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Diode-Pumped High Energy and High Power Lasers; ELI: Ultrarelativistic Laser-Matter Interactions and Petawatt Photonics; and HiPER: the European Pathway to Laser Energy

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Contents

xi *Conference Committee*
xv *Introduction to Part 3: HiPER — The European Path to Laser Energy*

ADVANCED LASER MATERIALS

8080 02 **Optical properties of CaF_2 and Yb^{3+}: CaF_2 for laser applications (Invited Paper)** [8080A-01]
J. Stäblein, K. Pöhl, A. Weisleder, G. v. d. Gönna, T. Töpfer, Hellma Materials GmbH & Co. KG (Germany); J. Hein, Friedrich-Schiller-Univ. Jena (Germany); M. Siebold, Forschungszentrum Dresden-Rossendorf e.V. (Germany)

8080 03 **Temperature dependent measurement of absorption and emission cross sections for various Yb^{3+} doped laser materials** [8080A-02]
J. Körner, J. Hein, M. Kahle, H. Liebetrau, M. Lenski, M. Kaluza, Friedrich-Schiller-Univ. Jena (Germany); M. Loeser, M. Siebold, Forschungszentrum Dresden-Rossendorf e.V. (Germany)

DIODE LASERS AND PUMP ENGINES

8080 06 **Residual mechanical stress decrease in GaAs-based laser diodes via a bi-material investigation** [8080A-05]
J. LeClecH, 3S PHOTONICS SA (France) and Institut des Matériaux Jean-Rouxel (France); D. T. Cassidy, McMaster Univ. (Canada); F. Laruelle, M. Bettiati, 3S PHOTONICS SA (France); J.-P Landesman, Institut des Matériaux Jean Rouxel (France)

8080 08 **Development of a 10 mJ-level optically synchronized picosecond Yb:KYW amplifier at 1040 nm for OPCPA pumping** [8080A-07]
C. P. João, Univ. Técnica de Lisboa (Portugal); J. Körner, M. Kahle, H. Liebetrau, R. Seifert, M. Lenski, S. Pastrik, J. Hein, T. Gottschall, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); V. Bagnoud, Gesellschaft für Schwerionenforschung GmbH (Germany) and Helmholtz-Institute Jena (Germany)

HIGH POWER FIBER LASER ARRAYS

8080 09 **Simple model to explain instabilities in passively-phased high-power fiber laser arrays** [8080A-08]
E. J. Bochove, Air Force Research Lab. (United States); S. A. Shakir, Y. Starcher, TASC, Inc. (United States); A. Jacobo, P. Colet, Univ. de les Illes Balears (Spain); A. B. Aceves, Southern Methodist Univ. (United States); Y. Braiman, Oak Ridge National Lab. (United States) and Univ. of Tennessee (United States); R. Deiterding, Oak Ridge National Lab. (United States); C. Miller, Oak Ridge National Lab. (United States) and Univ. of Tennessee (United States); C. Rhodes, Libration Systems Management Inc. (United States)

CRYOGENIC DPSSL

8080 0B **One kilohertz cryogenic disk laser with high average power** [8080A-10]
I. Mukhin, E. Perevezentsev, A. Vyatkin, O. Vadimova, O. Palashov, E. Khazanov, Institute of Applied Physics (Russian Federation)

8080 0C **Numerical evaluation of heat deposition in cryogenically cooled multi-slab amplifier** [8080A-11]
M. Sawicka, M. Divoky, J. Novak, T. Mocek, B. Rus, Institute of Physics of the ASCR, v.v.i. (Czech Republic)

8080 0D **High-efficiency cyrogenic-cooled diode-pumped amplifier with relay imaging for nanosecond pulses** [8080A-12]
J. Körner, J. Hein, M. Kahle, H. Liebetrau, M. Kaluza, Friedrich-Schiller-Univ. Jena (Germany); M. Siebold, M. Loeser, Helmholtz-Zentrum Dresden-Rossendorf e.V. (Germany)

ULTRASHORT PULSE LASERS

8080 0E **Z-Backlighter facility upgrades: a path to short/long pulse, multi-frame, multi-color x-ray backlighting at the Z-Accelerator** [8080A-13]
J. Schwarz, P. Rambo, M. Geissel, M. Kimmel, M. Schollmeier, I. Smith, Sandia National Labs. (United States); J. Bellum, Sandia Staffing Alliance, LLC (United States); D. Kletecka, LMATA Government Services, LLC. (United States); A. Sefkow, Sandia National Labs. (United States); D. Smith, Plymouth Grating Lab. (United States); B. Atherton, Sandia National Labs. (United States)

8080 0F **Contrast improvement by prepulse suppression in cascaded amplifier cavities** [8080A-14]
S. Keppler, Friedrich-Schiller-Univ. Jena (Germany); R. Bödefeld, M. Hornung, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany); A. Sävert, J. Hein, Friedrich-Schiller-Univ. Jena (Germany); M. C. Kaluza, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany)

MODULATORS AND POLARIZATION OPTICS FOR HIGH POWER LASERS

8080 0H **A new material for single crystal modulators: BBO** [8080A-17]
F. Bammer, T. Schumi, Technische Univ. Wien (Austria); R. Petkovsek, Univ. of Ljubljana (Slovenia)

8080 0I **Optical coatings on laser crystals for HiPER project** [8080A-18]
J. Oulehla, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic) and Palacky Univ. (Czech Republic); P. Pokorný, J. Lazar, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic)

THIN DISCS AND ACTIVE MIRRORS

8080 0M **Analysis of thermo-optic effects in Nd:YAG ceramics disk under high heat load** [8080A-22]
J. K. Jabczynski, M. Kaskow, L. Gorajek, W. Zendzian, J. Kwiatkowski, K. Kopczynski, Institute of Optoelectronics (Poland)

8080 0N **Beyond 10 J/ 2 Hz LUCIA current status with cryogenic amplifier** [8080A-29]
A. Lucianetti, T. Novo, B. Vincent, D. Albach, J.-C. Chanteloup, Lab. pour l'Utilisation des Lasers Intenses, CNRS, Ecole Polytechnique (France)

POSTER SESSION ON DIODE-PUMPED HIGH ENERGY AND HIGH POWER LASERS

8080 0R **Exploration of selective excitation of Mathieu-Gauss modes in end-pumped solid state lasers** [8080A-26]
S.-C. Chu, K.-F. Tsai, National Cheng Kung Univ. (Taiwan)

8080 0S **Suppression of ASE using the co-doping technology** [8080A-27]
J. Zheng, X. Yan, X. Jiang, Z. Wang, W. Duan, M. Li, China Academy of Engineering Physics (China)

8080 0U **25TW Ti:sapphire laser chain at PALS** [8080A-64]
J. Hřebíček, B. Rus, Institute of Physics of the ASCR, v.v.i. (Czech Republic); J. C. Lagron, Univ. Paris-Sud 11 (France); J. Polan, T. Havlíček, T. Mocek, J. Nejdl, M. Pešlo, Institute of Physics of the ASCR, v.v.i. (Czech Republic)

8080 0V **Ultra-broadband OPA of supercontinuum for ELI front end** [8080B-65]
F. Batysta, P. Hříbek, Institute of Physics ASCR (Czech Republic); T. Polívka, Univ. of South Bohemia (Czech Republic); B. Rus, Institute of Physics ASCR (Czech Republic)

HIGH INTENSITY LASERS I

8080 0X **Extreme Light Infrastructure: nuclear physics (Invited Paper)** [8080B-31]
N. V. Zamfir, Horia Hulubei National Institute of Physics and Nuclear Engineering (Romania); D. Habs, Ludwig-Maximilians-Univ. München (Germany); F. Negoita, Horia Hulubei National Institute of Physics and Nuclear Engineering (Romania); D. Ursescu, National Institute for Lasers, Plasma and Radiation Physics (Romania)

HIGH INTENSITY LASERS II

8080 10 **Outline of the ELI-Beamlines facility (Invited Paper)** [8080B-34]
B. Rus, F. Batysta, Institute of Physics of the ASCR, v.v.i. (Czech Republic); J. Čáp, ELYA Solutions s.r.o. (Czech Republic); M. Divoký, M. Fibrich, Institute of Physics of the ASCR, v.v.i. (Czech Republic); M. Griffiths, Brookson Ltd. (United Kingdom); R. Haley, Nuclear Technologies plc. (United Kingdom); T. Havlíček, Institute of Physics of the ASCR, v.v.i. (Czech Republic); M. Hlaváč, DELONG INSTRUMENTS a.s. (Czech Republic); J. Hřebíček, P. Homer, P. Hříbek, J. Jand'ourek, L. Juha, Institute of Physics of the ASCR, v.v.i. (Czech Republic); G. Korn, Institute of Physics of the ASCR, v.v.i. (Czech Republic) and Max-Planck-Institut für Quantenoptik (Germany); P. Korouš, M. P. Košelja, M. Kozlová, D. Kramer, M. Krůs, Institute of Physics of the ASCR, v.v.i. (Czech Republic); J. C. Lagron, Univ. Paris-Sud 11 (France); J. Limpouch, Czech Technical Univ. in Prague (Czech Republic); L. MacFarlane, Nuclear Technologies plc. (United Kingdom); M. Malý, D. Margarone, P. Matlas, L. Mindl, Institute of Physics of the ASCR, v.v.i. (Czech Republic); J. Moravec, FOTON s.r.o. (Czech Republic); T. Mocek, J. Nejdl, J. Novák, V. Olšovcová, Institute of Physics of the ASCR, v.v.i. (Czech Republic); M. Palatka, Palacký Univ. Olomouc (Czech Republic); J. P. Perin, Institut Nanosciences et Cryogénie, CEA (France); M. Pešlo, J. Polan, J. Prokůpek, J. Řídký,

K. Rohlena, V. Růžička, M. Sawicka, L. Scholzová, Institute of Physics of the ASCR, v.v.i. (Czech Republic); D. Snopek, ELYA Solutions s.r.o. (Czech Republic); P. Strkula, Institute of Physics of the ASCR, v.v.i. (Czech Republic); L. Švéda, ELYA Solutions s.r.o. (Czech Republic)

HIGH INTENSITY LASERS III

8080 12 **LASERIX: an open facility for developments of Soft X-ray and EUV lasers and applications (Invited Paper)** [8080B-36]
D. Ros, O. Guilbaud, S. Kazamias, LASERIX-CLUPS, Univ. Paris-Sud 11 (France) and Lab. d'Optique Appliquéw, CNRS, Univ. Paris-Sud 11 (France); M. Pittman, LASERIX-CLUPS, Univ. Paris-Sud 11 (France); J. Lagron, LASERIX-CLUPS, Univ. Paris-Sud 11 (France) and Lab. d'Optique Appliquéw, CNRS, Univ. Paris-Sud 11 (France); B. Zielbauer, LASERIX-CLUPS, Univ. Paris-Sud 11 (France) and Lab. d'Optique Appliquéw, CNRS, Univ. Paris-Sud 11 (France) and Gesellschaft für Schwerionenforschung GmbH (Germany); G. Mourou, Ecole Nationale Supérieure de Techniques Avancées (ENSTA), CNRS (France); K. Cassou, LASERIX-CLUPS, Univ. Paris-Sud 11 (France) and Lab. d'Optique Appliquéw, CNRS, Univ. Paris-Sud 11 (France); B. Cros, Lab. d'Optique Appliquéw, CNRS, Univ. Paris-Sud 11 (France); G. Maynard, LASERIX-CLUPS, Univ. Paris-Sud 11 (France); P. Zeitoun, Ecole Nationale Supérieure de Techniques Avancées (ENSTA), CNRS (France); D. Zimmer, LASERIX-CLUPS, Univ. Paris-Sud 11 (France) and Johannes Gutenberg-Univ. Mainz (Germany) and Gesellschaft für Schwerionenforschung GmbH (Germany); T. Kuehl, Gesellschaft für Schwerionenforschung GmbH (Germany) and Johannes-Gutenberg-Univ. Mainz (Germany)

X-RAY GENERATION WITH ULTRA-INTENSE LASERS AND ATTOSECOND GENERATION

8080 17 **Generation of giant attosecond pulses at the plasma surface in the regime of relativistic electronic spring (Invited Paper)** [8080B-41]
A. M. Sergeev, Institute of Applied Physics (Russian Federation); A. A. Gonoskov, Institute of Applied Physics (Russian Federation) and Umeå Univ. (Sweden); A. V. Kim, Institute of Applied Physics (Russian Federation); A. V. Korzhimanov, Institute of Applied Physics (Russian Federation) and Umeå Univ. (Sweden); M. Marklund, Umeå Univ. (Sweden)

8080 19 **Modelling and design of high harmonic seeding in soft x-ray laser plasmas with both direct and stretched amplification techniques: application to ELI facilities** [8080B-43]
Ph. Zeitoun, E. Oliva, Lab. d'Optique Appliquée, CNRS, Ecole Polytechnique ParisTech (France); M. Fajardo, Instituto Superior Tecnico (Portugal); D. Ros, M. Pittman, Lab. de Physique des Gaz et des Plasma (France); S. Sebban, Lab. d'Optique Appliquée, CNRS, Ecole Polytechnique ParisTech (France); P. Velarde, Univ. Politécnica de Madrid (Spain)

ULTRA-INTENSE LASER MATTER AND LASER VACUUM INTERACTIONS I

8080 1G **High-intensity laser plasma interactions and fast ignition (Invited Paper)** [8080B-50]
V. T. Tikhonchuk, Ctr. Lasers Intenses et Applications, CNRS, Univ. Bordeaux 1 (France); T. Schlegel, GSI Helmholtzzentrum für Schwerionenforschung GmbH (Germany)

8080 1H **Probing new physics using high-intensity laser systems (Invited Paper)** [8080B-51]
M. Marklund, A. Ilderton, J. Lundin, Umeå Univ. (Sweden)

ULTRA-INTENSE LASER MATTER AND LASER VACUUM INTERACTIONS II

8080 1M **Vision of positron science with ELI Beamlines** [8080B-56]
L. Drska, Czech Technical Univ. in Prague (Czech Republic)

ULTRA-INTENSE LASER MATTER AND LASER VACUUM INTERACTIONS III

8080 1O **On the design of experiments for the study of extreme field limits in the ultra-relativistic interaction of electromagnetic waves with plasmas (Invited Paper)** [8080B-58]
S. V. Bulanov, Japan Atomic Energy Agency (Japan) and Prokhorov Institute of General Physics (Russian Federation); T. Zh. Esirkepov, Y. Hayashi, M. Kando, H. Kiriyama, J. K. Koga, K. Kondo, H. Kotaki, A. S. Pirozhkov, Japan Atomic Energy Agency (Japan); S. S. Bulanov, Univ. of California, Berkeley (United States); A. G. Zhidkov, Osaka Univ. (Japan); P. Chen, National Taiwan Univ. (Taiwan); D. Neely, Rutherford Appleton Lab. (United Kingdom); Y. Kato, The Graduate School for the Creation of New Photonics Industries (Japan); N. B. Narozhny, Moscow Engineering Physics Institute (Russian Federation); G. Korn, Max-Planck-Institut für Quantenoptik (Germany) and Institute of Physics of the ASCR, v.v.i. (Czech Republic)

8080 1P **Effects of quantum vacuum in ultra-intense laser fields and their simulation (Invited Paper)** [8080B-59]
H. Ruhl, N. Elkina, Ludwig-Maximilians-Univ. München (Germany)

ULTRA-INTENSE LASER MATTER AND LASER VACUUM INTERACTIONS I

8080 1T **Ultra-strong laser pulses: streak-camera for gamma-rays via pair production and quantum radiative reaction (Invited Paper)** [8080B-63]
K. Z. Hatsagortsyan, Max-Planck-Institut für Kernphysik (Germany); A. Ipp, Technische Univ. Wien (Austria); J. Evers, A. Di Piazza, C. H. Keitel, Max-Planck-Institut für Kernphysik (Germany)

LASER DESIGN

8080 1V **HiPER laser reference design** [8080C-103]
B. Le Garrec, M. Novaro, Commissariat à l'Énergie Atomique (France); M. Tyldesley, Rutherford Appleton Lab. (United Kingdom); R. Juarez, J. Sanz, M. Perlado, Instituto de Fusión Nuclear (Spain); B. Rus, Institute of Physics (Czech Republic); J. Collier, C. Edwards, Rutherford Appleton Lab. (United Kingdom)

8080 1W **Overview of the LULI diode-pumped laser chain proposal for HIPER kJ beamlines** [8080C-102]
J.-C. Chanteloup, A. Lucianetti, D. Albach, T. Novo, Lab. pour l'Utilisation des Lasers Intenses, CNRS, Ecole Polytechnique (France)

8080 1X **Optimised design for a 1 kJ diode-pumped solid-state laser system** [8080C-104]
P. D. Mason, K. Ertel, S. Banerjee, P. J. Phillips, C. Hernandez-Gomez, J. L. Collier, Rutherford Appleton Lab. (United Kingdom)

TARGET AREA & FUSION TECHNOLOGY

8080 1Z **IFE plant technology overview and contribution to HiPER proposal** [8080C-106]
J. M. Perlado, Univ. Politécnica de Madrid (Spain); J. Sanz, Univ. Politécnica de Madrid (Spain) and Univ. Nacional Educación a Distancia (Spain); J. Alvarez, D. Cereceda, S. Cuesta, S. Courtin, E. del Rio, J. Fernández, A. Fraile, D. Garoz, N. Gordillo, C. Guerrero, R. Gonzalez-Arrabal, N. Moral, R. Juarez, F. Ognissanto, A. Rivera, Univ. Politécnica de Madrid (Spain); C. Sánchez, Univ. Politécnica de Madrid (Spain) and Univ. Nacional Educación a Distancia (Spain); R. Suarez, M. Victoria, Univ. Politécnica de Madrid (Spain); C. Edwards, J. Collier, M. Tyldesley, M. Tolley, D. Neely, Science and Technology Facilities Council (United Kingdom); B. Rus, Institute of Physics of the ASCR, v.v.i. (Czech Republic); B. Le Garrec, Commissariat à l'Énergie Atomique (France); G. Schurtz, Ctr. Lasers Intenses et Applications, Univ. Bordeaux 1 (France); S. Sanders, Oxford Technologies Ltd (United Kingdom)

8080 20 **Repetition rate target and fusion chamber systems for HiPER** [8080C-107]
B. Rus, Institute of Physics of the ASCR, v.v.i. (Czech Republic); C. Edwards, M. Tyldesley, Science and Technology Facilities Council (United Kingdom); M. Griffiths, Brookson Ltd. (United Kingdom); B. Le Garrec, M. Perlado, J.-P. Perin, D. Guillaume, Commissariat à l'Énergie Atomique (France); D. Neely, Science and Technology Facilities Council (United Kingdom); J. Polan, M. Kozlová, P. Homer, J. Nejdl, Institute of Physics of the ASCR, v.v.i. (Czech Republic); S. Sanders, Oxford Technologies Ltd. (United Kingdom); P. Havlík, M. Kopecký, SWELL s.r.o. (Czech Republic); V. Kolařík, T. Papírek, M. Hlaváč, Delong Instruments s.r.o. (Czech Republic); R. Haley, L. MacFarlane, Nuclear Technologies plc (United Kingdom); N. Alexander, General Atomics (United States)

8080 21 **Overview and recent progress in SBS PCM approach to self-navigation of lasers on direct drive IFE targets** [8080C-108]
M. Kalal, O. Slezak, Czech Technical Univ. in Prague (Czech Republic)

TARGET DESIGN

8080 22 **HiPER target studies: towards the design of high gain, robust, scalable direct-drive targets with advanced ignition schemes** [8080C-109]
S. Atzeni, Univ. degli Studi di Roma La Sapienza (Italy); G. Schurtz, Ctr. Lasers Intenses et Applications, CNRS, Univ. Bordeaux 1 (France)

8080 23 **HiPER targetry: production and strategy** [8080C-110]
M. Tolley, Rutherford Appleton Lab. (United Kingdom); F. ben Saïd, Commissariat à l'Énergie Atomique, Ctr. de Valduc (France); E. Koresheva, P.N. Lebedev Physical Institute (Russian Federation); J.-P. Perin, Commissariat à l'Énergie Atomique (France); J. M. Perlado, Univ. Politécnica de Madrid (Spain); G. Schaumann, Technische Univ. Darmstadt (Germany); G. Schurtz, Univ. Bordeaux 1 (France); C. Spindloe, Rutherford Appleton Lab. (United Kingdom)

8080 24 **HiPER Tritium factory elements** [8080C-111]
D. Guillaume, Commissariat à l'Énergie Atomique (France)

8080 25 **HiPER laser cooling system elements** [8080C-130]
D. Guillaume, Commissariat à l'Énergie Atomique (France)

EXPERIMENTAL VALIDATION

8080 27 **Experimental results performed in the framework of the HIPER European Project** [8080C-113]
D. Batani, CELIA, CNRS, Univ. de Bordeaux (France) and Univ. di Studi di Milano Bicocca (Italy); M. Koenig, S. Baton, F. Perez, Lab. d'Optique Appliquéw, CNRS, Univ. Paris-Sud 11 (France); L. A. Gizzi, P. Koester, L. Labate, Univ. Politécnica de Madrid (Italy); J. Honrubia, A. Debayle, CEA, DAM, DIF (Spain); J. Santos, G. Schurtz, S. Hulin, X. Ribeyre, C. Fourment, P. Nicolai, B. Vauzour, Univ. Bordeaux 1 (France); L. Gremillet, Ecole Polytechnique (France); W. Nazarov, Univ. of St. Andrews (United Kingdom); J. Pasley, G. Tallents, The Univ. of York (United Kingdom); M. Richetta, Univ. degli Studi di Roma Tor Vergata (Italy); K. Lancaster, C. Spindloe, M. Tolley, D. Neely, P. Norreys, Rutherford Appleton Lab. (United Kingdom); M. Kozlova, J. Nejdl, B. Rus, Institute of Physics of the ASCR, v.v.i. (Czech Republic); L. Antonelli, A. Morace, L. Volpe, Univ. di Studi di Milano Bicocca (Italy); J. Davies, Univ. Técnica de Lisboa (Portugal); J. Wolowski, J. Badziak, Institute of Plasma Physics and Laser Microfusion (Poland)

8080 29 **Computer simulations of the experiments at RAL, LULI, and PALS carried out under HiPER including those performed at ILE** [8080C-115]
Y.-J. Rhee, Korea Atomic Energy Research Institute (Korea, Republic of)

8080 2A **Parametric instabilities study in a shock ignition relevant regime** [8080C-116]
C. A. Cecchetti, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); A. Giulietti, Intense Laser Irradiation Lab., INO-CNR (Italy); P. Koester, L. Labate, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); T. Levato, Intense Laser Irradiation Lab., INO-CNR (Italy); L. A. Gizzi, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); L. Antonelli, A. Patria, Univ. degli Studi di Milano-Bicocca (Italy); D. Batani, Univ. degli Studi di Milano-Bicocca (Italy) and INO-CNR (Italy); M. Kozlová, D. Margarone, J. Nejdl, B. Rus, M. Sawicka, Institute of Physics of the ASCR, v.v.i. (Czech Republic); M. Lafon, X. Ribeyre, G. Schurtz, Ctr. Lasers Intenses et Applications, CNRS, Univ. Bordeaux 1 (France)

8080 2B **Investigation of laser plasmas relevant to shock ignition at PALS** [8080C-117]
J. Nejdl, Institute of Physics of the ASCR, v.v.i. (Czech Republic) and Czech Technical Univ. (Czech Republic); M. Kozlová, Institute of Physics of the ASCR, v.v.i. (Czech Republic); M. Sawicka, Institute of Physics of the ASCR, v.v.i. (Czech Republic) and Czech Technical Univ. (Czech Republic); D. Margarone, Institute of Physics of the ASCR, v.v.i. (Czech Republic); M. Krus, J. Prokupek, Institute of Physics of the ASCR, v.v.i. (Czech Republic) and Czech Technical Univ. (Czech Republic); B. Rus, Institute of Physics of the ASCR, v.v.i. (Czech Republic); D. Batani, L. Antonelli, A. Patria, Univ. degli Studi di Milano-Bicocca (Italy); O. Ciricosta, C. Cecchetti, P. Koester, L. Labate, A. Giulietti, L. A. Gizzi, Intense Laser Irradiation Lab, INO-CNR (Italy); A. Moretti, M. Richetta, Univ. degli Studi di Roma Tor Vergata (Italy); G. Schurtz, X. Ribeyre, M. Lafon, Ctr. Lasers Intenses et Applications, CNRS, Univ. Bordeaux 1 (France); C. Spindloe, T. O'Dell, Rutherford Appleton Lab. (United Kingdom)

FUNDAMENTAL SCIENCE

8080 2C **Issues of the HiPER fundamental science programme** [8080C-118]
E. L. Clark, C. Kamperidis, N. A. Papadogiannis, M. Tatarakis, Technological Education Institute of Crete (Greece)

8080 2D **A novel single-shot, spectrally resolved x-ray imaging technique of ICF relevant plasmas** [8080C-119]
L. Labate, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy) and Lab. Nazionali di Frascati, Istituto Nazionale di Fisica Nucleare (Italy); C. A. Cecchetti, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); O. Ciricosta, Univ of Oxford (United Kingdom); P. Köster, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); T. Levato, Lab. Nazionali di Frascati, Istituto Nazionale di Fisica Nucleare (Italy); L. A. Gizzi, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy)

8080 2E **High resolution X-ray spectroscopy in fast electron transport studies** [8080C-120]
P. Koester, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); N. Booth, The Univ. of York (United Kingdom); C. A. Cecchetti, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); H. Chen, Lawrence Livermore National Lab. (United States); R. G. Evans, Imperial College London (United Kingdom); G. Gregori, Univ. of Oxford (United Kingdom); L. Labate, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); T. Levato, Istituto Nazionale di Fisica Nucleare (Italy); B. Li, Univ. of Oxford (United Kingdom); M. Makita, Queen's Univ. Belfast (United Kingdom); J. Mithen, C. Murphy, Univ. of Oxford (United Kingdom); M. Notley, R. Pattathil, Rutherford Appleton Lab. (United Kingdom); D. Riley, Queen's Univ. Belfast (United Kingdom); N. Woolsey, The Univ. of York (United Kingdom); L. A. Gizzi, Intense Laser Irradiation Lab., INO-CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy)

8080 2F **Can proton radiography be used to image imploding target in ICF experiments?** [8080C-121]
L. Volpe, D. Batani, Univ. degli Studi di Milano-Bicocca (Italy); B. Vauzour, Ph. Nicolai, J. J. Santos, F. Dorchies, C. Fourment, S. Hulin, C. Regan, Univ. de Bordeaux (France); F. Perez, S. Baton, M. Koenig, Ecole Polytechnique (France); K. Lancaster, M. Galimberti, R. Heathcote, M. Tolley, Ch. Spindloe, Rutherford Appleton Lab. (United Kingdom); P. Koester, L. Labate, L. A. Gizzi, Intense Laser Irradiation Lab./INO-CNR (Italy); C. Benedetti, A. Sgattoni, Univ. degli Studi di Bologna (Italy); M. Richetta, Univ. degli Studi di Roma Tor Vergata (Italy)

8080 2M **FST-technologies for high rep-rate production of HiPER scale cryogenic targets** [8080C-128]
I. V. Aleksandrova, Lebedev Physical Institute (Russian Federation); A. A. Belolipetskiy, Dorodnitsyn Computing Ctr. (Russian Federation); V. A. Kalabuhov, E. R. Koresheva, E. L. Koshelev, Lebedev Physical Institute (Russian Federation); A. I. Kutergin, CryoTrade, Ltd. (Russian Federation); A. I. Nikitenko, I. E. Osipov, Lebedev Physical Institute (Russian Federation); L. V. Panina, Prokhorov General Physics Institute (Russian Federation); A. I. Safronov, Federal State Unitary Enterprise (Russian Federation); T. P. Timasheva, Lebedev Physical Institute (Russian Federation); I. D. Timofeev, G. S. Usachev, Federal State Unitary Enterprise (Russian Federation); V. I. Chtcherbakov, Lebedev Physical Institute (Russian Federation); M. Tolley, C. Edwards, C. Spindloe, Rutherford Appleton Lab. (United Kingdom)

8080 2O **Alternative fusion target tracking techniques** [8080C-131]
J. Hošek, Š. Němcová, K. Macůchová, P. Mareček, Czech Technical Univ. in Prague (Czech Republic); P. Homer, B. Rus, Institute of Physics of the ASCR, v.v.i. (Czech Republic)

Author Index

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1 Advanced Laser Materials
Joachim Hein, Friedrich-Schiller-University Jena (Germany)

2 Diode Lasers and Pump Engines
Antonio Lucianetti, Ecole Polytechnique (France)

3 High Power Fiber Laser Arrays
Magdalena Sawicka, Institute of Physics of the ASCR, v.v.i. (Czech Republic)

4 Cryogenic DPSSL
Mathias Siebold, Forschungszentrum Dresden-Rossendorf e.V. (Germany)

5 Ultrashort Pulse Lasers
Mathias Siebold, Forschungszentrum Dresden-Rossendorf e.V. (Germany)

6 Modulators and Polarization Optics for High Power Lasers
Christoph Wandt, Max-Planck-Institut für Quantenoptik (Germany)

7 Thin Discs and Active Mirrors
Jens Schwarz, Sandia National Laboratory (United States)

Part B ELI: Ultrarelativistic Laser-Matter Interactions and Petawatt Photonics

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Johann Rafelski, The University of Arizona (United States)
Toshi Tajima, Technische Universität Munich and Max-Planck-Institut für Quantenoptik (Germany)
Matthew Zepf, Queen's University Belfast (United Kingdom)

Session Chairs

10 High Intensity Lasers I
Georg Korn, Max-Planck-Institut für Quantenoptik (Germany)

11 High Intensity Lasers II
Todd Ditmire, The University of Texas at Austin (United States)

12 High Intensity Lasers III
Christopher P. J. Barty, Lawrence Livermore National Laboratory (United States)

13 X-Ray Generation with Ultra-Intense Lasers and Attosecond Generation
Donald P. Umstadter, University of Nebraska-Lincoln (United States)

14 Particle Acceleration with Ultra-Intense Laser Pulses
Florian J. Grüner, Ludwig-Maximilians-Universität München (Germany)

15 Ultra-Intense Laser Matter and Laser Vacuum Interactions I
Luis O. Silva, Universidade Técnica de Lisboa (Portugal)

16 Ultra-Intense Laser Matter and Laser Vacuum Interactions II
Christoph H. Keitel, Max-Planck-Institut für Kernphysik (Germany)

17 Ultra-Intense Laser Matter and Laser Vacuum Interactions III
Mattias Marklund, Umeå University (Sweden)

18 Ultra-Intense Laser Matter and Laser Vacuum Interactions I
Theodor Schlegel, Technische Universität Darmstadt (Germany)

Part C HiPER: the European Pathway to Laser Energy

Conference Chairs

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Chris Edwards, Science and Technology Facilities Council (United Kingdom)

Introduction to Part 3: HiPER – The European Path to Laser Energy

HiPER – the European research infrastructure for inertial fusion energy – is currently well into its "Preparatory Phase", with funding from United Kingdom and Czech Republic for technical work, with E.C. funding for coordination activity, and in-kind contributions from other nations providing staff effort and access to experimental and computational facilities throughout Europe. This was the first successful demonstration of a coordinated approach to laser fusion energy at a European level.

In fact, anticipating the successful demonstration of fusion ignition and gain at the National Ignition Facility (NIF) in the United States, scientists and engineers from across Europe are developing the case for the next generation laser fusion facility to be constructed in Europe. HiPER is being strategically driven by an ambitious medium term goal for the demonstration of clean energy production via laser-driven fusion (Laser Energy).

Laser Energy offers important advantages over alternative energy sources: It is carbon-free; sustainable for the foreseeable future; inherently safe; has low environment impact; and offers security of supply as the fuel, Deuterium and Tritium (derived from Lithium) is widely distributed geographically. It is ideally suited to base load electricity production, and commercial modelling studies to date suggest that the laser energy scheme will be cost-competitive with other sources of low-carbon energy.

A HiPER Technical Showcase event was held in Prague during April as part of the SPIE Optics + Optoelectronics symposium. Papers were presented on a wide range of technical topics central to HiPER's Laser Energy mission, and also relevant to other extensive laser-based applications – including next-generation laser technology, target physics (experiments and simulations), reactor studies, mass manufacture of targets, materials, radio-protection, waste management, and safety.

The collection of papers published here offers a necessarily dense, but comprehensive, overview of current progress within the HiPER project. More information, including the latest publications, details of how to contact the project, etc., is available from the HiPER website at http://www.hiper-laser.org/.

The members of the HiPER Preparatory Phase Project wish to record their grateful thanks to SPIE and the organisers of the HiPER Technical Showcase for hosting the event, and for the arrangements for publishing these Proceedings.

Leonida A. Gizzi
Chris Edwards