PROCEEDINGS OF SPIE

High-Power, High-Energy, and High-Intensity Laser Technology IV

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Editors

3–4 April 2019
Prague, Czech Republic

Sponsored by
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Published by
SPIE

Volume 11033

Proceedings of SPIE 0277-786X, V. 11033

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

High-Power, High-Energy, and High-Intensity Laser Technology IV, edited by Joachim Hein, Thomas J. Butcher, Proc. of SPIE Vol. 11033, 1103301 · © 2019 SPIE
CCC code: 0277-786X/19/$18 · doi: 10.1117/12.2535649

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Please use the following format to cite material from these proceedings:
Author(s), "Title of Paper," in *High-Power, High-Energy, and High-Intensity Laser Technology IV*, edited by Joachim Hein, Thomas J. Butcher, Proceedings of SPIE Vol. 11033 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510627321
ISBN: 9781510627338 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445
SPIE.org
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Introduction

This SPIE proceedings volume summarizes modern applications of lasers in science and industry and demand technology that has been pushed to the limits. High peak power and high energy are required for research on laser plasma interactions, whereas high average power is the key parameter in many material processing tools. Diode pumped solid state laser technology has continued to drive high efficiency and performance improvements across the spectrum. Papers featured in this volume illustrate that its foundation, namely laser diodes, is continuously improved. Emerging large-scale facilities such as ELI, Apollon, and HiLASE are undoubtedly pioneers in the field of scientific applications. Consequently, several contributions in this issue review the status of these facilities' laser systems and new technology developments.

Thus far, high pulse energy and average power have typically been achieved in the near-infrared, based on diode pumped Yb- and Nd-lasers, whilst Ti:Sapphire lasers are still the work horses of the high peak power regime. However, in recent years a new trend can be observed: increasing the power and energy of mid-infrared sources. These lasers have many applications in science and material processing, as well as their well-established use as spectroscopy tools for pollution detection and similar tasks. This issue reflects this trend by covering research on mid-infrared lasers based on Tm, Ho, Er, Cr, and Fe doped host materials as well as alternative approaches via optical parametric amplification.

The expansion of high-power lasers into new wavelength ranges in the deep-ultraviolet and mid-infrared and the continued development of their average and peak power necessitates advances in laser materials and frequency conversion techniques. The conference, High-Power, High-Energy, and High-Intensity Laser Technology, and its proceedings are dedicated to the presentation of the novel enabling technologies needed to build even more powerful laser systems in future.

The conference committee acknowledges the many contributions from the community as well as contributions to the joint session with the conference, Short-pulse High-energy Lasers and Ultrafast Optical Technologies.

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