



Laser-ion acceleration for Fast Ignition research and applications

A. Morace, N. Iwata, Y. Sentoku, K. Mima, Y. Arikawa, A. Yogo, A. Andreev, Y. Nakata, S. Tosaki, X. Vaisseau, Y. Abe, S. Kojima, S. Sakata, M. Hata, S. Lee, K. Matsuo, N. Kamitsukasa, T. Norimatsu, J. Kawanaka, S. Tokita, N. Miyanaga, H. Shiraga, Y. Sakawa, M. Nakai, H. Nishimura, H. Azechi, S. Fujioka, and R. Kodama.

Abstract:

Laser ion acceleration has been an active topic of research for the past two decades. Several methods of acceleration have been envisioned over the years and applications range from injectors for particle acceleration, proton radiography of electric and magnetic fields associated to high energy density physics experiments, potential medical applications, and generation of high energy density states via plasma heating by intense ion beams, the latter closely related to ion Fast Ignition research.

The FIREX project at the Institute of Laser Engineering in Osaka University, now in the first stage, is focused on the demonstration of ultra-fast heating of a compressed, 0.1g/cm^3 plasma by either electron or ion beams. Within the FIREX project, several steps forward have been taken in characterizing and optimizing the ion source as well as performing the first studies in Japan about ion induced heating in dense plasmas. This included the study of LPI of multiple, interfering beamlets, the dynamics of ion beams in focusing plasma devices and the first studies of ion induced heating in mid-Z materials.

In this talk we will present the progresses achieved by the research team as well as future challenges to tackle in order to achieve the FIREX I goal for ion Fast Ignition.