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Laser-Driven electron Plasma Acceleration by External Injection

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The External Injection (SL-ExIn) experiment aims at demonstrating the possibility to accelerate a high brightness electron bunch by plasma wakefields in a stable and reproducible way, without spoiling its phase space quality. The plasma wakefield is excited through a high power laser guided by a dielectric capillary. Simulations[1] show this is actually feasible and foresee an accelerating gradient around 7 GV/m with the chosen parameters set. The experiment will take place in the INFN Frascati labs at the SPARC LAB facility, where the unique availability of the high power laser FLAME, together with the high brightness photo-injector SPARC, allows to perform plasma acceleration experiments. In this contribution, we explain the rationale behind the choice of experimental parameters and show simulation results both for start to end beam dynamics, where a novel methodology is introduced for the delivering of ultra short bunches, and for the guiding of non ideal (Gaussian) profile high power laser pulses. Finally we report on advancements in hardware acquisition, installation and commissioning.

1 - A.R. Rossi et al., NIM-A 740 (2914) 60-66

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