

20TH ANNIVERSARY

SANTA FE, NEW MEXICO

26 - 29 MARCH 2018

HPLA

INTERNATIONAL HIGH POWER LASER ABLATION

CALL FOR ABSTRACTS

Abstracts Due: 25 Aug 2017

PARTICIPATE

We invite you to participate in the 20th Anniversary of the High Power Laser Ablation (HPLA) Symposium to be held 26 - 29 March 2018 at the beautiful La Fonda on the Plaza Hotel in Santa Fe, NM, USA. The 2018 event offers exceptional learning and networking opportunities for researchers in the laser ablation, and associated beamed energy propulsion and directed energy fields.

Since 1998, the International HPLA has provided a unique forum, in a collegial atmosphere, for exchange of ideas on the physics and application of high power laser-materials interaction, including advances in relevant high power laser sources and problems of beam propagation and detection. This event, held mostly biannually, will be the twelfth meeting over a span of 20 years. The HPLA series is one of the first scientific symposia to be organized around a broad physical phenomenon (laser ablation and its applications) rather than one narrow technology. HPLA treats advances in all related aspects from basic physics to applications. In 2002, the International Symposium on Beamed Energy Propulsion joined HPLA and brought together organizations and individuals interested in developing beamed-energy propulsion vehicles, engines, schemes and concepts into space transportation systems of the future. BEP includes microwave sources as well as lasers as drivers. This combined meeting offered an exceptional opportunity for researchers in the BEP and HPLA fields to present the current results of their studies. In 2016, parallel sessions were introduced from the Ultrashort Pulse and Free Electron Laser Meetings which have been organized in the past by DEPS (the Directed Energy Professional Society). The 2018 will feature new and exciting topics relevant to today's challenges. Here are some ways to engage in the 2018 Symposium:

Present

Take advantage of this opportunity to present your research or program results/progress to your colleagues. Submit an abstract for consideration for an oral or poster presentation addressing one or more of the key topic areas in this call for abstracts.

Network

Networking and continuing education are key elements to staying current, promoting your research, developing a strong career, or building a successful business. One attendee wrote: "You have really been most successful to bring together such a large number of most distinguished scientists all around the world, active in the various fields of laser ablation. Congratulations for the high scientific level of all the contributions and for the wonderful organization." Please take advantage of this outstanding opportunity to convene with those on the leading edge of this field!

Exhibit

The 2018 event will feature table top exhibits in the area just outside of the technical sessions. This is an excellent way to showcase your organization or technology to those in attendance. There is a limited amount of space so spots will be sold on a first-come-first-served basis. For more information visit: <https://www.usasymposium.com/hpla/exhibit.php>.

Sponsor

Join the leaders in the industry as a sponsor of the HPLA. Participating as a sponsor:

- Highlights your commitment to furthering excellence in engineering and technology education in the HPLA, and associated BEP and DE fields, and
- Creates brand awareness and increases brand loyalty among a targeted audience in the industry.

A variety of sponsorship packages are available for all budgets. For more information, contact Erin Foster at efoster@blue52productions.com or 00+1+937-689-7387.

KEY DATES TO REMEMBER

- 25 August 2017 – Abstracts Due
- November 2017 – Abstract Submitters will be notified of their selection status
- 9 March 2018 – Final Poster Abstracts Due
- 12 March 2018 – Final Presentations Due
- 26 - 29 March 2018 – HPLA Symposium

Keynote Presentations

HPLA has multiple keynote presentations scheduled throughout the week. Check for updates on the website as the program develops. Keynote presentations confirmed as of this publication include:

Pulsed Laser Deposition: Back to the Basics
Prof. Dr. Thomas Lippert, Paul Scherrer Institute,
Switzerland

Developments at HiLASE
Prof. Tomas Moček, Director, HiLASE Center,
Dolni Brezany, Czech Republic

Future Concepts at CNES
Mr. Frédéric Masson, CNES, Paris, France

Status of DE Technology
Mr. Mark Neice, DEPS, Albuquerque, USA

SUBMISSION TOPICS

Submission Topics

Original abstracts are solicited for the topics listed below. This list is offered for guidance, and is not intended to exclude relevant topics not listed. If you would like to submit an abstract in a topic not listed, simply select "Other" on the abstract submission form. Final session names will be released after the abstract selection process concludes.

Biological Applications

This topic area is dedicated to the use of modern laser technology for improved biomedical research. Recent growth in the applications of lasers to medicine and biology has been explosive. The objective of the topic area is to bring together international researchers to jointly examine how new laser technologies have provided new knowledge in biology, and pave the way for innovative medical procedure developments. HPLA attendees will have the chance to critically assess the state of the biological application of lasers and to set goals for the future.

Femtosecond Repetitive Action on Materials

This topic is dedicated to fundamentals and applications of repetitive ultrashort pulse laser interactions with materials. The repetitive and single pulse interactions are quite different in what concerns thermal coupling, mechanical coupling, shock effects, chemical composition changes, etc. induced and accumulated in the materials. Different applications can be considered ranging from laser space propulsion to laser micro- and nano-structuring. The objective is to bring together international researchers to jointly examine state-of-art in the field and to set goals for future innovative technologies.

Laser Direct Writing

The Laser Direct Writing topic area provides an interdisciplinary forum for discussing the most recent progress in laser-matter interactions, with a focus on laser material transfer, such as laser-induced forward transfer and matrix-assisted pulsed laser evaporation – direct write. This topic is also focused on advancements in laser material processing for organic electronics and sensing, including very recent research fields such as biomedical applications and biotechnology. Experimental and theoretical abstracts, as well as contributions from industry are welcome.

Laser Induced Shock Applications

The development of high-power laser sources is currently undergoing technological developments with strong industrial prospects. HPLA 2018 provides an opportunity to take stock of these technological developments and the applications fostering them. The state of the art on applications such as laser shock peening, laser shock adhesion test, up-to-date diagnostics, and laser shocks to improve our knowledge of the dynamic behavior of materials under severe conditions will be at the heart of this HPLA topic.

Laser Materials Interactions in a Liquid Environment

Laser materials interactions in a liquid environment provides the basis not only for e.g. submarine laser-induced plasma spectroscopy, but also the nanoparticle generation by lasers in liquids as an alternative path to produce ligand-free colloidal nanoparticle building blocks. Gas phase and chemical synthesis approaches exhibit numerous problems regarding particle aggregation and material variety. Nanoparticles as functional components on surfaces, in bulk materials, and as nanohybrids may be applied in optics, biomedicine, catalysis, or energy science. Fundamental studies and scalable applications are under way.

Laser Modification of Surface Microstructure and Morphology

Surface modification by laser irradiation is in the core of many modern surface processing applications where desired material properties are achieved through the formation of metastable phases, grain refinement, generation/annealing of crystal defects, redistribution of the alloying elements and, in the ablation regime or upon irradiation of multiple laser pulses, and generation of complex surfaces morphology. This topic area will review recent progress in the fundamental understanding of the mechanisms responsible for the laser-induced modification of surface microstructure and morphology.

MAPLE and Materials Processing

This topic area is related to laser-based materials processing, especially matrix-assisted pulsed laser evaporation (MAPLE) and pulsed laser deposition (PLD). Application areas to be discussed include nanomaterials and nanocomposites, thin-films, and optoelectronic devices and components. In addition to recent research results, perspectives on commercial scale-up and quantitative analysis of laser-based, thin-film deposition will be provided.

New Results in High Power Lasers and Their Applications

This topic area is concerned with high-power and high-energy lasers and their applications. Progress in efficient high pulse energy, diode-pumped solid-state laser architecture based on cryogenic gas cooled, multi-slab ceramic solid state amplifier technology, capable of amplifying nanosecond pulses to kilo-Joule pulse energies are an example of these, being applied now in the European Union's HiLASE Program. Applications range from laser space propulsion and debris removal to minimizing defects for photovoltaics, and providing laser driven hard x-ray sources.

Next Generation Beamed Energy Propulsion

This topic area is devoted to aspects related to the science and technology of beamed-energy propulsion (BEP) in its various forms and applications. Special interest is given to new BEP concepts (microwave or laser), basic science and technology, mission analysis, and flight experiments. Experimental techniques and new concepts for the determination of relevant propulsion parameters such as thrust, plasma temperature, shockwave velocity, exhaust plume divergence, and plume velocity distributions will also be addressed.

Panel - The Business Side of High Power Laser Applications

Science has to be funded. Often we are tempted to do our scientific work independently from this important consideration, and then go looking for funding – a solution looking for a problem. This panel will explore the intersection between science and its users, by connecting users with HPLA researchers.

Plasmonics and Metamaterials

Metamaterials are those with dielectric functions not found in nature – offering unique electromagnetic properties leading to “superlenses” and “cloaking.” These were first perfected in the microwave regime, but are now seeing reality at visible wavelengths. These materials can be designed to passively cancel light scattering from a chosen object, making it invisible. Alternatively, cloaking can be visualized as bending light around a chosen object, giving the appearance that it is not there. As intriguing as optical cloaking is, it is only one example of emerging applications enabled by the unprecedented ability to concentrate and manipulate the electromagnetic field on the subwavelength scale provided by the integration of plasmonics and metamaterials. This topic area will consider the ways in which the science of plasmonics can produce these effects.

Promising New Laser and Optical Technologies

The “Promising New Laser and Optical Technologies” topic area will demonstrate recent progress on laser sources, laser coatings, and their unusual applications, including for example, high efficiency solar cells.

Space Debris Removal and Asteroid Impact Mitigation Strategies

Since the space launches started in 1957, they have led to more than 18,000 tracked objects. A much larger population that cannot be tracked (due to their smaller size) is estimated to exceed the number of 100 million, finally leading to an unstable debris environment (Kessler Syndrome). Therefore there is an urgent need to address the problem of debris removal and/or mitigation not only from the technical point of view but also from the operational and legal aspect. This topic area’s emphasis will be given to laser ablation and radiation pressure based solutions, including new laser sources and long range propagation. The role of laser solutions vs microwaves and more conventional approaches will be discussed. In addition, long term asteroid threats and impact mitigation strategies will be presented. Finally, the importance of legal aspects, as well as international cooperation will be highlighted.

Theory and Simulation

The interaction of pulsed laser radiation with materials involves a wealth of the physical processes, depending on the material kind and laser light properties, whose deep understanding is critical for further advancing lasers in the fields of surface processing, new material synthesis, nanotechnology, and biomedicine. The goal of this topic area is to provide a broad overview of the methods for theoretical interpretations and numerical simulations which enable us to gain insight into dynamical behavior of laser-excited matter at different temporal and spatial scales. Kinetic, thermodynamic, mechanical, and other related aspects of laser-matter interaction will be discussed.

Thermal and Mechanical Coupling for Ultrashort Pulses

This topic area is dedicated to the latest results in ultrashort pulse laser-matter interaction in terms of coupling mechanisms with the target material. The comprehensive understanding of mechanical coupling processes, ranging from shockwave generation to material spallation and phase explosion, is crucial for the optimization of laser heating and ablation applications, e.g., in material processing, beamed-energy propulsion, as well as in biomedical research. Moreover, insights on thermal coupling of laser energy into the target material that specifically come along with ultrashort pulses can provide for valuable perspectives for new technological developments. HPLA attendees are invited to assess and discuss the latest results and upcoming application trends on this field of laser ablation.

Ultrafast Materials Processing

Picosecond and femtosecond laser processing of materials is rapidly moving into the mainstream of protocols ranging from laser-finished metallic surfaces to micro- and nanostructuring of semiconductors. This topic area will include recent selected developments as examples of laser-materials interactions under far-from-equilibrium conditions.

Ultrashort Pulse Effects

Ultrafast pulsed excitation allows creating highly non-equilibrium states of matter characterized by extreme electronic excitation, as well as high temperature and pressure. Subsequent to the initial deposition of energy, a complex chain of secondary relaxation processes can lead to dynamics on very rapid time-scales, and often along unusual, non-equilibrium pathways. Abstracts should highlight the fundamental aspects of material dynamics on ultrafast time- and atomic length scales, but also discuss the technological potential enabled by the recent progress in ultrafast technology.

Ultra High Intensity Lasers: From Earth to Cosmos

Every day, we are witnessing the ultra high intensity laser expanding its ubiquity, particularly in fundamental science. It can study the loss-of-information paradox in Black Holes, offer an explanation of Ultra High Energy Cosmic Ray generation and provide new ways to produce and accelerate particle beams. It is the goal of this topic to provide a flavor of one of the most exciting laser fields in science and technology today.

POSTER SESSION

The HPLA Poster Session adds an additional option for presenters to share their material. Some information, especially highly technical material, needs a format more conducive to presenting in-depth details, equations, citations, etc. than the oral presentation format can provide. All poster submissions should address one of the session topics listed above. Poster abstracts will be accepted until **9 March 2018**, or until space runs out. Because space is limited, we encourage you to submit your abstract as soon as you are able to.

ABSTRACT SUBMISSION

Submission Process

We look forward to receiving your abstract(s) for the 2018 HPLA Symposium. Submitted abstracts should be no more than 400 words long. Please be sure to include the title of your abstract in the body of the submission (this does not count against the 400 word count). In **early November 2017**, you will be contacted regarding the status of your acceptance. Final presentations will be due **12 March 2018**. Abstracts will be accepted for both oral and poster presentations for all topics listed on the previous page.

For technical questions regarding the topics on the previous page, please contact Dr. Claude Phipps at crphipps@aol.com. For questions about the submission process, please contact Ms. Sherry Johnson at sjohnson@blue52productions.com.

To submit your abstract, visit
<https://www.usasymposium.com/hpla/cfaForm.php>.

Abstracts Are Due: 25 August 2017

SYMPOSIUM COMMITTEE

The symposium's technical program is guided and directed by an international esteemed committee.

Symposium Chair: Dr. Claude Phipps, Photonic Associates, LLC

Prof. Sergei Anisimov, L. D. Landau Institute of Theoretical Physics (Russia)
Prof. Victor Apollonov, General Physics Institute (Russia)
Prof. Michel Autric, Université de la Méditerranée (France)
Prof. Dieter Bäuerle, Johannes Kepler University (Austria)
Prof. Willy Bohn, Bohn Laser Consult (Germany)
Dr. Eric Davis, Institute for Advanced Studies at Austin (USA)
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Dr. Fred Zutavern, Sandia National Laboratory (USA)

Interested in becoming a Steering Committee member to help drive the program? Contact Dr. Claude Phipps at crhipps@aol.com.