Tunes of Non-Flip Lattices

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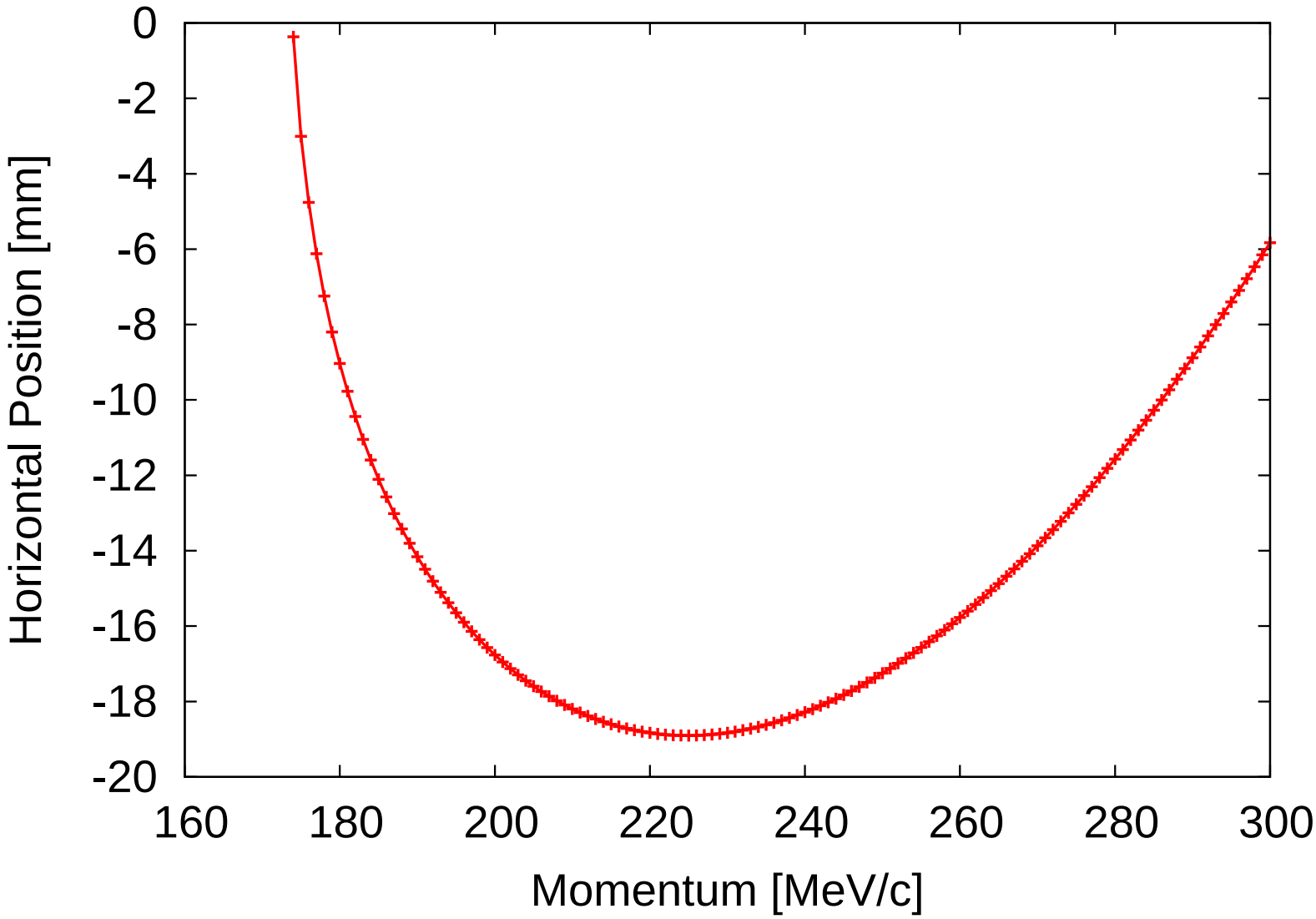
Straight Non-Flip Lattice

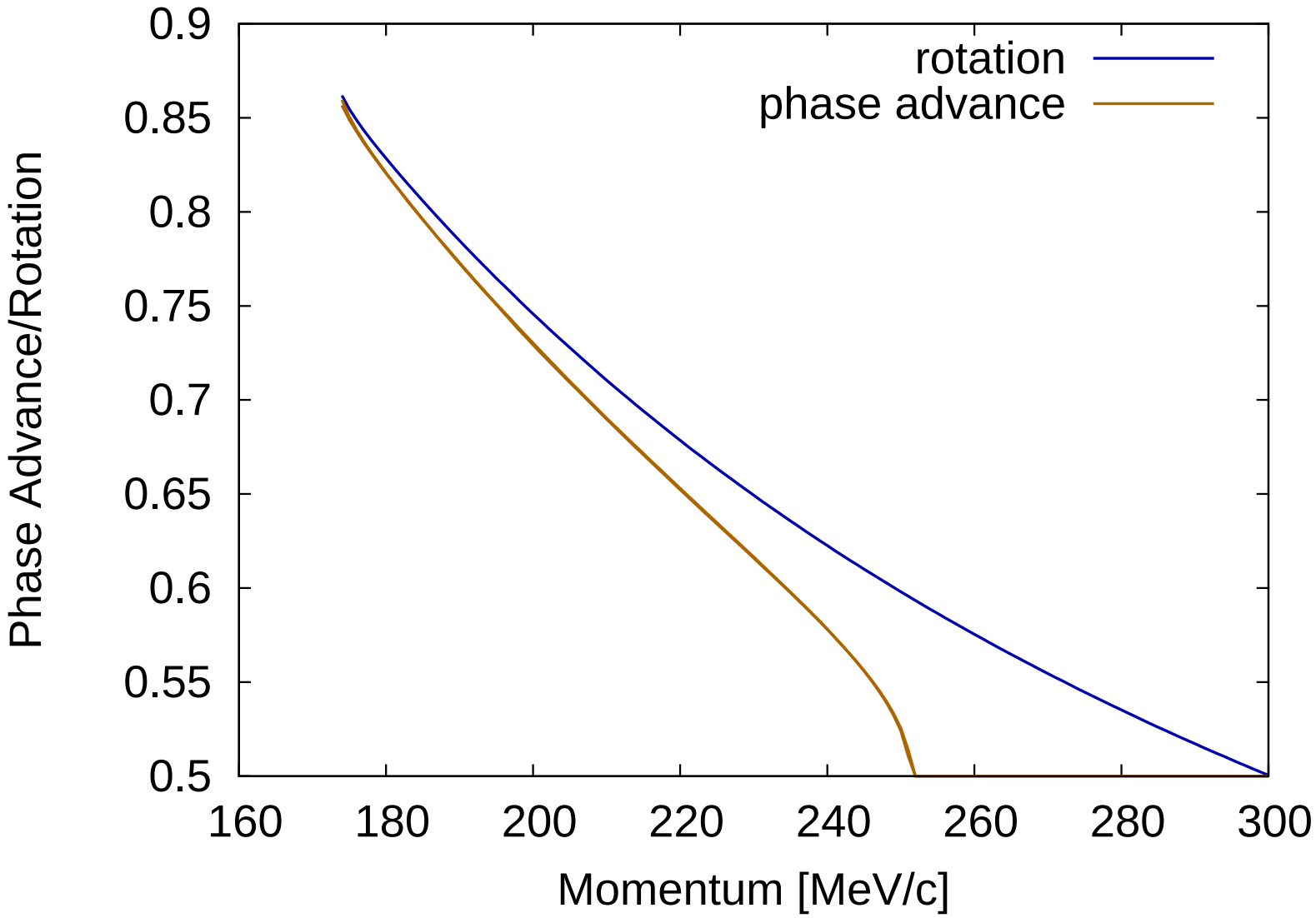
- Straight solenoid lattice with phase advance μ in Larmor frame, and rotation ϕ
- Eigenvalues in non-rotating lab frame are $e^{\pm i(\mu-\phi)}$ and $e^{\pm i(\mu+\phi)}$
- Constant solenoid field: μ and ϕ are the same
- First order perturbation theory: still the same!
- Two constant field parts

$$\cos\mu = \cos\phi - \frac{\sin\phi_0}{\phi_0}\frac{\sin\phi_1}{\phi_1}\frac{L_0 L_1}{2}\left[\frac{q(B_0 - B_1)}{2p}\right]^2$$

Closed Orbit



Tunes and Rotation



Analysis

- Lose closed orbit when rotation and phase advance the same
  - Less momentum aperture than tunes in larmor frame would indicate
- Rotation and phase advance being close may impact dynamic aperture
- Could work in rotating frame
  - Rotate wedges by fixed amount each cell
    - Angle different for each momentum, choose some reasonable value
    - Worry about both $\mu + \phi$ and $\mu - \phi$ hitting integer
  - Helical closed orbit