CNR-INO
ISTITUTO NAZIONALE DI OTTICA
CONSIGLIO NAZIONALE DELLE RICERCHE

AVVISO DI SEMINARIO

Giovedì 14 Marzo 2019 alle ore 12:00

presso l'Area della Ricerca di Pisa, Aula 33, Edificio A, Piano terra

Il Dr. Davide Terzani

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terrà un seminario sul tema:

Numerical and theoretical modelling of plasma-based accelerations schemes.

Laser Plasma Accelerators (LPA) have been a technological breakthrough for the creation of compact accelerating machines. Due to its capability to support accelerating fields many orders of magnitude bigger than the ones implied in the conventional RF accelerators, plasma allows in principle to reach ultra-high energies in a very reduced space.

In this seminar, we present the theoretical and computational modelling of the nonlinear laser – plasma interaction in regimes relevant to the acceleration process. Due to the strongly limited computational speed that can be reached by a standard fully kinetic Particle-In-Cell code, we addressed the problem of developing some reduced numerical model. Our goal is in fact to boost the simulations without losing the most important kinematic details. For this reason, we implemented in the ALaDyn code an explicit integration of the so called laser – envelope model in which, assuming a broad laser pulse, only the relevant long scales are retained while the short ones are averaged out, allowing to strongly reduce the resolution needed to evolve the system. Also, we implied this numerical technique to validate a novel and very promising acceleration scheme, based on the decoupling of the wakefield generation and of the particle ionization process. Due to the complexity of the model, a fully 3D kinetic simulation would unfeasible with the currently available computational resources, so we performed a stage-by-stage comparison making use of the reduced model implemented in ALaDyn and of the hybrid, cylindrical, quasi-static code QFluid, showing an excellent agreement.