**Chromaticity Considerations for Nonlinear Integrable Lattices**

**Abstract:**

The nonlinear integrable lattices of the proposed IOTA ring are susceptible to chromaticity-induced tune spread. In conventional accelerator rings, sextupoles are used to correct the linear chromaticity. We present preliminary studies of how sextupole correction can affect integrable dynamics in IOTA.

**Summary:**

Nonlinear integrable optics [1] is a promising route to large tune spreads to suppress parametric resonances such as beam halo [2]. The Integrable Optics Test Accelerator (IOTA) has been proposed to study the practical implementation and beam dynamics of integrable lattices [3]. The ring [4] and its special purpose nonlinear magnets [5] are currently under construction.

A critical effect to be studied is chromaticity, the energy-dependent focusing that can lead to broken invariants. We present here preliminary studies of how linear chromaticity effects beam dynamics in a simplified model of the IOTA lattice. Also, we examine how the use of sextupoles for chromaticity correction affects the dynamic aperture and integrability particle trajectories.

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[3] A. Valishev et al., “Beam Physics of Integrable Optics Test Accelerator at Fermilab,” Proc. IPAC, TUPPC090 (2012).  
  
[4] E. Prebys, "Protons in IOTA Ring," presented at 2nd ASTA Users Meeting (Fermilab, June 2014).  
  
[5] F. O‘Shea, "Non-linear IOTA inserts," presented at 2nd ASTA Users Meeting (Fermilab, June 2014).