Contribution ID: **88** Type: **talk**

Effect of the laser wavefront in a high repetition rate laser-plasma accelerator

Thursday, 17 September 2015 18:00 (30 minutes)

Recently, several groups have been developing laser-plasma accelerators operating at high repetition rate, using kHz lasers with energies < 10 mJ [1, 2]. Such developments are particularly important for applications as the high repetition rate improves the beam stability and permits data accumulation [3].
We performed an experiment of electrons acceleration by tightly focusing kHz, few-mJ laser pulses into an underdense plasma. This high intensity laser-plasma interaction led to stable electron beams with strikingly complex transverse distributions even for good quality laser focal spots. The laser wavefront at focus was measured experimentally and we performed for the first time PIC simulations including experimentally retrieved wavefronts.
Analysis of the experimental data, along with results of PIC simulations demonstrates the effect of the distorsions of the laser wavefront on the acceleration of electrons [2]: the laser pulse drives an inhomogenous transverse wakefield whose focusing/defocusing properties affect the electron distribution. These findings explain the experimental results and suggest the possibility of controlling the electron spatial distribution by tailoring the laser wavefront.

[1] Z. He et al, NJP 15 (2013) 053016
[2] B. Beaurepaire et al, arXiv:1501.05797
[3] Z. He et al, APL 102, 064104 (2013)

Primary author: Mr BEAUREPAIRE, Benoit (Laboratoire d'Optique Appliquée (LOA))

Co-authors: Dr LIFSCHITZ, Agustin (Laboratoire d'Optique Appliquée (LOA)); Dr VERNIER, Aline (Laboratoire d'Optique Appliquée (LOA)); Dr GUENOT, Diego (Laboratoire d'Optique Appliquée); Dr FAURE, Jérôme (Laboratoire d'Optique Appliquée (LOA))

Presenter: Mr BEAUREPAIRE, Benoit (Laboratoire d'Optique Appliquée (LOA))

Session Classification: WG1 - Electron beams from plasmas

Track Classification: WG1 - Electron beams from plasmas