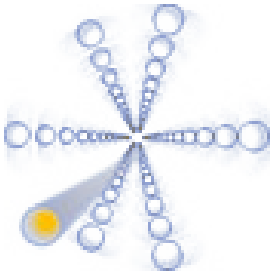

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Compact X-Ray Beams Produced with Laser Plasma Accelerators

Thursday, 9 October 2014 12:00 (30 minutes)

Ultra-bright femtosecond X-ray pulses resulting from the laser beam interacting with a plasma medium have been successfully developed this last decade. An important role in the development of the compact X-ray sources, is given to the laser plasma accelerators, that deliver today high quality and high peak current electron beams. I present here a review of the different schemes that allow to produce such bright X ray beams (betatron, Compton, Bremsstrahlung) and I will discuss about their applications. I'll also discuss on a new concept that allows to extend and control the photon energy range and the number of the emitted X-ray using without requiring additional laser energy or additional laser beam. In the simplest case, electron and laser beams from a laser-plasma accelerator interact with a sub-millimeter structure of nano-wires that are periodically assembled. The driver laser pulse that precedes the electron bunch produces a strong charge separation field on the surfaces of the wires, which acts as an undulator on the following relativistic electrons. The characteristics of emitted light, for a 1 J laser system, can be controlled for example by changing the spatial distribution of the wires, to deliver photons of hundreds of keV energies in a collimated beam.

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