

Ion motion and hosing suppression in plasma-based accelerators

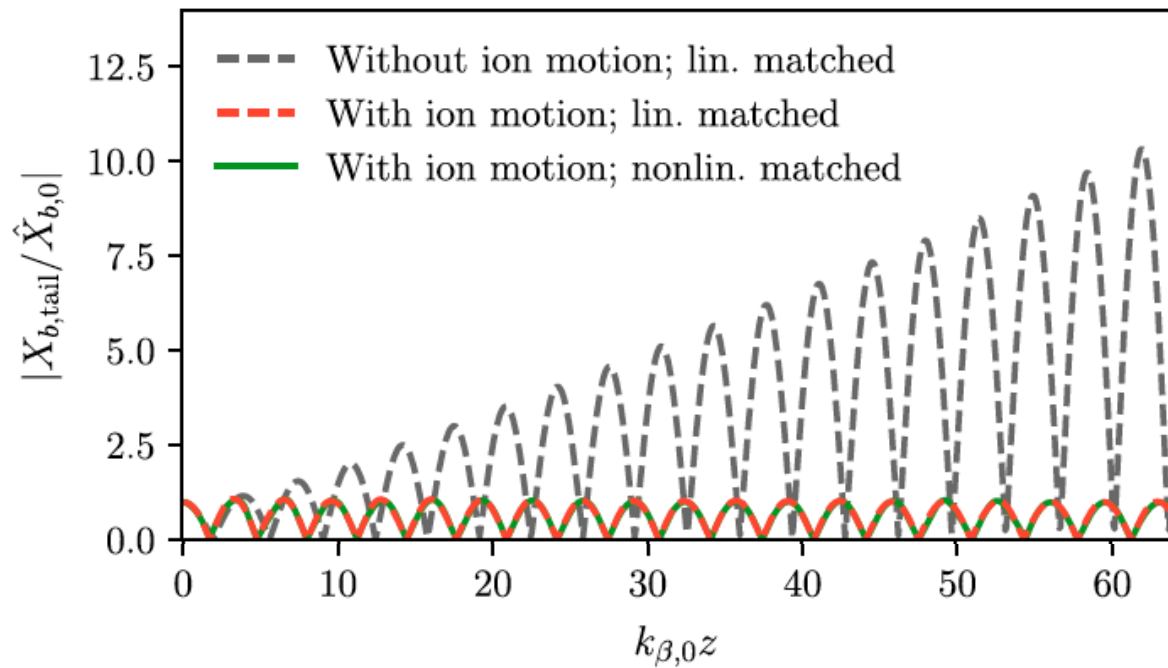
[C. Benedetti et al., LBNL]

- Bunch parameters of interest for a plasma-based collider trigger hosing and ion motion
- Bunch-induced ion motion as a way to generate betatron frequency chirp that suppresses hosing¹
- Emittance degradation associated with ion motion eliminated by proper bunch shaping²

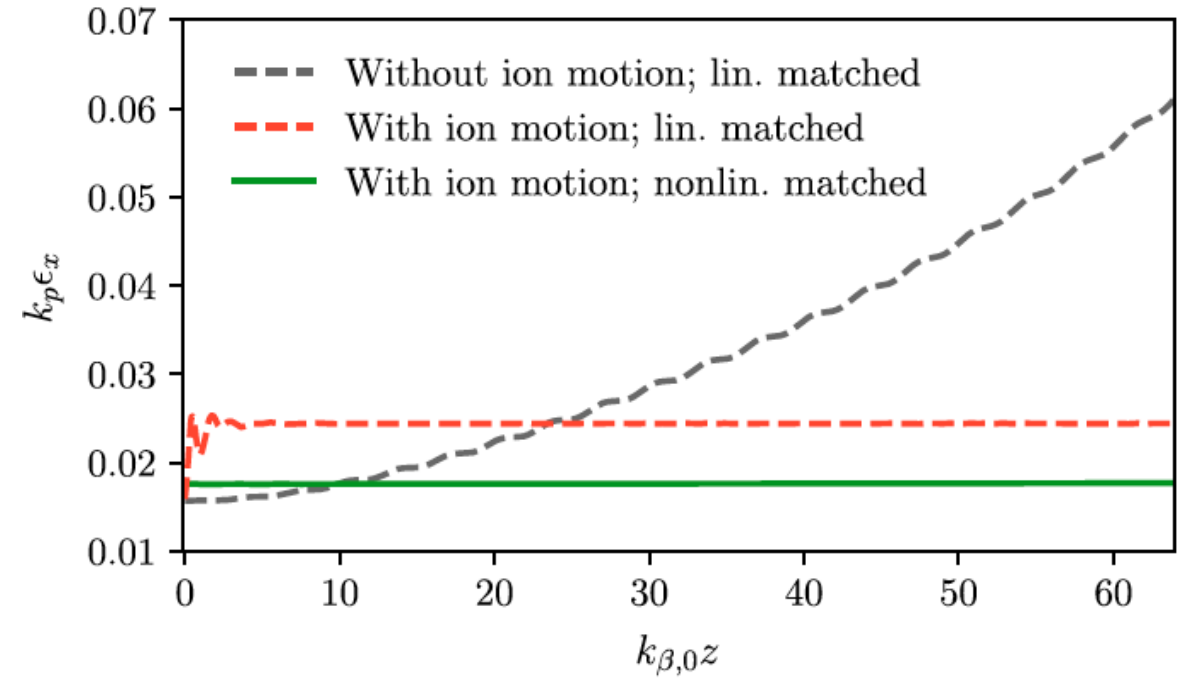
¹Mehrling et al., PRL (2018)

²Benedetti et al, PRAB (2017)

Centroid evolution



Emittance evolution



- NO ion motion → hosing, large emittance growth (beam breakup)
- WITH ion motion + LIN. matched → hosing suppressed, but emittance growth (+60%) from ion motion
- WITH ion motion + NONLIN. matched (equilibrium bunch) → hosing suppressed and no emittance growth