

Editorial from the Editor in Chief: Inertial Fusion Energy on the Horizon

While the current issue was under preparation, the fifth International Conference on Inertial Fusion Sciences and Applications was held at Kobe, Japan, from September 9–14, 2007. This conference has developed into the most important biannual meeting of scientists involved in fusion science and its applications. The topics addressed at this conference are also at the center of interest for readers and authors of *Laser and Particle Beams*. Inertial Fusion Energy is generally associated with research at major laser facilities like the National Ignition Facility (NIF) in the United States and the project Megajoule in France (Dewald *et al.*, 2006; Kilkenny *et al.*, 2005). Smaller laser facilities like the Vulcan petawatt Laser (Danson *et al.*, 2005), or the Prague Asterix Laser (PALS (Jungwirth, 2005; Batani *et al.*, 2007), and others study specific aspects of laser matter interaction at high intensities. Especially the discovery of high energy electrons and ions accelerated in laser plasma has given a boost to this field (Flippo *et al.*, 2007; Yin *et al.*, 2006; Lifshitz *et al.*, 2006; Glinec *et al.*, 2005 Roth *et al.*, 2005). While laser drivers are expected to achieve ignition and gain in the laboratory, within a few years from now the route to economically feasible inertial fusion energy still remains open. Heavy ion beam drivers from accelerators offer the option of high repetition rate and efficient transformation of electric energy to kinetic energy of the beam ion, which in turn couples its energy in a very efficient way to the bulk matter of the target. Major accelerator laboratories worldwide have been and are currently still engaged in projects to investigate the potential of ion beams as drivers for inertial fusion energy.

It is obvious that significant advances have been made toward inertial fusion. Both large scale laser facilities designed to achieve ignition soon after 2010 are nearing completion. The status of the National Ignition Facility in the U.S and the MegaJoule project in France was the obvious focal point of interest, and is the subject of a large number of recent publications (Giorla *et al.*, 2007; Haynam *et al.*, 2007). However, laser laboratories worldwide are participating in the effort to understand the details of beam matter interaction physics necessary to achieve the conditions of inertial fusion (Laska *et al.*, 2006; Lontano *et al.*, 2006;

Borghesi *et al.*, 2005; Schaumann *et al.*, 2005). The scientific discussion for many years shows (Meyer-ter-Vehn *et al.*, 1990; Funk *et al.*, 1998) and it was confirmed here that the target design is a most crucial issue for the experimental facilities as well as for a future full scale driver (Nobile *et al.*, 2006; Fernandez *et al.*, 2005; Khalenkov *et al.*, 2006; Koresheva *et al.*, 2005).

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