Joint DESY and University of Hamburg Accelerator Physics Seminar

Thursday, February 26, 2004

(16:00 in Room 459/30b)

Emittance Compensation of a Superconducting RF Photoelectron Gun by a Magnetic RF Field

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Abstract

For compensation of transversal emittance in normal conducting RF photoelectron guns a static magnetic field is applied. In superconducting RF guns the application of a static magnetic field is impossible. Therefore we put instead of a static field a magnetic RF field (TE–mode) together with the corresponding accelerating mode into the superconducting cavity of the RF gun. For a 3 1/2 cell cavity of the superconducting gun with frequencies $f = 1.3$ GHz for the accelerating mode and $f = 3.9$ GHz for the magnetic mode and a bunch charge of 1 nC a transversal emittance of 0.5 mm mrad has been obtained. In this case the maximal field strength on the axis were $E_z = 50$ MV/m for the accelerating mode and $B_z = 0.34$ T for the magnetic mode. (This corresponds to $B_s(\text{max}) = 0.22$ T on the surface of the cavity). Possibilities for the technical realization (input of RF power for the TE mode, tuning of two frequencies in one cavity, phase stability) are discussed.

NOTE THE UNUSUAL DATE AND TIME

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