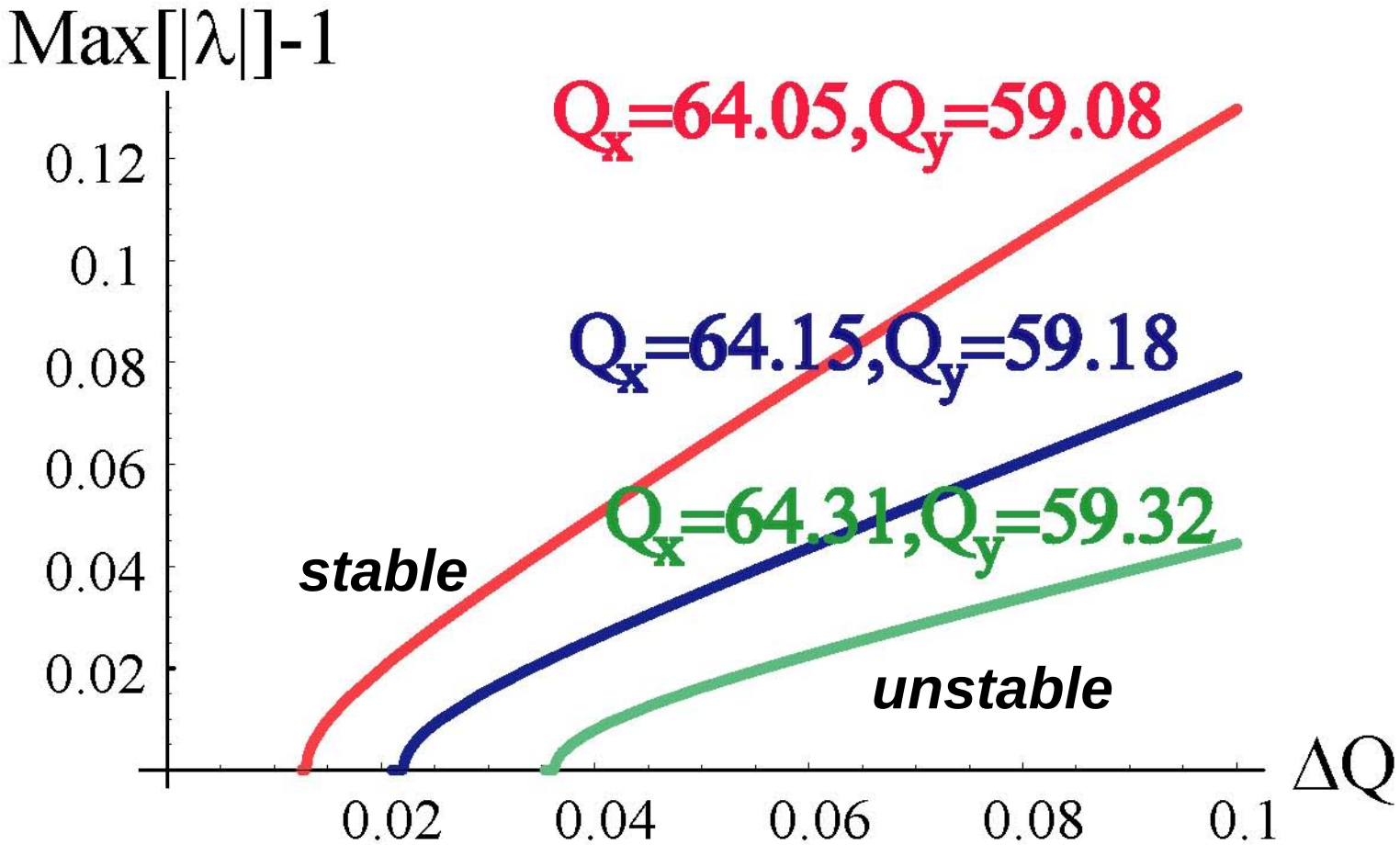
linear stability limit in LHC from 6x6 1-turn matrix

include crossing angle effect in IPs 1 and 5
as transverse kick changing linearly with
longitudinal position and linear energy change
with transverse position (symplectic);
find ($\Delta Q\ \theta_c$) for which motion becomes unstable

# synchrobetatron stop band

**LHC**

*6-dim. eigenvalue calculation for LHC,*
*2 IPs with horizontal & vertical crossing*

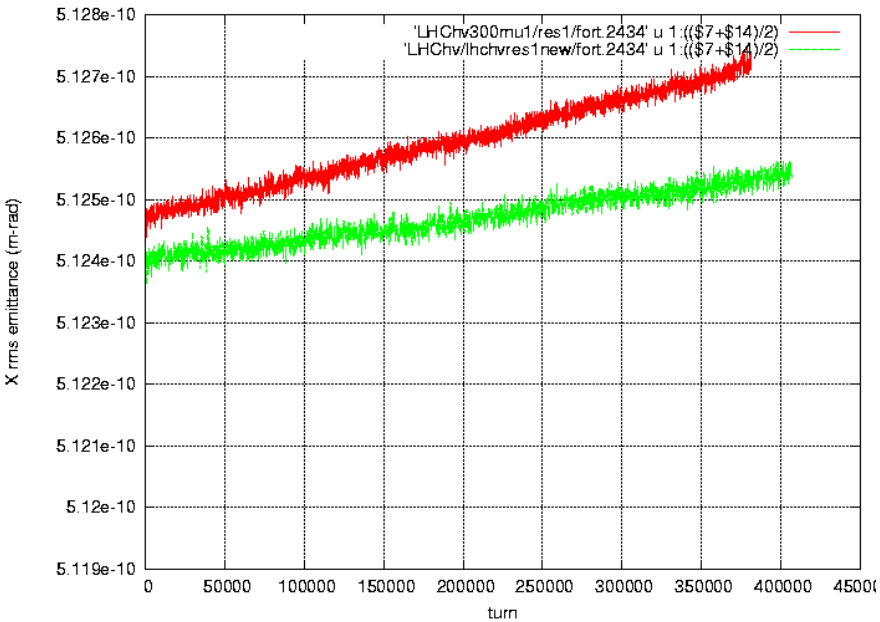



**beam-beam tune shift parameter**

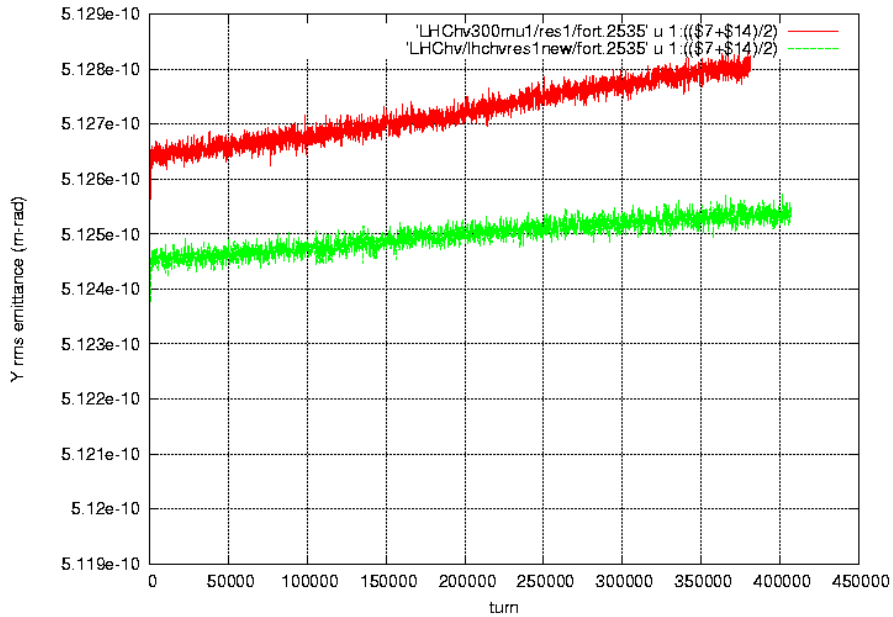
>10x lower threshold than KEKB due to lower $\nu_s$

# recent strong-strong beam-beam simulations by Ji Qiang (LBNL) for LHC with and without X/Y crossing angles

→ crossing angle enhances the growth




X emittance growth




Y emittance growth