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Laser-plasma acceleration: A close view on self-injection mechanisms

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In the original paper, Tajima and Dawson (1979), suggest to use a wakefield generated by an intense laser pulse to accelerate relativistic electron. In the Laser Wakefield Accelerators (LWFA), the high longitudinal electric field supported by plasma waves accelerates trapped (self-injected) electrons to velocities close to wave phase velocity. With respect to the standard RF-linacs, the accelerating distances is 1000 times shorter.

A critical aspect of LWFA is the self-injection mechanism which can influence the shot-to-shot stability. We will report on a recent experimental study on self-injection aimed at the optimization of a LWFA used for radiobiology and secondary sources. We will also compare the experimental results at ILIL laboratory with a PIC simulation code; the Jasmine code.

Primary author: PALLA, Daniele (PI)

Co-authors: BAFFIGI, Federica (INO CNR (Pisa)); Mr ROSSI, Francesco (INFN Bologna); GIZZI, Leonida Antonio (PI); FULGENTINI, Lorenzo (INO CNR (Pisa)); Dr LABATE, Luca (Istituto Nazionale di Ottica - Consiglio Nazionale delle Ricerche); FERRARA, Paolo (INO CNR (Pisa)); LONDRILLO, Pasquale (BO); KOESTER, Petra (INO CNR (Pisa))

Presenter: PALLA, Daniele (PI)

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