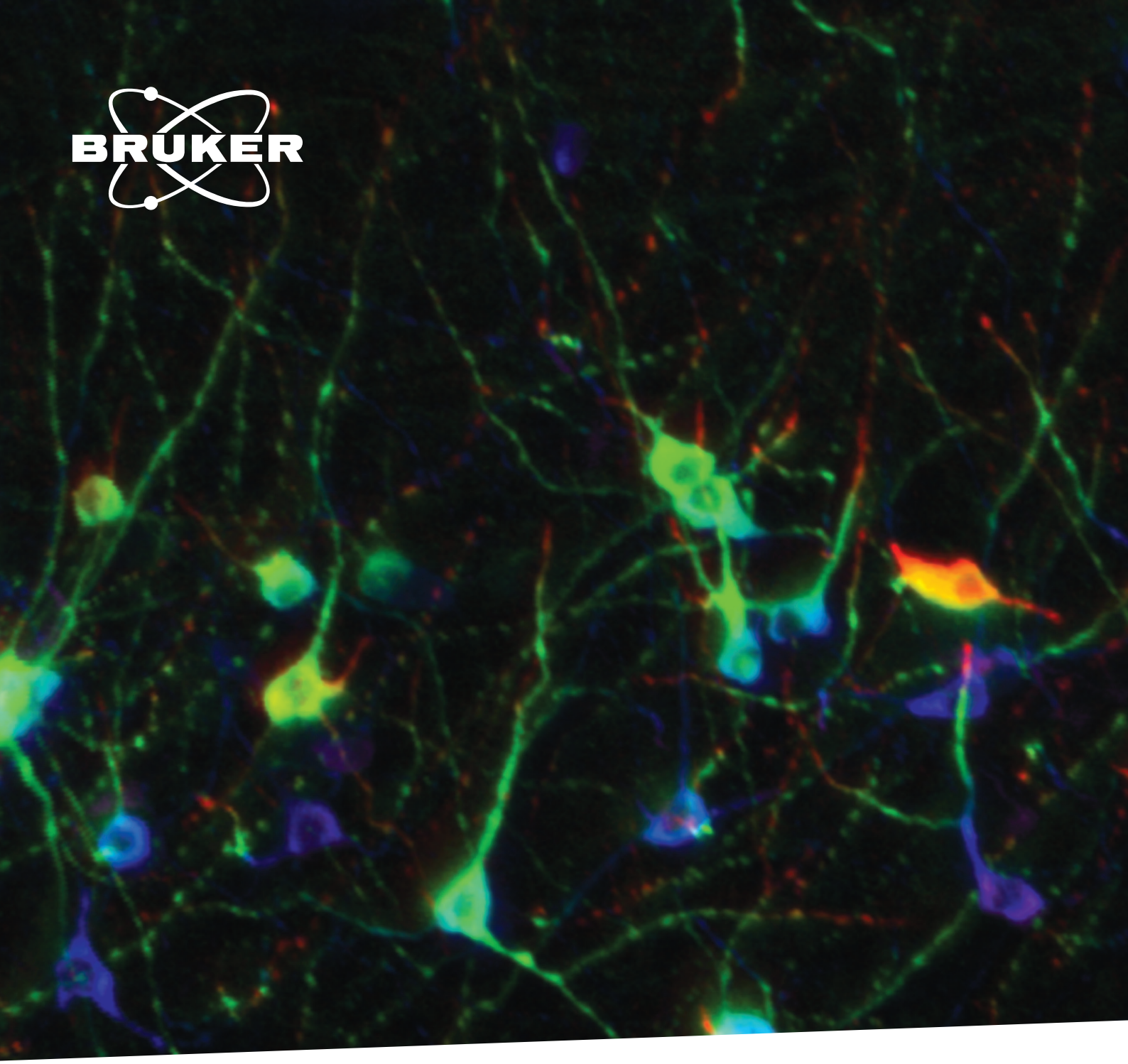


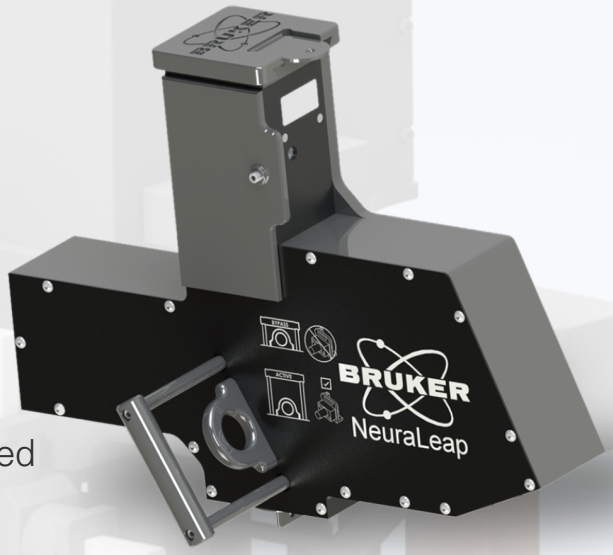
MULTIPHOTON MICROSCOPY

NeuraLeap Module

Unprecedented Imaging Speed Across Optical Planes for Advanced Neuroscience Research

NeuraLeap Module for Ultima 2Pplus Systems

Bruker's NeuraLeap module provides groundbreaking digital micromirror device (DMD) focusing for Ultima 2Pplus Microscopes and allows near-instantaneous switching between optical planes. In close collaboration with neuroscientists at prestigious universities, including Columbia and Northwestern, NeuraLeap was developed to expand on existing Ultima multiphoton microscopy technology for enhanced research on neural networks.



NeuraLeap provides researchers with:

- Near-instantaneous switching between optical planes
- Ability to define multiple planes of varying sizes to image simultaneously
- An impressive frame rate for large and variable depth-of-field imaging
- Increased speed and flexibility for Ultima 2Pplus microscopes

Cortex imaged at single frame rates far apart in Z, showing dual-layer imaging with each composite represented in color (magenta = shallower, green = deeper).
Image courtesy of Neto Canton, Northwestern University.

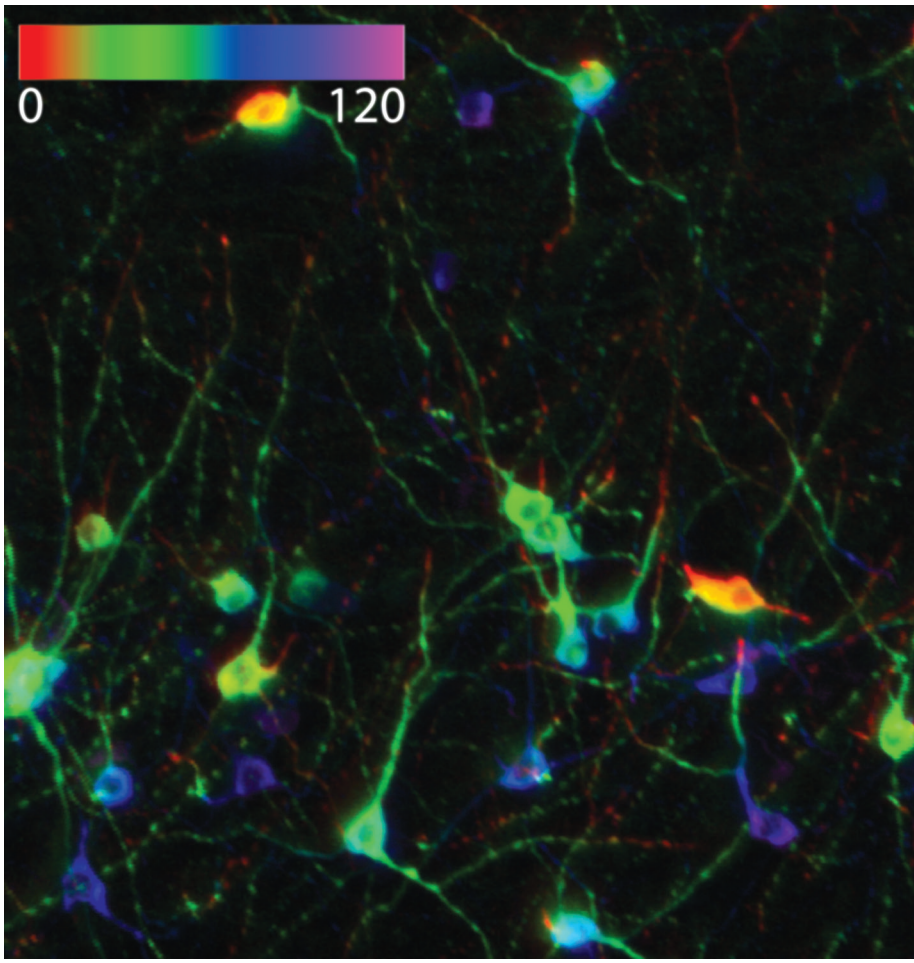
DMD Focusing for Instantaneous Imaging Across Variable Depths

Image with groundbreaking speed and flexibility across optical planes

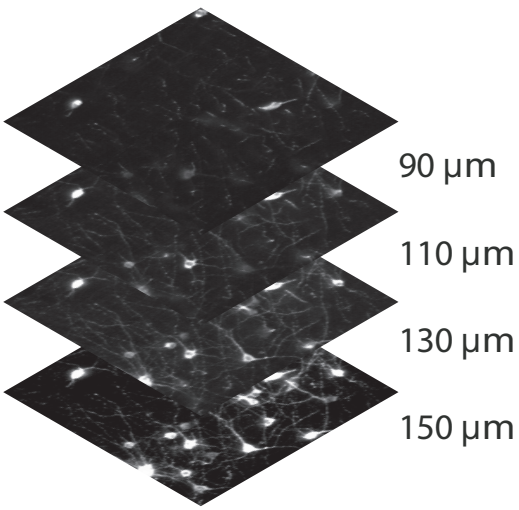
NeuraLeap combines an ultrafast DMD chip with an extended depth-of-field laser excitation module for near-instantaneous switching between optical planes. Volumes that are several hundred microns thick can be collected at high frame rates due to the elongated illumination generated by NeuraLeap. The DMD mirrors can refocus illumination spots in Z with only a 20-microsecond delay, which enables near-instantaneous transitions between imaging planes.

Perform multiplane sampling with a large depth of field

NeuraLeap can produce two discrete imaging spots along its full depth of field, allowing researchers to select multiple planes of interest to image at resonant-rate speeds. Separated by only hundreds of microns, complex applications, such as imaging correlations of neural activity in populations of cells across large distances in depth, are now feasible.



Dopaminergic neurons of the mouse ventral tegmental area. The 120 µm section was scanned and color-coded by depth using NeuraLeap.

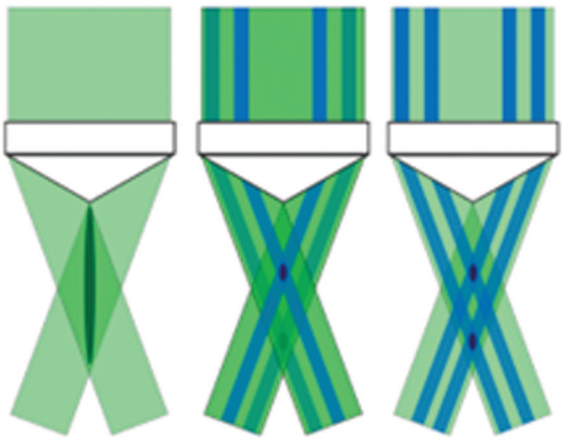


Mouse ventral tegmental area showing how an elongated beam excites more of the sample simultaneously.

Explore Neuronal Networks in Depth

Perform ultrafast Z focusing with variable optical mixing

The NeuraLeap module provides researchers with a large depth of field, fast focus, and multi-plane imaging. An elongated illumination profile produces a large, variable depth of field for imaging volumes at frame rates. Furthermore, the DMD can be used as a fast Z device and can be used to select multiple planes for simultaneous imaging across the depth of field.



Reduce scanning time for fast volumetric imaging

NeuraLeap expands upon the capabilities of piezo devices and electrotunable lenses to image volumes of tissues with minimal lag time. The module provides three orders of magnitude improvement of switching speed between discrete imaging planes compared to traditional mechanical focus methods. This is especially useful for correlating the activity of neuronal circuits across cortical layers.

Elongated illumination provides a variable and large depth of field for fast focusing and multiplane imaging.

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