

International Workshop on Laser-Plasma Interaction at Ultra-High Intensities 2nd Dresden ENLITE Conference

Laser-Plasma Interaction (LPI) at Ultra-high Intensities (UHI) is one of today's hot topics in plasma physics. Around the globe, new laser facilities are being built opening new paths towards a wide range of applications: laser-based particle acceleration, novel radiation sources, fast ignition for inertial fusion, hadron-therapy, etc... To trigger and sustain such developments, a deep understanding of LPI is necessary. This understanding relies on theoretical/analytical models as well as on intensive realistic numerical simulations.

This workshop aimed at stimulating and discussing recent progress in this field. To do so, the conference has been organized around 4 main topics, all of them introduced by a 1h30 overview talk. The first day of the conference was dedicated to laser-based electron acceleration and waves in plasmas. This first topic was introduced by an overview talk by Prof. Alexander Pukhov (Düsseldorf) who introduced the basics of theory and simulation of laser-based electron acceleration and presented recent progress toward TeV electron generation. The second day was devoted to laser-based ion acceleration. This topic was introduced by Prof. Vladimir Tikhonchuk (Bordeaux) who gave an overview of the theory and simulation of ion acceleration with lasers, presenting various acceleration mechanisms and addressing some of the newest studies in this field. The third topic of the conference was devoted to fundamental high-field physics, with a particular focus on quantum electrodynamics (QED) processes, which will arise on the forthcoming multi-petawatt lasers. This topic was introduced by Dr. Antonino Di Piazza (Heidelberg), who made a bridge between classical electrodynamics and QED. In particular, he addressed the so-called problem of radiation back-reaction which will give us the opportunity to test both theories on the next generation of lasers. The fourth main topic was addressed on the last day of the conference and concerned the most recent developments in the numerical simulation of LPI. This topic was introduced by Prof. Paul Gibbon (Jülich), who presented the latest advances and emerging trends in this field.

In addition to this 4 central topics, Prof. W. Sandner (Berlin) presented the latest European projects of multi-petawatt lasers, and Prof. T. Cowan (Dresden) presented various applications – such as hadron-therapy – of the new particle and radiation sources available using high-power lasers. A visit of the Helmholtz Zentrum Dresden Rossendorf (HZDR) was also organized on the third day of the conference.

Finally, the Institute Colloquium was given by Prof. L. Silva (Lisbon) who presented large scale numerical simulations discussing both fundamental applications of LPI, such as the possibility to mimic in the laboratory relativistic astrophysical shocks, and more applied developments in connection with plasma-based particle accelerators.

In addition to these seven overview talks, 21 contributed talks were selected by the scientific coordinators of the ENLITE 2012 workshop. PhD students, postdocs and senior scientists had 25 minutes to present their latest results, and 5 additional minutes were attributed to questions and/or discussions.

Also, two poster sessions were organized. A total of 38 posters were presented. Among the poster presented by PhD students, four outstanding contributions were selected and awarded prizes provided by two of the conference sponsors, namely NVIDIA (which offered 3 graphic cards designed for scientific computation) and Circular (which offered a mobile workstation as the first prize).

This workshop was organized within the ENLITE (Dresden Exchange on Laser-plasma Interaction Theory 09) framework in collaboration with HZDR and CELIA (University of Bordeaux). It was intended as a follow-up of the ENLITE 2009 conference hosted at HZDR three years ago. With more than 60 participants, we believe the conference to be a success. In particular, the overview speakers have given outstanding, pedagogical, presentations which allowed to trigger lively discussions. Contributed talks and posters also allowed to present the latest advances in the

field of LPI at ultra-high intensity. The format of the workshop – combining long overview talks, 30 minutes contributed talks, and posters, thus granting time for extensive discussions – was met with great enthusiasm by the participants. These participants came from all continents, and we obtained an interesting balance between junior (Master and PhD students) and more experienced (postdocs and senior) researchers.

Convinced of the success of this workshop, we already plan to organize, within the next three years and in the context of the ENLITE framework, a follow up for this workshop.

Finally, we would like to thank the Max Planck Society for providing us with the means to organize this event, as well as the conference sponsors: NVIDIA, Transtec and Circular. The scientific coordinators are particularly grateful to the MPIPKS visitors program for its support and efficiency.