Department of Physics

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Colloquia

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Photonics and Ultrafast Laser Science
Ruhr University, Germany

High-power modelocked thin-disk lasers for compact high-repetition rate sources from the XUV to the THz.

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The amazing progress in the performance of high-power ultrafast laser systems continues to give momentum to many fields of science and technology. Nowadays, ultrafast laser systems delivering hundreds of watts to kilowatts of average power with pulse energies ranging from hundreds of micro-joules to hundreds of millijoules start to be even commercially available. In particular, disk lasers have consistently been at the forefront of this progress in the last decade: their geometry is particularly well-suited for power and energy scaling of ultrashort pulses: the thin, disk-shaped gain medium combined with large mode areas, results both in nearly unrestricted power scalability, and low accumulated nonlinearities. Among these laser systems based on the disk technology, one particular technology has attracted attention as a potential path to achieve the desired level from a simple, one-box, multi-MHz repetition rate oscillator: modelocked thin-disk oscillators can reach hundreds of watts of average power with femtosecond pulses at multi-MHz repetition rate. Exponential progress in the achievable levels is only an illustration of their enormous potential. So far, these oscillators reach up to 275 W average power, and pulse energies up to 80 µJ, both based on Yb:YAG thin-disk lasers. This talk will review latest progress achieved with this technology, next steps and challenges towards further scaling, as well as their use as driving sources for the generation of high-power sources ranging from the XUV to the THz spectral regions.

Clara Saraceno is an Associate Professor of Photonics and Ultrafast Science at the Ruhr University Bochum, Germany since 2016. She was born in 1983 in Argentina. In 2007 she completed a Diploma in Engineering and an MSc at the Institut d'Optique Graduate School & Ecole Polytechnique, Paris. She completed a PhD in Physics at ETH Zürich in 2012. From 2013-2014, she worked as a Postdoctoral Fellow at the University of Neuchatel and ETH Zürich, followed by a postdoc position from 2015 – 2016 at ETH Zürich.

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