

Development and Commissioning of a Single Non-linear Kicker Magnet System for the BESSY II Storage Ring Injection

Top-Up injections without noticeable motion of the stored beam is a challenge. The common method of beam accumulation with a local bump formed by four independent pulsed dipole kicker magnets usually causes beam oscillations. The matching of the four independent kicker systems regarding pulse jitters and shapes is technologically limited. Powering neighboring kicker magnets in pairs reduces the excitation of the beam. An even more promising approach is to deploy a single non-linear kicker magnet with zero $B_{x,y}$ -field in the center and an off-axis maximum, B_y , which is horizontally displaced by 10-12 mm. There the injected beam gets kicked and loses half of its transverse momentum. Such a magnet was designed and built as a short in-vacuum magnet with a small vertical gap height. For first beam tests the kicker was placed in the second straight section after the injection point, and the 1.5 μ s pulse was designed to deflect the 1.72 GeV beam by 1 mrad. In this talk, the calculation and measurement of the magnetic fields, the mechanical design as well as the electrical pulser circuit are described. The experiences with the commissioning of this kicker magnet system are discussed.

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