Joint DESY and University of Hamburg Accelerator Physics Seminar

Tuesday September 28, 2004

(15:00 in Room 459/30b)

A Bunch Compressor for small Emittances and high Peak Currents at the VUV Free–Electron Laser

(Disputation)

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Abstract

To produce laser–like radiation of 6 nm wavelength in the VUV–FEL, electron bunches with a peak current of 2500 A are needed. Their emittance has to be lower than 2 mm mrad. The electron bunches which are produced in the photo injector have a small emittance, but their current is too low. Consequently, they have to be compressed longitudinally.

During bunch compression in a magnetic chicane strong coherent synchrotron radiation (CSR) is emitted by the electrons and the transverse emittance of the electron bunch grows. Since the emittance dilution depends on the chicane geometry different layouts are compared in computer simulations. A symmetric S–shaped chicane built of six dipoles is found to match the requirements of bunch compressor 3 (BC3) very well.

CSR also leads to an amplification of small modulations in charge density and energy. The amplification factor strongly depends on the modulation frequency as well as on the emittance and the energy spread of the electron bunch. It is studied if and in which frequency range the amplification of modulations can become important in BC3.

NOTE THE UNUSUAL TIME

D.P.Barber (MPY), J.Rossbach (Univ. HH), P.Schmüser (Univ. HH), and M.Vogt (MPY).