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Manipulating Relativistic Electrons with Intense Laser Pulses

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Laser Plasma Accelerators (LPA) rely on the control of the electrons motion with intense laser pulses [1]. Improvements of electron beam parameters such as divergence, energy or energy spread are possible thanks to this fine optical control. This manipulation of electrons with intense laser pulses allows a fine mapping of the longitudinal and radial components of giant electric fields that can be therefore optimized for accelerating charged particle or for producing X rays. To illustrate the beauty of laser plasma accelerators I will show different experimental results that we recently performed that allow to improve the quality of the electron beam, its stability [2] and its energy gain in longitudinal field [3], or the reduction of its divergence using radial field [4]. I'll then show how by controlling the quiver motion of relativistic electrons intense and bright X-rays beam are produced in a compact and elegant way [5-7]. Finally I'll show some examples of applications [8].

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- [2] E. Guillaume et al., Phys. Rev. Lett. 115, 155002 (2015).
- [3] C. Thaury Scientific Report, 10.1038, srep16310, Nov. 9 (2015)
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- [5] K. Ta Phuoc et al., Nature Photonics 6, 308-311 (2012).
- [6] S. Corde et al., Review of Modern Phys. 85 (2013)
- [7] I. Andriyash et al., Nature Comm. 5, 4736 (2014)
- [8] V. Malka et al., Nature Physics. 4, 447 (2008)

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Experiments and Diagnostics

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