

Latest Developments in Multi Laser Engines and Fiber Lasers for Microscopy

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This presentation will focus on multi-laser engines and ultrafast fiber lasers – compact and robust solutions for reliable hands-off operation as light-sources for microscopy. We will present latest innovations and show exemplary applications from users in the field.

Ultrafast fiber lasers

Nonlinear microscopy techniques require reliable femtosecond lasers. Ultrafast fiber lasers are gaining in importance in this field as they are compact and cost-effective alternatives to space- and energy-consuming titanium-sapphire lasers. As a vivid example the new FemtoFiber ultra at 1050nm will be presented. With pulse durations shorter than 100 fs, average power of > 10W at 80 MHz repetition rate, this laser shows unmatched specifications in the market today.

Another inherent advantage of femtosecond fiber lasers is the possibility to “stitch” lasers together, thus getting hands on advanced lasers systems for microscopy compromising of several perfectly synchronized laser outputs exhibiting various (tunable) wavelengths. Examples of such solutions will be presented and their impact on techniques such as broadband CARS and other synchronized techniques will be shown.

Multi-laser engines

Gas lasers played an important role in laser-based microscopy for more than two decades. Breadboard solutions, macroscopically combining several diode and DPSS lasers replaced these systems by now. The next step in optimizing the light-engine are better featured, fully integrated multi-laser engines, based on diode laser technology. We will present TOPTICA’s latest innovation in that area, the iChrome CLE, a laser engine featuring an unmatched level of convenience and reliability combined with optimized performance for laser microscopic applications. One major step towards cost effective laser engine solutions is TOPTICA’s FDDL technology (Frequency Doubled Diode Laser) at 561nm, which eliminates the need of costly DPSS lasers and AOMs. Another inherent challenge in multi-laser systems, the reliable laser-alignment, is solved by COOL^{AC}; TOPTICA’s proprietary automatic beam alignment technology that ensures highest, constant power without the need to ever manually align optics in the field.