Joint DESY and University of Hamburg Accelerator Physics Seminar

Tuesday, January $\boxed{\textbf{22-nd}}$, 2008

(16:00 in Room 459/30b)

Longitudinal Phase Space Studies at the Photoinjector for the X-FEL

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Abstract

For a high brilliance free electron laser using the SASE–principle an electron beam with a high current, a small transverse emittance and a small energy spread is required. The properties of the electron bunches are predefined by the source, therefore photoinjectors are under investigation at the PhotoInjector Test facility DESY in Zeuthen (PITZ). Among other diagnostics, devices to measure the longitudinal phase space and its projections (momentum distribution and temporal current distribution) were designed. Measurements and simulations to determine the influence of different input parameters, like RF launch phase, charge, gradient and laser distribution were performed.

Since space charge forces still play a major role on emittance growth at a few MeV the initial electron bunch length is chosen several orders of magnitude longer than required for an FEL. Typically the beam current after the gun is about 50 A. When the energy is high enough the bunch can be compressed in a magnetic chicane, but an optimum compression is only possible for a linear longitudinal phase space. Thus the knowledge of the shape of the longitudinal phase space and its beam dynamics is of particular interest in order to prepare it for optimum compression.

NOTE THAT THE DATE HAS BEEN SHIFTED BY ONE WEEK

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

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