IMPACT Simulation of the Montague Resonance at PS

PS Montague Resonance Studies

- Montague Resonance:
  2 Qx – 2 Qy = 0
- can cause particle due to unequal aperture size in horizontal and vertical dimensions.

Physical parameters:

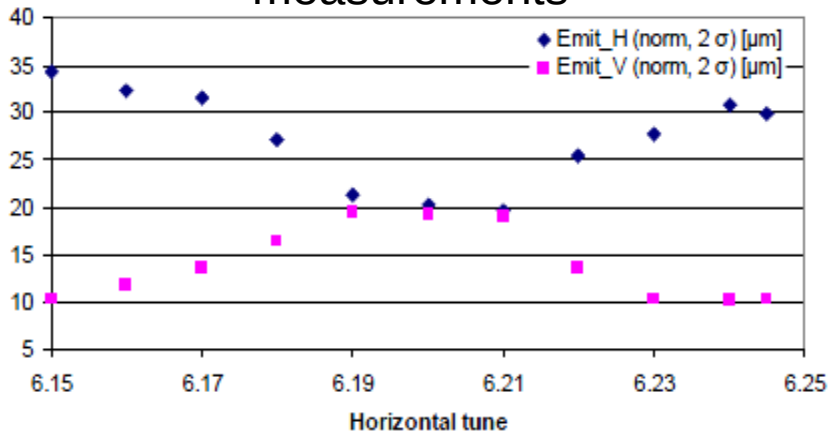
Vrf = ramping with f = 39.5 MHz
Ek = 1.4 GeV
Emit_x = 7.5 mm-mrad
Emit_y = 2.5 mm-mrad
Rms bunch length = 45 ns
Rms dp/p = 1.7 x 10^{-3}

Horizontal tune: 6.15 – 6.245
Vertical tune: 6.21
Synchrotron period: 1.5 ms
Half Aperture = 7cm x 3.5cm
I = 1.0x10^{12}

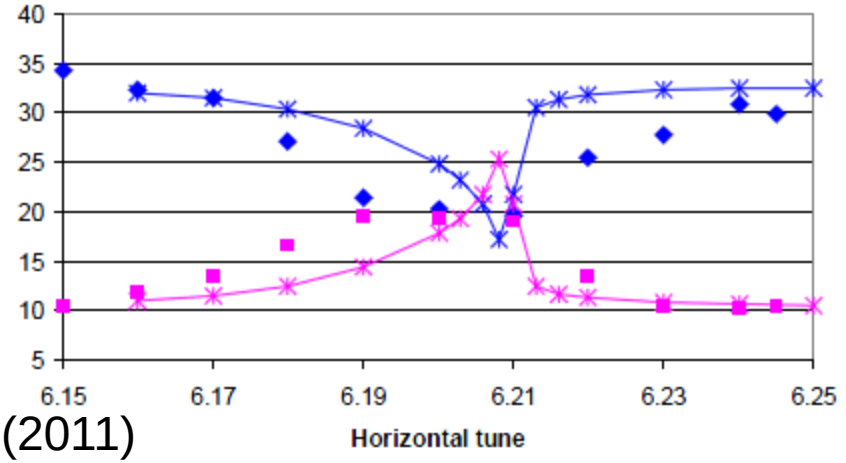
Refs: B. W. Montague, CERN-Report No. 68-38, CERN, 1968.
E. Metral et al., Proc. of EPAC 2004, p. 1894.
I. Hofmann et al., Proc. of EPAC 2004, p. 1960.

Static Montague Resonance Crossing at PS

measurements



2004 results



IMPACT simulation: fully 3D+nonlinear lattice (2011)

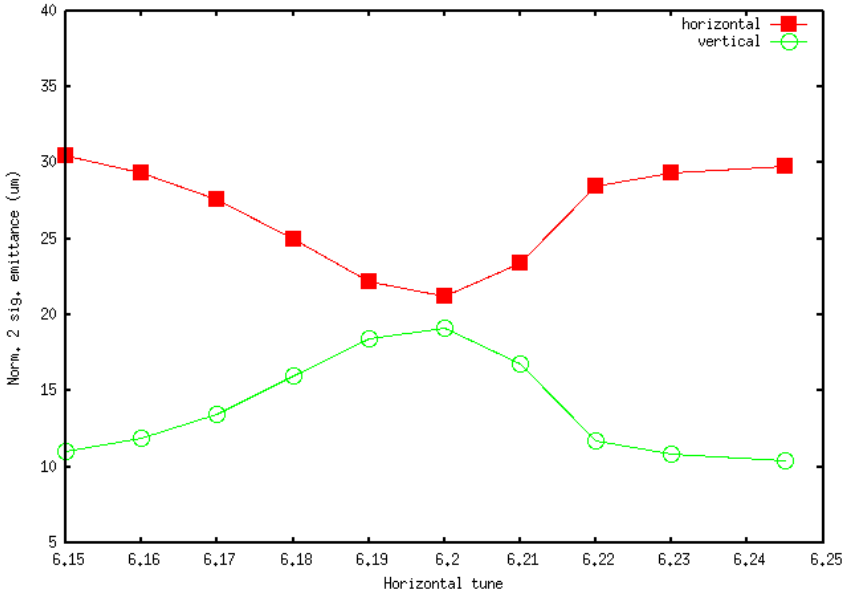
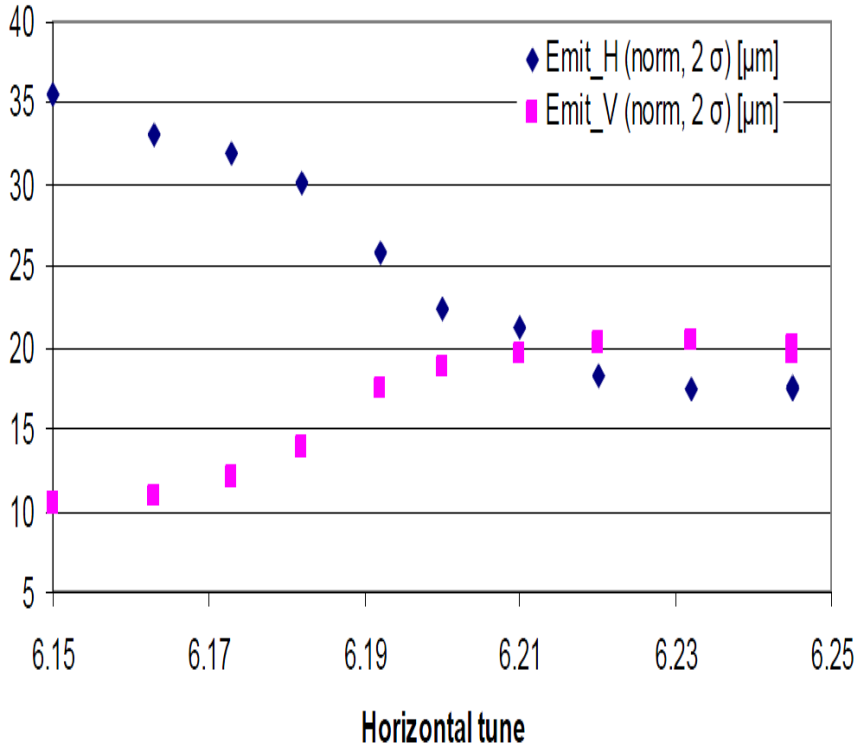


FIGURE 3. Measured (dots, see Fig. 2) and simulated (full line) intensity-dependent emittance transfer in the static case.

Dynamics Montague Resonance Crossing at PS

100 ms dynamic Crossing

measurements



IMPACT simulation: fully 3D+nonlinear lattice