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Joachim Hein
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Contents

- v *Authors*
- vii *Conference Committee*
- ix *Introduction*

HIGH ENERGY LASERS

- 10238 02 **A 100 J-level nanosecond DPSSL for high energy density experiments (Invited Paper)**
[10238-1]
- 10238 05 **All diode-pumped 4 Joule 527 nm Nd:YLF laser for pumping Ti:Sapphire lasers** [10238-4]

TI:SAPPHIRE LASERS AND OPCPA

- 10238 0E **Femtosecond optical parametric amplification in BBO and KTA driven by a Ti:sapphire laser for LIDT testing and diagnostic development** [10238-13]
- 10238 0F **Theoretical and experimental study of 808nm OPCPA amplifier by using a DKDP crystal**
[10238-14]

NEW AMPLIFIER APPROACHES

- 10238 0H **Commissioning of a kW-class nanosecond pulsed DPSSL operating at 105 J, 10 Hz (Invited Paper)** [10238-16]
- 10238 0I **Active cavity stabilization for high energy thin disk regenerative amplifier** [10238-17]

MID-IR LASERS, LASER MATERIALS AND THERMAL EFFECTS IN AMPLIFIERS

- 10238 0L **Gigawatt mid-IR (4-5 μm) femtosecond hybrid $\text{Fe}^{2+}:\text{ZnSe}$ laser system (Invited Paper)**
[10238-19]
- 10238 0M **Temperature dependent spectroscopic characterization of Tm:YAG crystals as potential laser medium for pulsed high energy laser amplifiers** [10238-20]
- 10238 0O **Wavefront aberration measurement in a cryogenically cooled Yb:YAG slab using a wavefront sensor** [10238-22]
- 10238 0P **Investigation and modelling of pump saturation effect on thermal load of Yb:YAG thin disk pumped at various wavelengths** [10238-23]

ULTRASHORT PULSES AND HIGH PEAK POWER II

- 10238 0Q **Design update and recent results of the Apollon 10 PW facility (Invited Paper)** [10238-24]
10238 0T **Optimization of a grating pulse stretcher suitable for kJ class 10PW laser system** [10238-27]

LARGE APERTURE AND SPECIAL LASER EQUIPMENT

- 10238 0V **Effect of cryogenic temperature on spectroscopic and laser properties of Er, Yb-doped potassium-lanthanum phosphate glass** [10238-29]
10238 0W **AlGaInN laser diode bars for high-power, optical integration and quantum technologies** [10238-30]
10238 0X **Watt-level yellow emitting lasers by frequency doubling of high power diode lasers** [10238-31]
10238 0Y **Design of precise assembly equipment of large aperture optics** [10238-32]

POSTER SESSION

- 10238 10 **Influence of resonator length on catastrophic optical damage in high-power AlGaInP broad-area lasers** [10238-35]
10238 12 **Temperature influence on diode pumped Yb:GGAG laser** [10238-37]
10238 15 **Diode-side-pumped monolithic Nd:YAG slab laser** [10238-40]
10238 16 **Development of 2.7- μm Er:Y₂O₃ ceramic laser operated at room temperature** [10238-41]
10238 19 **Room temperature CW and QCW operation of Ho:CaF₂ laser pumped by Tm: fiber laser** [10238-44]
10238 1A **Precision control of mirror-grating phasing for a large aperture pulse compressor** [10238-45]

TECHNOLOGY AND APPLICATIONS OF INTENSE, HIGH AVERAGE POWER LASERS WORKSHOP

- 10238 1B **An all-reflective polarization rotator** [10238-100]
10238 1C **Design of the optical fiber unit for industrial equipment** [10238-101]
10238 1D **DUV high power lasers processing for glass and CFRP** [10238-102]
10238 1E **Wavelength tunable parametric mid-IR source pumped by a high power picosecond thin-disk laser** [10238-103]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Afanasev, Maxim Ya., 1C
Antipenkov, Roman, 0I
Audebert, P., 0Q
Bakule, Pavel, 0I
Banerjee, Saumyabrata, 02, 0H
Batysta, František, 0I
Bege, R., 0X
Beluze, A., 0Q
Benson, Luke, 0H
Blake, Steve, 0H
Blume, G., 0X
Boge, Robert, 0I
Boháček, Pavel, 12
Bohus, J., 1B
Bou Sanayeh, Marwan, 10
Bravy, B. G., 0L
Briggs, Chris, 05
Budai, Judit, 1B
Bugge, F., 0X
Butcher, Thomas, 02, 0H
Chekhlov, Oleg, 02
Chériaux, G., 0Q
Chyla, M., 0P
Cihlár, Antonín, 0V
Collier, John, 02, 0H
Costello, Billy, 0H
Cupal, Josef, 0E
Cvrček, Jan, 19
Czernecki, R., 0W
De Vido, Mariastefania, 02, 0H
Divoký, Martin, 02, 0H
Dominey, Mark, 0H
Doster, Jay, 05
Druon, F., 0Q
Đurák, Michal, 0E
Edwards, Chris, 02, 0H
Endo, Akira, 00, 0P, 16, 1E
Ertel, Klaus, 02, 0H
Fedosov, Yuri V., 1C
Feeler, Ryan, 05
Feise, D., 0X
Firsov, V. V., 0L
Fréneaux, A., 0Q
Frolov, M. P., 0L
Fujimoto, Junichi, 1D
Gao, Qi, 0F
Gaul, Erhard, 0T, 1A
Georges, P., 0Q
Gordienko, V. M., 0L
Green, Jonathan T., 0I
Guo, Ailin, 0F
Hanuš, Martin, 0H
Havlák, Lubomír, 12
Hein, Joachim, 0M
Hernandez-Gomez, Cristina, 02, 0H
Higashiguchi, T., 0P
Hofmann, J., 0X
Hollingham, Ian, 0H
Hooker, Chris, 02
Horáček, Jakub, 0I
Hřibek, Petr, 0E
Hubka, Zbyněk, 0I
Jambunathan, V., 0M
Jedzejczyk, D., 0X
Jelínek, Michal, 15, 16, 19
Jelínková, Helena, 00, 0V, 12, 15
Jiang, Dapeng, 19
Jurek, Karel, 12
Kakizaki, Kouji, 1D
Kalashnikov, M., 1B
Kaluzna, Mathe C., 0M
Kang, Jun, 0F
Kawasaki, M., 0P
Kepler, Matt, 0T
Kobayashi, Masakazu, 1D
Körner, Jörg, 0M
Korostelin, Yu. V., 0L
Kozlovsky, V. I., 0L
Král, Robert, 0V
Kramer, Daniel, 0E, 0T, 1A
Kubeček, Václav, 15, 16, 19
Landowski, Brian, 0H
Le Blanc, C., 0Q
Le Garrec, B., 0Q
Lebas, N., 0Q
Leszczyński, M., 0W
Liang, Xiao, 0F
Lintern, Andrew, 0H
Lucianetti, Antonio, 02, 0H, 0M, 00
Lühder, Tilman, 0M
Ma, Weiwei, 19
Marona, L., 0W
Martin, L., 0Q
Mason, Paul, 02, 0H
Mathieu, F., 0Q
Mazůrek, Petr, 0I
Meadows, Alexander R., 0E
Migal, E. A., 0L

Mimura, Toshio, 1D
 Miura, T., 0P
 Mizoguchi, Hakaru, 1D
 Mocek, Tomáš, 02, 0H, 0M, 0O, 0P, 16, 1E
 Muresan, Mihai-George, 0H
 Mužík, Jiří, 0P, 16
 Najda, S. P., 0W
 Naylor, Jack Alexander, 0I
 Nejezchleb, Karel, 0V, 15
 Němec, Michal, 0V
 Nikl, Martin, 0V, 12
 Nitsch, Karel, 0V
 Novák, Jakub, 0I
 Novák, Ondřej, 0O, 1E
 Oizumi, Hiroaki, 1D
 Osvay, K., 1B
 Papadopoulos, D. N., 0Q
 Paschke, K., 0X
 Pei, Guoqing, 0Y
 Perlin, P., 0W
 Phillips, P. Jonathan, 02, 0H
 Pilař, Jan, 02, 0H, 0O
 Podmar'kov, Yu. P., 0L
 Potemkin, F. V., 0L
 Priebe, Gerd, 02
 Pushkin, A. V., 0L
 Qin, Tinghai, 0Y
 Reiter, Jürgen, 0M
 Romanova, Galina E., 1C
 Rus, Bedřich, 0E, 0I, 0T, 1A
 Schiavon, D., 0W
 Severová, P., 0P
 Shaikh, Waseem, 02
 Sikocinski, P., 0O
 Širotkin, A. A., 0L
 Škoda, Václav, 15
 Smith, Jodie, 02, 0H
 Smrž, Martin, 0O, 0P, 16, 1E
 Snopek, David, 1A
 Šobr, Václav, 0I
 Šolc, Martin, 1A
 Stanczyk, S., 0W
 Stephens, Edward, 05
 Su, Liangbi, 19
 Suarez-Merchan, Jorge, 0H
 Šulc, Jan, 0V, 12, 15
 Sun, Meizhi, 0F
 Suski, T., 0W
 Švejkar, Richard, 0V
 Thomas, Adrian, 0H
 Tomlinson, Stephanie, 0H
 Toncian, Toma, 02
 Tränkle, G., 0X
 Trojek, Pavel, 1A
 Trunda, Bohumil, 12
 Tyldesley, Mike, 0H
 Veselský, Karel, 12
 Vyhlička, Štěpán, 0T, 1A
 Vyvlečka, Michal, 1E
 Wisniewski, P., 0W
 Xie, Xinglong, 0F
 Xiong, Zhao, 0Y
 Xu, Faming, 05
 Xu, Xu, 0Y
 Yan, Han, 0Y
 Yang, Qingwei, 0F
 Yasuhara, Ryo, 16
 Yuan, Xiaodong, 0Y
 Zhao, Beibei, 19
 Zhou, Hai, 0Y
 Zhu, Haidong, 0F
 Zhu, Jianqiang, 0F
 Zou, J. P., 0Q

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- 1 High Energy Lasers
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- 3 Ti:Sapphire Lasers and OPCPA
Thomas J. Butcher, STFC Rutherford Appleton Laboratory (United Kingdom)
- 4 New Amplifier Approaches
Fedor V. Potemkin, M.V. Lomonosov Moscow SU (Russian Federation)

- 5 Mid-IR Lasers, Laser Materials and Thermal Effects in Amplifiers
Paul D. Mason, STFC Rutherford Appleton Laboratory
(United Kingdom)
- 6 Ultrashort Pulses and High Peak Power II
Gilles Cheriaux, National Energetics (United States)
- 7 Large Aperture and Special Laser Equipment
Joachim Hein, Friedrich-Schiller-Universität Jena (Germany)

Introduction

Modern applications of lasers in science and industry always demand technology that is pushed to the limits. High peak power and high energy is required for research on laser plasma interactions, whereas high average power is needed for different kinds of material processing tools. Most often, high efficiency and maximum performance demands diode pumped solid state laser technology to be applied. Their foundation, namely laser diodes, are continuously improved as described in some articles within this volume. In the case of scientific applications, the emerging large scale facilities like ELI, Apollon, and HiLASE are undoubtedly pioneering new ground in the field. Consequently, many contributions in this volume originate with them and are reviewing the status of their laser systems and their new technology developments.

So far, high pulse energy and average power was mainly achieved in the near-infrared based on diode pumped Yb- and Nd-lasers like the 1 kW, 100 J laser Bivoj or DiPOLE of the Rutherford Appleton Laboratory, England and HiLASE, Czech Republic. On the high peak power side Ti:sapphire lasers like the Apollon laser at the Ecole Polytechnique, France are still the work horses. But in recent years a new trend can be observed: increasing the power and energy of mid-infrared sources, because these lasers have many applications in science and material processing as well as used in 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, and Fe doped host materials as well as the alternative approach via optical parametric amplification.

The expansion of high power lasers into new wavelength ranges in the deep-ultraviolet and mid-infrared and continuously raising their average and peak power always implies advanced 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 all these novel enabling technologies that are needed to build even more powerful laser systems in future.

The committee of the conference acknowledges many contributions from the community and also four contributions from the 'Technology and Applications of Intense, High Average Power Lasers Workshop', that were added to this issue since they fit well in the modern approaches these proceedings are about.

Joachim Hein

