10. Annual MT Meeting



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Performance scaling with multicore fiber based laser systems

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Fiber laser systems are reputed for being able to provide emission at high average powers while keeping nearly diffraction-limited beam quality. However, achieving pulsed operation with high peak-powers has traditionally been a challenge due to the small confinement of the light in the fiber causing the onset of nonlinear effects. A successful strategy to overcome these limitations is the parallelization using coherent combination of pulses emitted by multiple amplifier. This technique has been developed in the last decade and it has resulted in the achievement of record performance values of over 10kW average power and 32mJ pulse energies. However, both the complexity and footprint of these systems grow linearly with the channel count and, therefore, new architectures are required for further power scaling opportunities. One of such alternative architecture is the multicore fiber, which has the potential to allow for laser systems with a massive number of amplification channels while maintaining a compact footprint and manageable component count. In this contribution, we will present experimental results based on multicore fibers with up to 49 cores. Based on the coherent combination concept, femtosecond pulses with high beam quality could be realized with kW-level average powers. Using incoherent beam combination, nanosecond pulses with over 100mJ energy could be demonstrated. Additionally, we will provide an outlook towards multicore fibers capable of multi-kW average power with > 1J pulse energy.

Speed talk:

Normal speed talk selection

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