ID contributo: **357** Tipo: **Poster (participant)**

On maximizing LWFA by tailoring the plasma density

lunedì 18 settembre 2023 19:00 (1O 30m)

We present a preliminary analytical procedure [1,2] in 4 steps to tailor the initial density of an inhomogenous cold diluted plasma to the laser pulse (both assumed plane-symmetrical) so as to control wave-breakings of the plasma wave and maximize the acceleration of small bunches of electrons self-injected by the first wave-breaking at the density down-ramp. We use an improved fully relativistic plane hydrodynamic model [3,4,5] whereby the pulse is modeled as a plane wave travelling in the z direction and the Lorentz-Maxwell and electrons' fluid continuity equations are reduced to a family, parametrized by $Z > 0$, of decoupled pairs of Hamilton equations; Z pinpoints the infinitesimal layer of electrons having coordinate $z = Z$ for $t \leq 0$, while $\xi = ct - z$ replaces time t as the independent variable. Our (1+1)-dimensional results may help also in realistic (3+1)-dimensional problems.

[1] G. Fiore, arXiv:2305.04580, to appear in the IEEE Proceedings of the Workshop AAC'22.

[2] G. Fiore, On maximizing LWFA by tailoring the plasma density,
in preparation.

[3] G. Fiore, J.Phys.A:Math.Theor. 51, 085203 (2018).

[4] G. Fiore, M. De Angelis, R. Fedele, G. Guerriero, D. Jovanovic,
Mathematics 10, 2622 (2022).

[5] G. Fiore, S. De Nicola, T. Akhter, R. Fedele, D. Jovanovic,
arXiv:2303.03322, PhysicaD:NonlinearPhenomena in press.
doi:10.1016/j.physd.2023.133878

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Classifica Sessioni: Poster session

Classificazione della track: WG1: Plasma-based accelerators and ancillary components