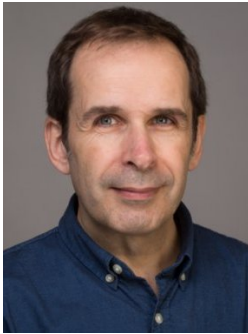


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Team Microscopies avancées & physiologie des tissus

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Emmanuel Beaurepaire is a specialist of multiphoton microscopy of tissues. He works at the Lab for Optics and Biosciences at Ecole polytechnique (Palaiseau, France), where he is appointed as a Research Director by the CNRS.

Our group develops methods and applications of multiphoton imaging. We work on strategies for removing bottlenecks in live tissue studies, such as multicolor/multimodal imaging or light-sheet excitation. We also explore novel applications such as imaging embryonic and nervous tissue development in animal models, and optical diagnostics.

S1-L1 ‘Large volume multicolor multiphoton microscopy of brain tissue.’

Large-scale microscopy approaches are transforming brain imaging, but generally lack efficient color contrast modalities. I will discuss recent developments aiming at augmenting the information content of multiphoton microscopy of tissues.

First, we introduce chromatic multiphoton serial (ChroMS) microscopy⁽¹⁾, an approach combining trichromatic multiphoton excitation through wavelength mixing and microtome-based serial block-face image acquisition to image neural tissue expressing multiple fluorescent proteins. This approach delivers micrometric color imaging with constant resolution and sub-micron channel registration over the entire imaged volume. We demonstrate continuous 3D imaging over several cubic millimeters of neural tissue, and whole brain reconstructions by serial 2D acquisition. We illustrate the potential of ChroMS for several types of measurements relevant for region-scale or whole brain studies, such as color-based morphological, clonal and connectivity analyses.

Second, we report on the development of a novel infrared OPA emitting simultaneously at 1.3 and 1.7 μm with characteristics optimized for in-depth dual-color three-photon microscopy of tissues⁽²⁾.

References

⁽¹⁾ Abdeladim et al, in press. ⁽²⁾ Guesmi, Abdeladim et al, Light Sci App (2018).
