Laser plasma accelerators physics with the first results from the new WIS 2×100 TW laser

Victor Malka

Department of Physics of Complex Systems, Weizmann Institute of Science, Rehovot, Israel

Laser Plasma Accelerators (LPA) rely on our ability to control finely the electrons motion with intense laser pulses [1]. Their collective manipulation permit to produce giant electric fields of value exceeding by 3 orders of magnitude or more the ones used in current machines [2]. These collective motions when controlled permits also to modify and to shape the longitudinal and radial components of the plasma fields for either accelerating efficiently electrons or for producing energetic photons by wiggling electron during their acceleration [3,4]. This control is crucial for electrons injection that is essential for delivering ultra-short and ultra-bright energetic particle or radiation beams. To illustrate the beauty of laser plasma accelerators I will show some concepts we recently demonstrated that allow these controls for beams improvements. Finally, I will show the commissioning of the HIGGINS dual laser system of the Weizmann Institute of Science [5], together with a set of first experimental results.

Keywords: high power lasers, accelerators, X-ray beams, electron beams

[5] E. Kroupp et al., submitted to MRE