Optimization of plasma density profile in laser electrons plasma accelerators

[1]Céline HUE, [1]Yang WAN, [1]Eithan LEVINE, [1]Omri Seeman, [1]Daria RASPOPOVA, [1]Sheroy TATA,[1]Victor MALKA
*conférencier principal, Céline HUE
[1] *Weizmann Institute of Science, Rehovot, Israël*
* celine.hue@weizmann.ac.il

Shock-injection in laser driven plasma-based accelerators (LWFAs) are proofed to be an elegant and efficient approach for generating high quality electron beams. Yet, the charge of the produced beams is still limited to tens of pc, reducing then its use for a wider range of applications. The possibility to generate high charge beams by keeping a good quality, stays to be explored. Moreover, despite former studies focused on separate physical processes such as for example beam loadings, repulsive defocusing force, and laser evolution, a more general investigation of the plasma density parameters on the final beam parameters is required. In this research, we investigate the possibilities to improve shock-injection parameters for producing high quality and high charge electron beams in the hundreds of MeVs range of energy. With this research, we have understood that the longitudinal distribution of the beam current $I(\xi)$ plays an important role in the injected beam charge as well as energy performance. Ways to tailoring $I(\xi)$ are also been studied.