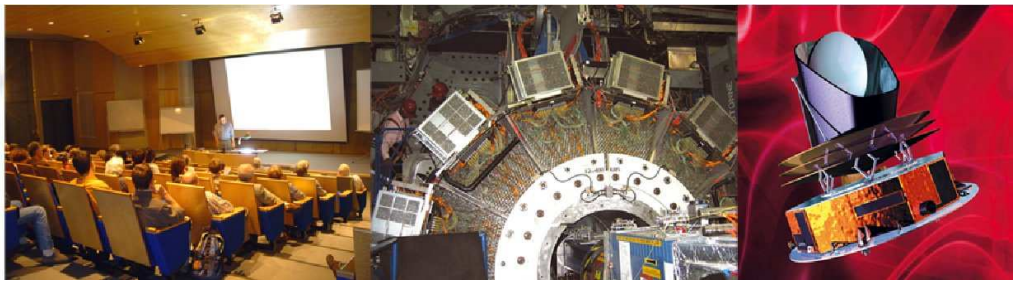
LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE



Séminaire du Laboratoire de l'Accélérateur Linéaire

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LOA (ENSTA Palaiseau)

Mardi 2 Juin 2015 à 11 :00

Laser plasma technologies for new ultracompact sources of bright synchrotron radiation

The capability of laser plasmas to generate and sustain ultra-high electric fields has given rise to laser-plasma engineering, which nowadays is widely used to produce and manipulate the intense beams of charged particles and radiation. One important application of laser plasmas is the compact sources of X-ray synchrotron radiation (SR)[1]. In this context, an important role is given to *laser plasma acceleration* (LPA) – the technique, where quasi-monoenergetic beams of MeV/GeV electrons are produced in a millimeter-scale gas jet via laser-driven plasma waves [2,3]. The beams delivered by state-of-the-art LPA are extremely intense, but yet have relatively high divergence and energy spread due to complexity of electron injection into the accelerating plasmas fields. Therefore, for efficient X-ray generation and/or amplification, such future laser-plasma SR sources require strong undulators, which can also operate on very short lengths. New concepts of the compact sources attract growing interest worldwide thanks to the numerous applications of X-rays in science, medicine and technology. In this presentation, I discuss the schemes of ultra-compact optical and plasma undulators, which involve laser-plasma technology and nano-engineering. The concepts of the undulators based on the optical lattice~[4], and on the nano-structured plasmas [5] are presented in details. Theoretical descriptions are provided and verified with advanced numerical modeling. The numerical methods are discussed explicitly in the context of X-ray amplification via stimulated scattering mechanisms [6].

Références

[1] S. Corde et al, Rev. Mod. Phys. 85, 1 (2013)
[2] E. Esarey et al, Rev. Mod. Phys. 81(3), 1229 (2009)
[3] V. Malka et al, Phys. Plasmas 16, 056703 (2009)
[4] I.A. Andriyash et al, Phys. Rev. Lett. 109, 244802 (2012)
[5] I.A. Andriyash et al, Nat. Commun. 5, 4736 (2014)
[6] I.A. Andriyash et al, J. Comput. Phys. 282, 397 (2015)

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Thé et café seront servis 5 mn avant le séminaire