

Preface

The Fourth International Conference on Inertial Fusion Sciences and Applications (IFSA 2005) was held September 4–9, 2005 at the Bellevue Conference Center in Biarritz, France. The host organizations for this conference were the University of Bordeaux 1, the Centre National de la Recherche Scientifique (CNRS) and the Commissariat à l'Énergie Atomique (CEA). The conference objective was to review the state of the art of research in inertial fusion sciences and applications since the last conference held in Monterey California, USA, in 2003. Altogether 509 abstracts were submitted, 418 accepted, and more than 440 persons from 23 countries attended the conference. These Proceedings contain 249 of the papers presented at IFSA 2005. This collection of papers represents the manuscripts submitted to and passing the peer review process.

The IFSA 2005 conference is the first of a new series of three conferences to be organized in France, Japan and the USA and governed under Annex I of the Memorandum of Agreement, signed in June 2004, among the Lawrence Livermore Laboratory operated by the University of California (UC), Osaka University, and Institut Lasers et Plasmas (ILP), operated by CNRS Délégation Aquitaine.

IFSA 2005 continued the strong tradition of the three previous conferences in Bordeaux, Kyoto and Monterey. It was the largest IFSA yet with a substantial participation from countries such as China and Russia. With a goal of achieving inertial fusion ignition and burn propagation in the laboratory, there continues to be significant progress in the international inertial fusion community. At IFSA 2005, researchers presented the exciting advances in traditional hot spot ignition approach, including results from the early experiments from the NIF laser. A particular emphasis of the meeting was the rapid and exciting progress in the fast ignition scheme. Integrated and basic physics experiments on GekkoXII, Vulcan, and other laser-matter interaction facilities have shown promising results. A lot of new results of experiments and numerical simulations in ultra-intense laser interactions have also been presented.

The Megajoule Laser (LMJ), as one of two facilities being built to achieve target ignition, was a key attraction of IFSA 2005. About 200 participants toured the LMJ construction site and the LIL laser prototype during the conference. Before the tour, a special Facility Focus session examined progress on inertial fusion facilities around the world, including the soon-to-be-completed OMEGA-EP upgrade at Rochester, USA, and FIREX I, at Osaka, Japan. Recent progresses in hohlraum physics continue to give confidence in the ultimate achievement of ignition on the NIF Laser and the Megajoule Laser. The USA are pursuing a very focused program on ICF under the National Ignition Campaign (NIC). In China, a national project has been launched, the goal of which is fusion ignition and plasma burning in about 2020. Progress in direct drive has been notable over the past few years with the cryogenic implosions at LLE, polar direct-drive that may enable to switch rapidly from an indirect- to a direct-drive laser configuration, adiabat shaping of laser pulses, and even “Saturn targets”, a short circuit topic from ICF to laboratory astrophysics. About this last topic, radiative shocks and plasma jets were among the most studied subjects. There were also sessions on the technologies of all types of drivers, including KrF and DPSSL lasers, particle beams, and Z-pinches. Advances in Z-pinch included double-hohlraum irradiation symmetry and the construction of a PW laser beam for the Z-facility. Advance in plasma diagnostics were dominated by proton imaging from ultra-intense interactions and precise imaging spectroscopy of core implosions. Of special interest, advanced target physics and reactor design studies have started to be more present during this IFSA edition.

These Proceedings start with special chapters on the keynote speeches and the Teller lectures. The keynotes give an overview of progress in inertial fusion in North America, Europe and Asia. The Teller lectures show the contributions of this year's two winners: Joe Kilkenny of General Atomics and Max Tabak of LLNL. The remainder of the Proceedings is divided into three parts. Part A covers the physics of inertial fusion; Part B covers facilities, lasers, particle beams, Z-pinches, target fabrication and reactor design; Part C covers fundamental high-energy density science and other applications of inertial fusion

technology such as plasma diagnostics, atomic physics and X-ray sources, laboratory astrophysics and laser particle acceleration. The readers should be aware that for some of the papers, only a short version is presented in this book: the extended version will be published in a topical issue of the European Physical Journal.

The IFSA International Organizing Committee and Scientific Advisory Board appreciate the efforts of inertial fusion researchers worldwide in making IFSA 2005 an extremely successful conference.

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