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Glückstad, Jesper

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

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Jesper Glückstad
DTU Fotonik, Techn. Univ. Denmark
www.ppo.dk www.OptoRobotix.com

A major challenge within biophotonics and bio-imaging is to obtain sharply defined structured light excitation of cells and their organelles. In addition, to obtaining the highest possible resolution it is a desired feature to illuminate specimen with a multiplicity of wavelengths wither in sequence or in parallel. In contemporary biophotonics such as neurophotonics and/or optogenetics, structured light is used to trigger specific neuron locations for brain activity whereas other locations should avoid being exposed to laser radiation. Given the high price tag of advanced lasers and the low throughput of sensors, efficient laser light sculpting is mandatory in these applications. Moreover, the use of multi-photon excitation in e.g. optogenetics demands light excitation that is virtually free of noise or speckles. The complex morphology of neural networks demands precise light sculpting tools, however, specialists in the neuroscience field and its associated equipment manufacturers are constantly on the outlook for improved light sculpting modalities. Generalized Phase Contrast (GPC) and its extensions such as Temporal Focusing TF-GPC or 3D Holo-GPC offer such features for a variety of high-fidelity and fast reconfigurable light sculpting applications.

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