Joint DESY and University of Hamburg Accelerator Physics Seminar

Tuesday, July 22-nd, 2008

(16:00 in Room 459/30b)

Infrared Single Shot Diagnostics for the Longitudinal Profile of the Electron Bunches at FLASH
(Disputation)

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Abstract

For the free electron laser FLASH in Hamburg, a longitudinal compression scheme is used which results in an asymmetric longitudinal bunch profile with a "spike". This "spike", which has a very high peak current, is used in a high–gain SASE–FEL process to produce high intensity femtosecond photon pulses in the XUV wavelength range. The required high peak current of the electron bunch is realized by confining a large number of electrons in a width, measured in time units, of few tens of femtosecond, making the diagnostics of such bunches a challenge. Furthermore, the operation of facilities such as FLASH shows that single–shot diagnostics is indispensable. I will describe a wavelength–domain technique that fulfils both requirements of single shot and high resolution reaching to the femtoseconds range. The amount of charge that is confined in a typical length of several femtoseconds (FWHM of the spike) can be determined by a novel single-shot spectrometer that resolves the coherent radiation (e.g. coherent transition radiation) in the infrared range.

D.P.Barber (MPY), S.Khan (Univ. HH), J.Roßbach (Univ. HH) and M.Vogt (MPY).