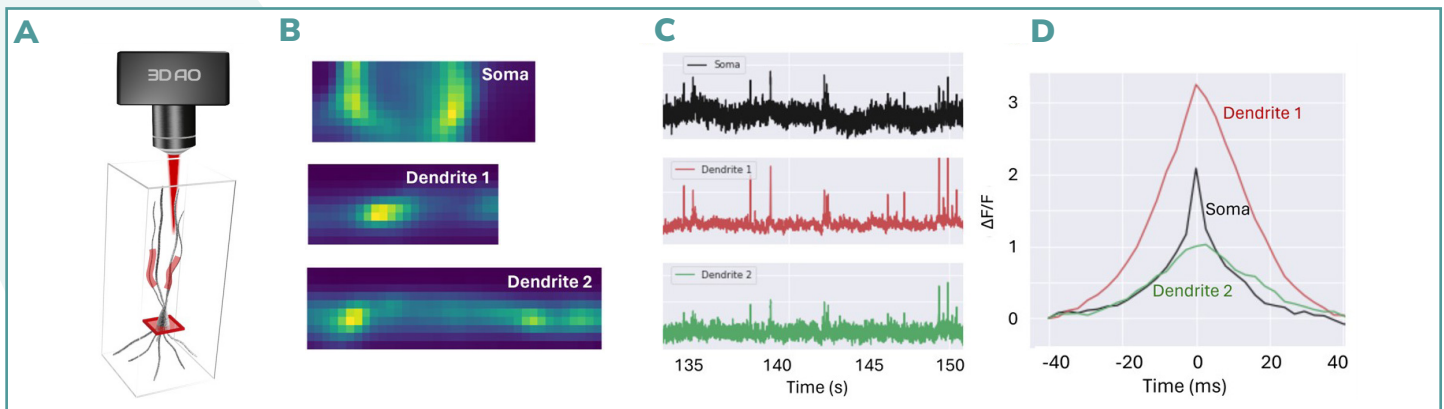


Figure 3: A) 3D model showing a chessboard and ribbon scans from the same neuron in visual cortex B) Recorded ROIs from different planes. C) Normalized voltage traces the recorded areas D) Soma and the two different dendritic segment aligned.

- ✓ **Simultaneous dendritic and somatic voltage imaging from behaving animals**
- ✓ **Variable scanning options: point scan, line scan, chessboard scan, ribbon scan, etc.**
- ✓ **Multiple dendritic patches made easy**

CAN VOLTAGE SIGNALS BE TRIGGERED?

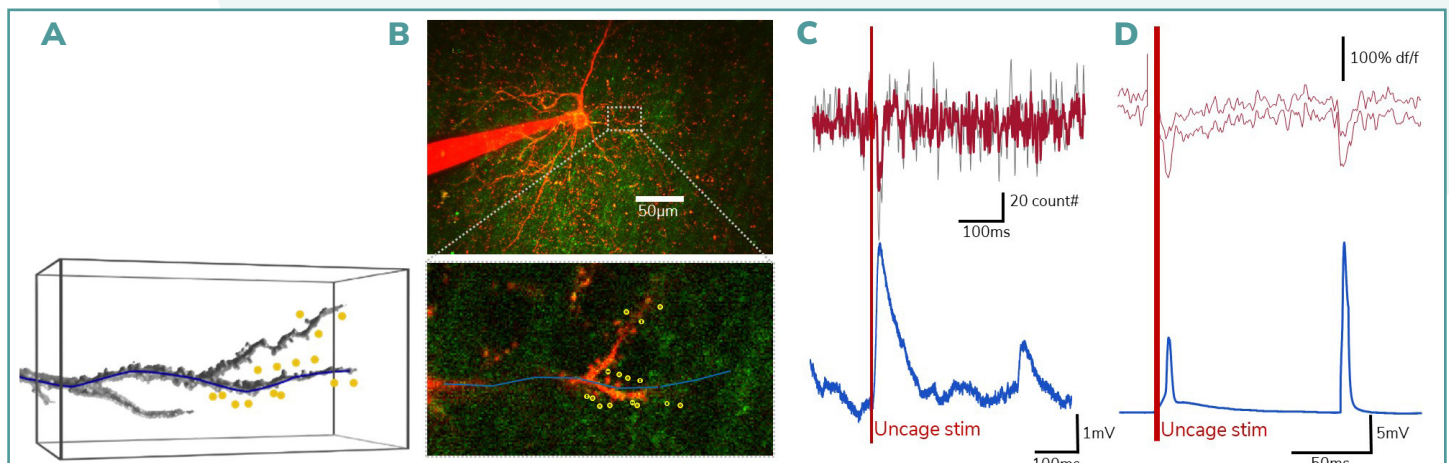


Figure 4: A) Maximum Z-projection of a pyramidal neuron (ALEXA-594) and in the inset the scanning line (blue), uncaging locations (yellow, 15 locations, 0.3 ms ROI time). B) Examples of uncaging (DNI-Glu) evoked EPSP (top, JEDI-2P signal on dendrite, bottom somatically recorded electrophysiological signal).

- ✓ **Combine optogenetics and voltage imaging in vivo**
- ✓ **Investigate spike shape in vivo in different neurons**
- ✓ **Investigate evoked event and their propagation and integration**
- ✓ **3D information integration studies**
- ✓ **Source precise data for computational modelling**



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



Authors:



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



Mezőczy Zsolt
 Application Specialist
 Femtonics