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High-Power, High-Energy, and High-Intensity Laser Technology; and Research Using Extreme Light: Entering New Frontiers with Petawatt-Class Lasers

**Joachim Hein
Georg Korn
Luis O. Silva**
Editors

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Extreme Light Sources and Facilities

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High-Field Physics and Simulations II

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High-Power Intense Laser Sources with Enhanced Repetition Rates

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Acceleration of Particles using High-Power PW-Class Lasers

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Introduction to Part A: High-Power, High-Energy, and High-Intensity Laser Technology

More than ever, lasers for industrial as well as scientific applications are pushed to deliver higher pulse energies and higher peak power or higher average power. Besides the traditional laser based material processing tools, studies in modern high field physics, like laser plasma interaction, laser particle acceleration, attosecond pulse generation, coherent x-ray production, and inertial confinement fusion research demand specialized lasers with the ability to generate short pulses at such an elevated energy and power level that technical as well as physical limitations apply. To fill the gap between the low repetition rate, (typically flash lamp pumped lasers producing giant pulse energies) and high average power (mostly diode pumped lasers) new technologies are required. These technologies will overcome and extend the limits. It can be noticed that tremendous progress is achieved in the development of large scale laser facilities, laser materials that allow broad band diode pumped pulse amplification, cryogenic cooling that offers an enormous improvement of amplifier efficiencies, laser designs that dramatically simplify the set ups, and new devices that are able to handle the vast power densities. The conference 'High-Power, High-Energy, and High-Intensity Laser Technology' and its proceedings are dedicated to the presentation of all these novel enabling technologies that are needed to build even more powerful laser systems in future.

Joachim Hein