

Séminaire du Laboratoire de l'Accélérateur Linéaire

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Vendredi 31 octobre 2014 à 11h00

The AWAKE plasma-wakefield experiment at CERN

Plasma-based particle acceleration is one of the promising high-gradient techniques investigated to possibly replace current RF technology to build a future more compact and economical electron/positron linear collider at the energy frontier.

I will review the motivations, the physics and the plans for the AWAKE, the Advanced WAKEfield Experiment at CERN (<http://home.web.cern.ch/about/experiments/awake>). The goal of this experiment is to explore the possibility of exploiting the large amount of energy (many kilojoules) carried by proton bunches to drive wakefields in plasmas and to accelerate electrons and positrons to the TeV energy scale.

Current proton bunches are long (~12cm) and the first experiments will study the self-modulation instability (SMI, Kumar PRL 104, 255003 (2010)) that can transform the incoming bunch into a train of short bunches, separated by approximately the plasma wavelength (~1mm), to drive wakefields to GV/m amplitudes. The SMI has never been observed and the first experiments will study the SMI of long proton bunches in plasmas. A second round of experiments will use externally-injected electrons to probe the wakefields. The RF-gun will produce bunches encompassing a few plasma wavelengths. A fraction of the electrons will be trapped and accelerated to the GeV scale with a finite energy spread, as suggested by numerical simulations. These experiments will use a single plasma cell, ~10m long. Later experiments will use two plasma sections and short electron bunches (<<1mm) for accelerator experiments.

The very first experiments are planned for late 2016 (AWAKE Collaboration, Plasma Phys. Control. Fusion 56 084013 (2014)).

Auditorium Pierre Lehmann - Bât. 200, Orsay

Thé et café seront servis ¼ h avant le séminaire

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