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Detailed numerical modeling of electron injection in the Laser Wakefield Accelerator: Particle Tracking Diagnostics in PIC codes R.A. FONSECA, ISCTE - Lisbon, IST - Lisbon, L. GARGATÉ, S.F. MARTINS, F. PEANO, J. VIEIRA, L.O. SILVA, IST - Lisbon, W.B. MORI, UCLA — The field of laser plasma acceleration has witnessed significant development over recent years, with experimental demonstrations of the production of quasi mono-energetic electron bunches, with charges of ~ 50 pC and energies of up to 1 GeV [1]. Fully relativistic PIC codes, such as OSIRIS [2] are the best tools for modeling these problems, but sophisticated visualization and data analysis routines [3] are required to extract physical meaning from the large volumes of data produced. We report on the new particle tracking diagnostics being added into the OSIRIS framework and its application to this problem, specifically targeting self-injection. Details on the tracking algorithm implementation and post processing routines are given. Simulation results from laser wakefield accelerator scenarios will be presented, with detailed analysis of the self injection of the electron bunches.

[1] W.P. Leemans et al, Nature Phys. 2 696 (2006)

[2] R. A. Fonseca et al., LNCS 2331, 342, (2002)

[3] R. A. Fonseca, Proceedings of ISSS-7, (2005)

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