

Electron laser wakefield acceleration with the CILEX facility, a PIC simulation based investigation

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CILEX (Centre Interdisciplinaire Lumiere Extreme) is the Interdisciplinary Center on EXtreme Light. This facility located in the Paris area will host the APOLLON-10P laser, which will deliver short pulses, down to possibly 15 fs, at a still unreached instantaneous power of 10PW, and the associated infrastructures and experimental setup which will offer the possibility to perform scientific breakthroughs in various domains.

We have used the particle-in-cell (PIC) code Calder-Circ, to determine the typical characteristics of the electron beams that could be generated with this laser in its very first phase when only 1 PW will be available in the case of self-injection in the blow out regime. We compare initially matched pulses against initially over-focused pulses in terms of injection capabilities and dark current suppression. In the first case, self-guiding sets in very quickly whereas in the second, the laser diffracts, forcing the bubble to expand before reaching a self guided stage. We also try to evaluate the importance of having a 15 fs pulse versus a more standard 25 fs pulse.

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