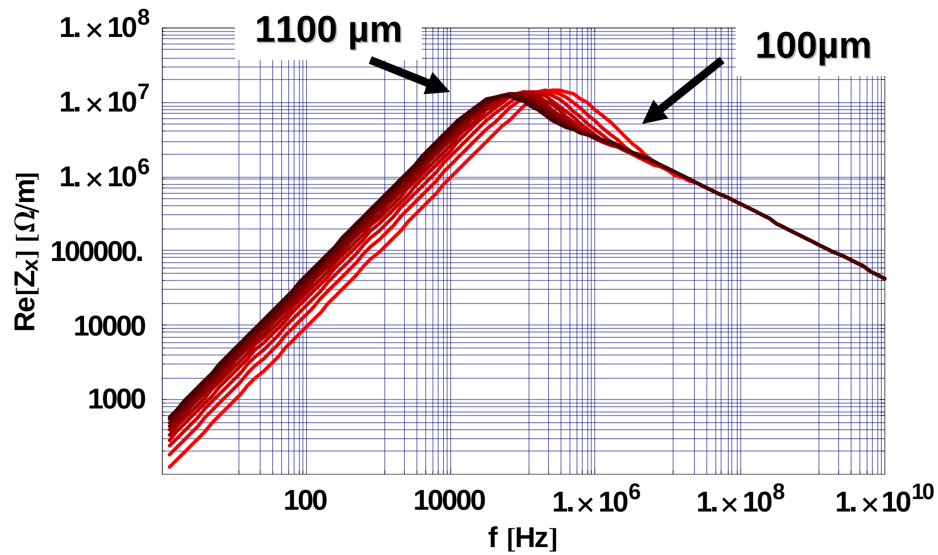
FP420 detector – Resistive wall effect on coupled-bunch instability

- Input parameters:
  - 8 m long detector
  - Scan of Stainless Steel layer thickness from 200 to 1100 μm
  - Stainless Steel resistivity =7.2e-7 Ω m AISI Type 304N Stainless Steel
  - Stability diagram based on:
    - Particle distribution with nominal LHC transverse emittance (3.75 μm RMS, normalized)
    - Landau damping due to the maximum octupole strength available in LHC at 7 TeV

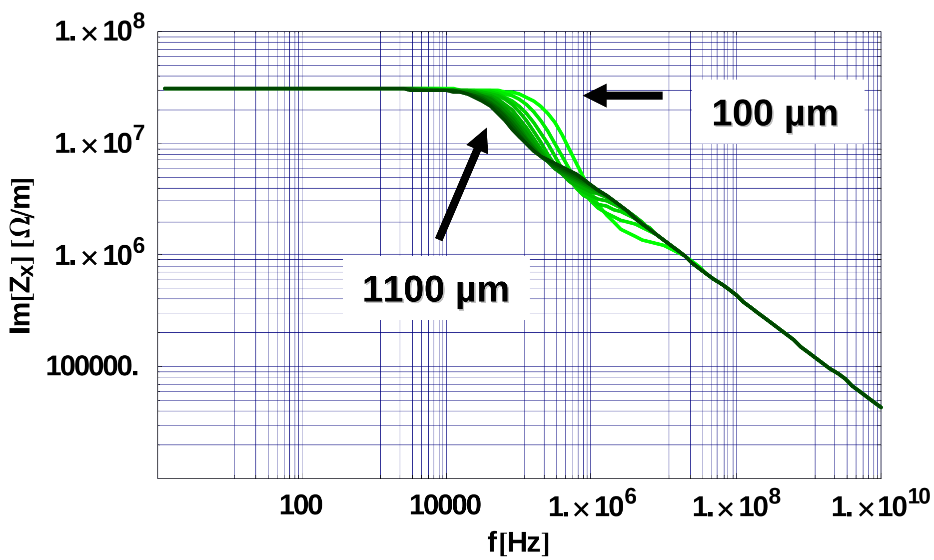
- Analysis results shown as:
  - Real and imaginary part of the transverse impedance as function of frequency and stainless steel thickness
  - Rise Time of the most critic coupled-bunch mode
  - Real and imaginary part of the coherent tune shift as function of stainless steel thickness
  - Resulting tune shift plotted on stability diagram

Transverse Impedance as function of frequency and Stainless Steel thickness

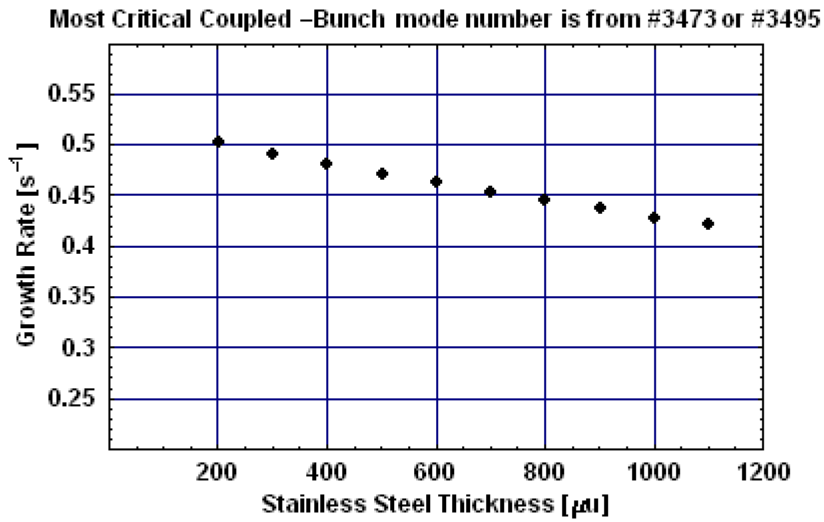
Real Part

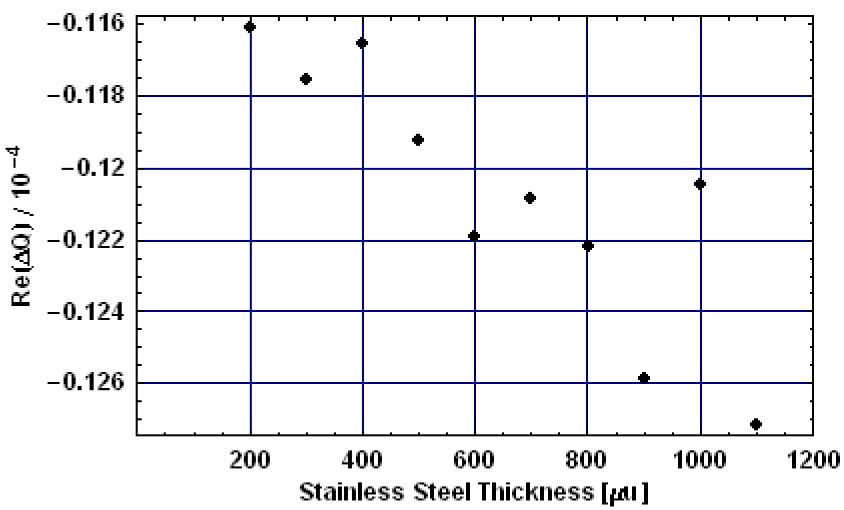


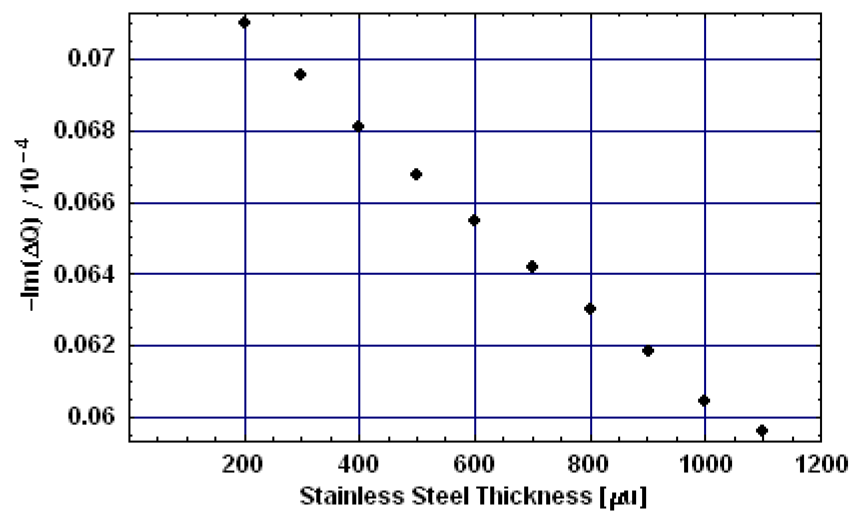
Imaginary Part



Coupled bunch instability growth rate and tune shift as function of Cu thickness

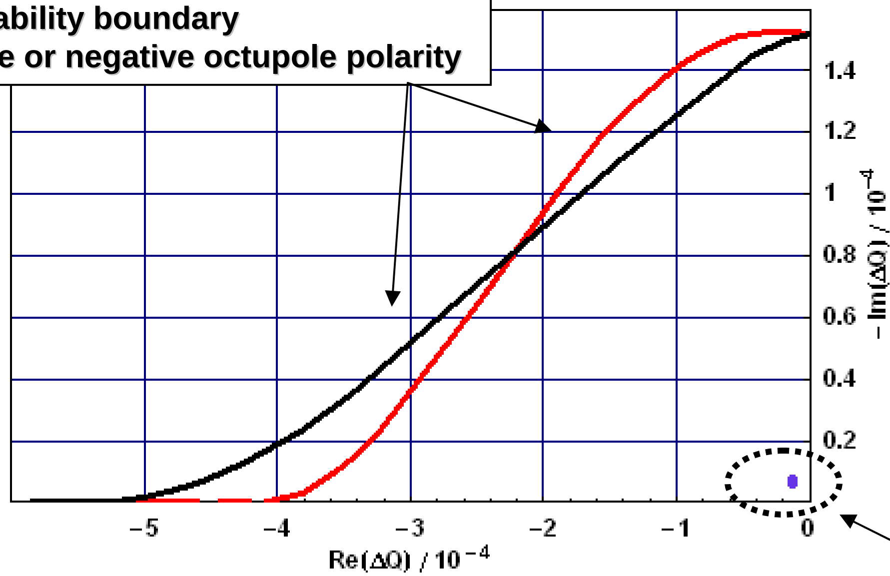






Stability Diagram

Locus of stability boundary
with positive or negative octupole polarity



Tune shift for all the scanned stainless steel thicknesses:
- All points are inside the "stability region"