Accelerator Physics Seminar

Tuesday April 15, 2003

(16.00 in Room 459/30b)

Stochastic Beam Dynamics:
The Echo Effect

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Abstract

The influence of noise on the particle motion in storage rings is an important issue. Noise can be the driving mechanims for the creation of coasting beams (i.e. diffusion out of the stable rf buckets) and the formation of beam halos. Furthermore, it is important for investigating and understanding the echo-effect in proton storage rings. The aim of this contribution is to present some numerical tools such as Monte Carlo simulations and solvers for the Fokker-Planck equation and the Stochastic Liouville equation to treat stochastic beam dynamics problems. In particular, we investigate Hamiltonian systems with weak noise. Because of the interplay between phase space volume conserving dynamics, the symplectic properties of the phase flow and the effects of stochastic perturbations a numerical treatment of these systems is highly non trivial. As a sensitive benchmark problem the longitudinal beam echo in proton storage rings is considered.

D.P.Barber (MPY) and M.Vogt (MPY).