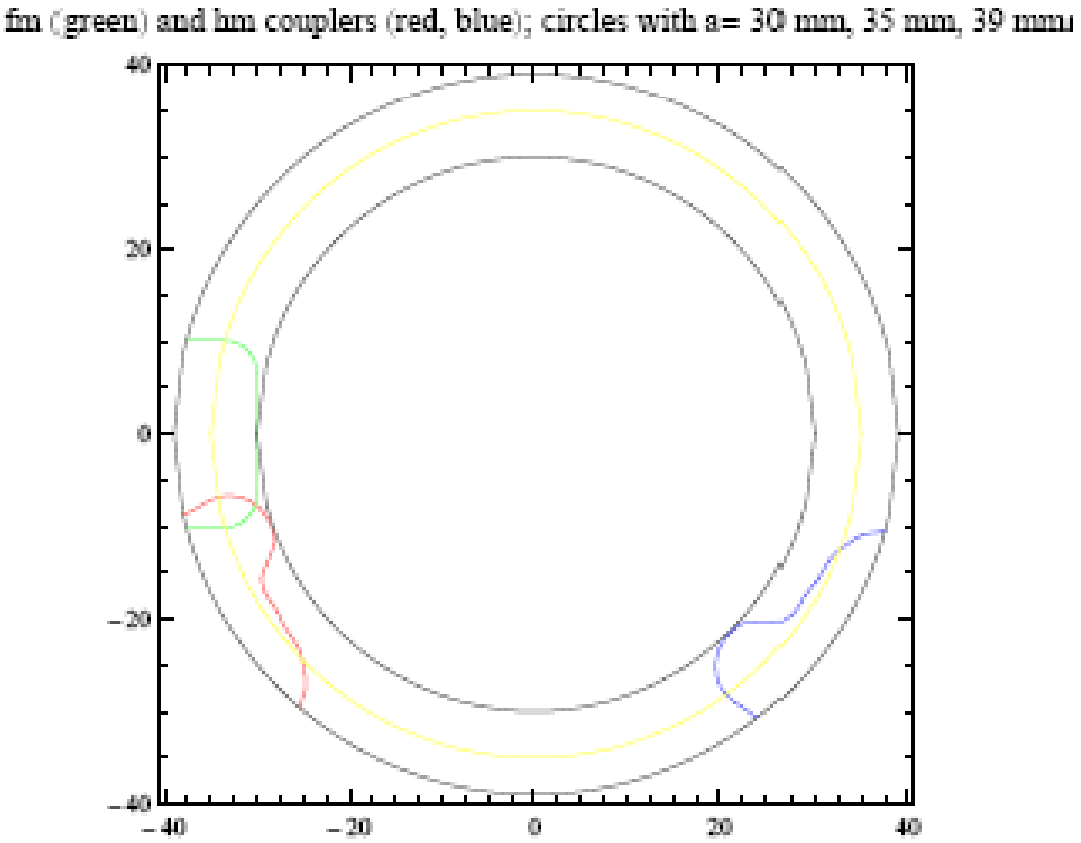
Wake Offsets

Shadow of FPC and HOM antennae cause non-zero wake at cavity centers

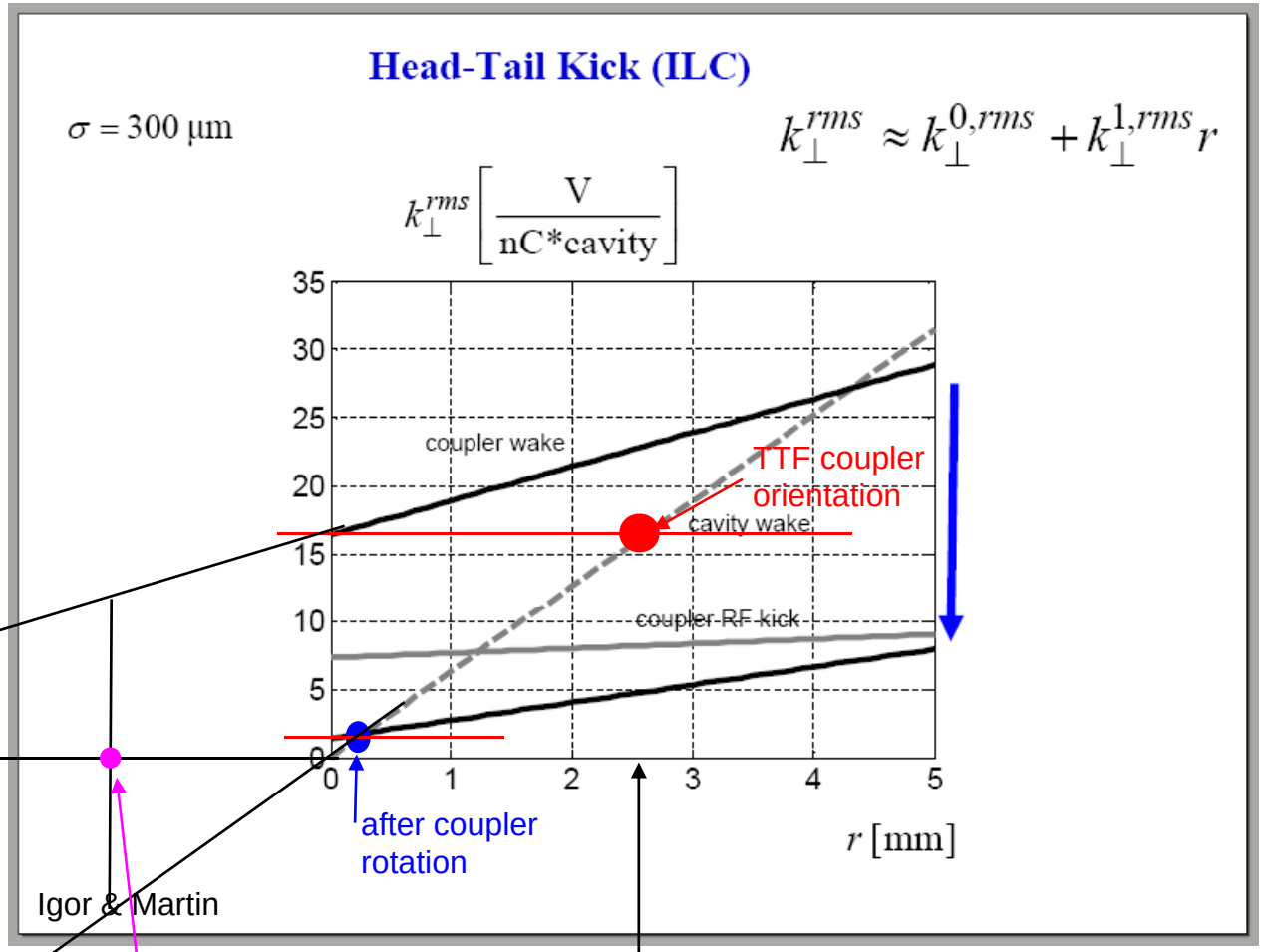


Chris Adolphsen, MLI KOM, 9/28/07

Size of Effect

Igor Zagorodnov (DESY) estimate for single cavity

Karl Bane (SLAC) gets similar results and about ½ of the effect for a cavity array



Wake cancels
At ~-2.mm offset

Effective cavity wake
= ~2.5mm offset

ILC Impact if Not Corrected

Assume

- Wt slope = 0.15 GeV/m^3 with 3 nC bunches
- Wake offset = 2.5 mm
- Sigma z of bunch = 9 mm (RTML) to 300 microns (ML)

Then Estimate (Roughly)

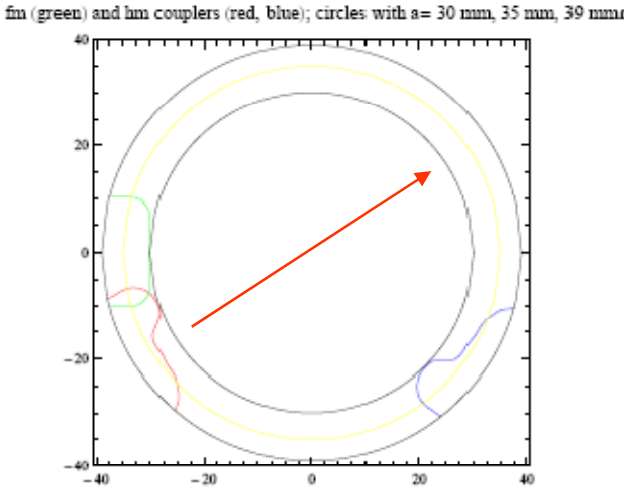
- RMS Head-to-Tail Offset / Vertical Beam Size

  = up to ~ 10 in the 5-15 GeV RTML depending on cancellation

  = ~ 2 in Main Linacs (x4 emittance) if cancelled in RTML and beta is constant: better cancellation if beta ~ sqrt(E)

Solution that does not change design of cavity parts and cancels all azimuthal asymmetries

First: Rotate downstream HOM by 180 degrees to reduce local effect



Second: Rotate cavities by 180 degrees in downstream half of rf unit and connect WG to couplers on wall side (although distribution on aisle side)