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Editorial

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The interaction of intense laser radiation with matter is a key research subject that now approaches previously unexplored regimes and required mutual expertise of different communities. On the one side, the "Ultra-High-Intensity" (UHI) community is developing very promising studies (e.g. ultra-fast physics or particle acceleration) of fundamental and societal interests and is rapidly expanding, mostly using small-sized laboratory-based facilities. While on the other side, the Holy Grail of the "High-Energy-Density" (HED) community is inertial confinement fusion (ICF) energy production, of major interest both from a pure scientific point of view and for its potential applications. Such a complex research is principally conducted on large-scale national instruments.

The relationship between these two populations of researchers could look lose, at first sight. But, recently, some synergies arose, over topics such as the physics of fast ignition, which simultaneously requires UHI and HDE laser pulses, and the development of innovative probe diagnostics based on energetic UHI laser-accelerated particle or radiation sources.

For the mutual benefit of the whole laser-plasma community it thus seemed very timely to initiate a joint conference – which was eventually held in Bordeaux in the fall of 2007 – with the ambitious goal to make a decisive step forward in the strengthening of the links between two communities developing science on lasers at either high energy (hundreds of J delivered in ns pulses) or high intensity, handling ultra-short (fs to ps) moderate-energy (mJ to J) pulses. More than 150 researchers gathered and we are confident that this conference will be the forerunner of a long series, for the development of our community and of the physics of laser-generated plasmas and their applications.

Following this successful event it was decided to make the additional effort to produce together a special issue reflecting the growing overlap between the scientific communities involved, a refereed status report that would contain some basic short reviews as well as a selection of papers where advances on some of the issues dealt with at that meeting could be reported: high energy-high intensity laser sources, attophysics – where sub-femtosecond short pulses reveal structural and dynamical structures with unprecedented resolution – relativistic driven plasma as a novel radiation source, Inertial Confinement Fusion for energy with a special emphasis on fast ignition, plasma driven particle acceleration, XUV-X or particle secondary sources, related applications and radioprotection issues and, last but not least, prospective overviews of the fundamental physics that could be investigated with ultra-high-intensities.

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