Joint DESY and University of Hamburg Accelerator Physics Seminar

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(16:00 in Room 459/30b)

Smith–Purcell Radiation from Different Kinds of Gratings Comparison of Theoretical Models and Experimental Results

Alexander Potylitsyn

Tomsk Polytechnic University
Tomsk, Russia

Abstract

Up to now there exists no conventional model for the calculation of the characteristics of Smith–Purcell Radiation (SPR) allowing to choose the experimental set–up (kind of grating, geometry, impact parameter, etc.) and estimate the SPR intensity for beam diagnostics purposes.

Simulation results on SPR characteristics from relativistic electrons for different kinds of gratings based on wide–spread theoretical models are presented in the report. The dependence of SPR characteristics on a geometry of grating and detector disposition was investigated also and so–called pre–wave zone effect criteria are proposed.

Angular dependencies and SPR intensities for lamellar, triangular and flat gratings were measured at the 6 MeV TPU microtron. It is shown that coherent SPR generated by bunches with a population of 10^8 electrons/bunch and a length of around a few millimeters may be investigated by modern room temperature detectors for mm–wavelength range with the required accuracy.

Comparisons with theoretical predictions were carried out and an estimate of the bunch length was obtained.

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