FERMILAB-CONF-06-166-AD

An AC Dipole for the Tevatron - Initial Tests -

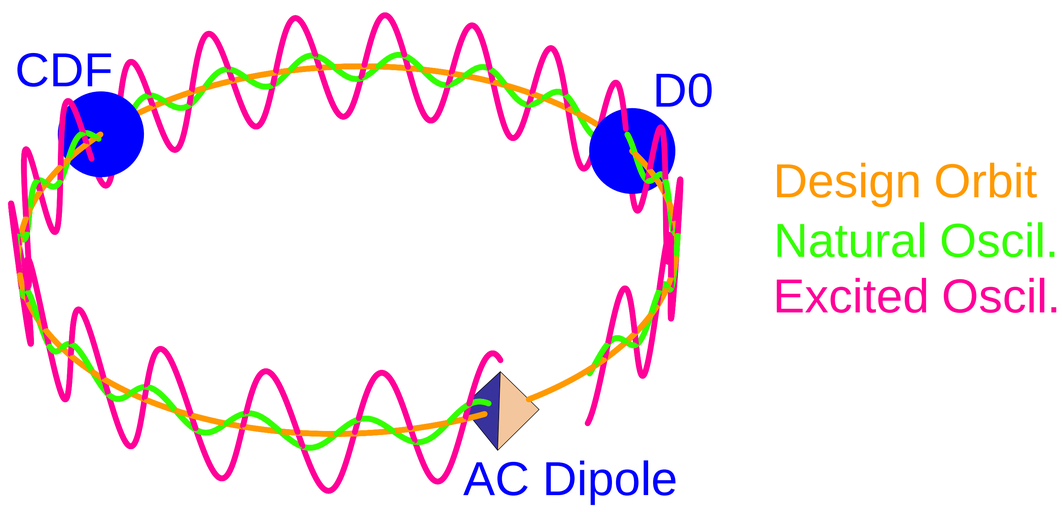
Fermilab Users' Meeting Poster Session (5/31/2006)

Ryoichi Miyamoto[1] Supervised by Sacha Kopp[1], Andreas Jansson[2], & Mike Syphers[2]

[1]*The University of Texas at Austin*, [2]*Fermi National Accelerator Laboratory*

A Cartoon Image of the Betatron Oscillation

Transverse harmonic motions of the beam (betatron oscillation) is too small to observe → Need excitations.

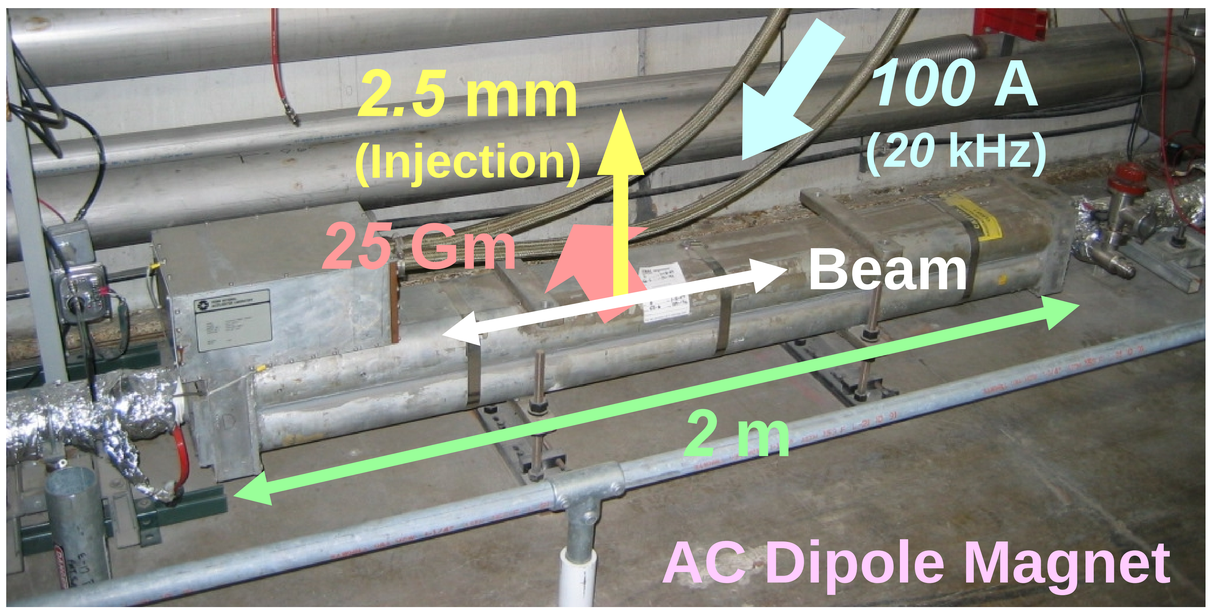


Excitations by the AC dipole

- ❑Driving ↔ Single turn kick
  - ▪No decoherence (signal damping) - (1)
  - ▪No emittance (beam size) growth - (2)
- ❑Driven amplitudes:

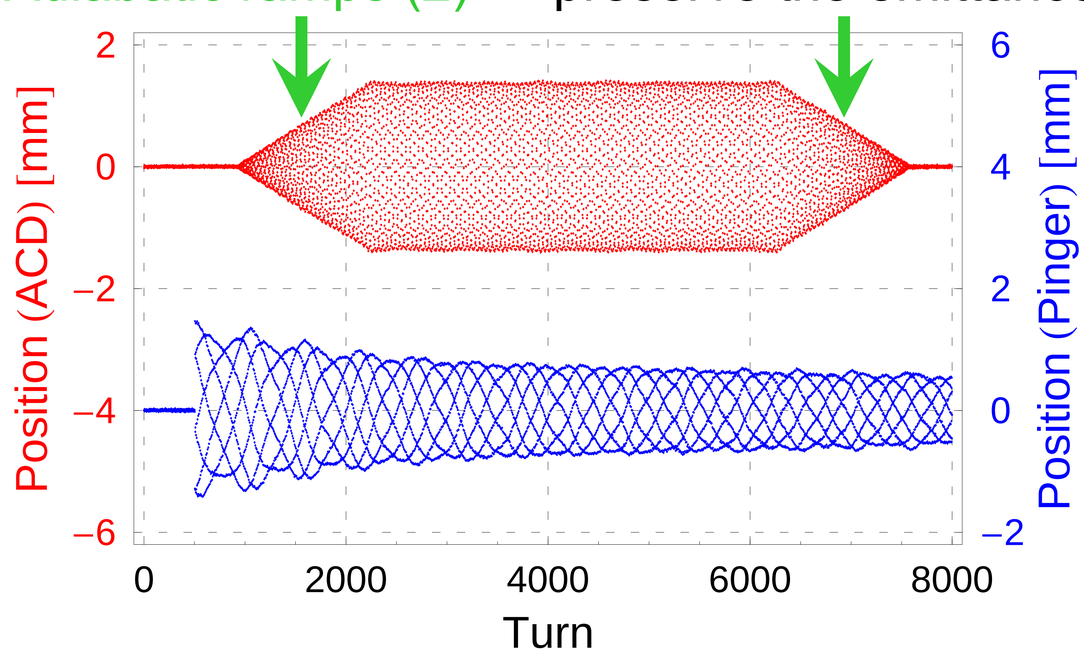
$$\frac{eBlf_{rev}}{4\pi p(f_{res}-f_{mag})}\sqrt{\beta_{mag}\beta(s)} \quad \text{- (3)}$$

Parameters of the AC Dipole

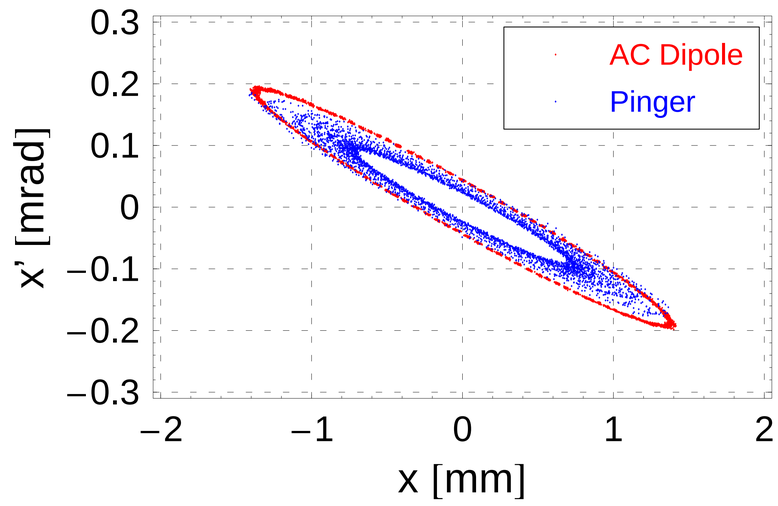


Data of a BPM: AC Dipole vs. Kicker (1)

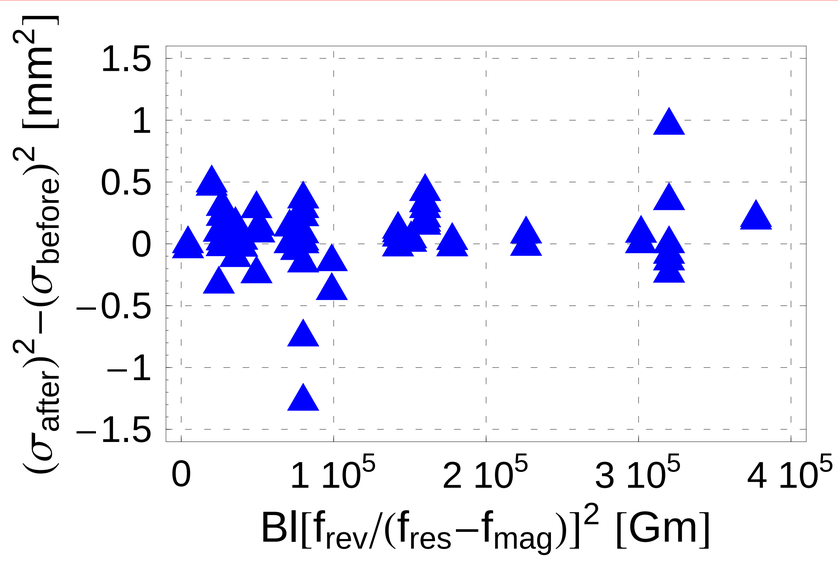
Adiabatic ramps (2) → preserve the emittance



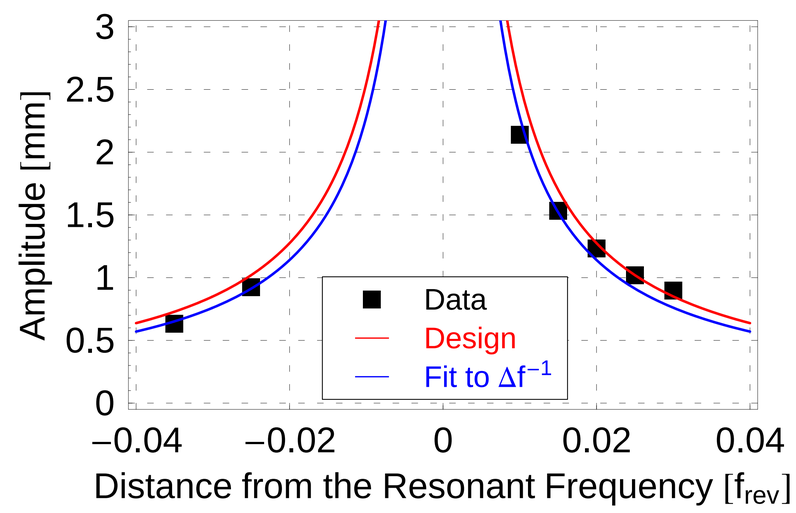
Phase Spaces from the Same Data (1)



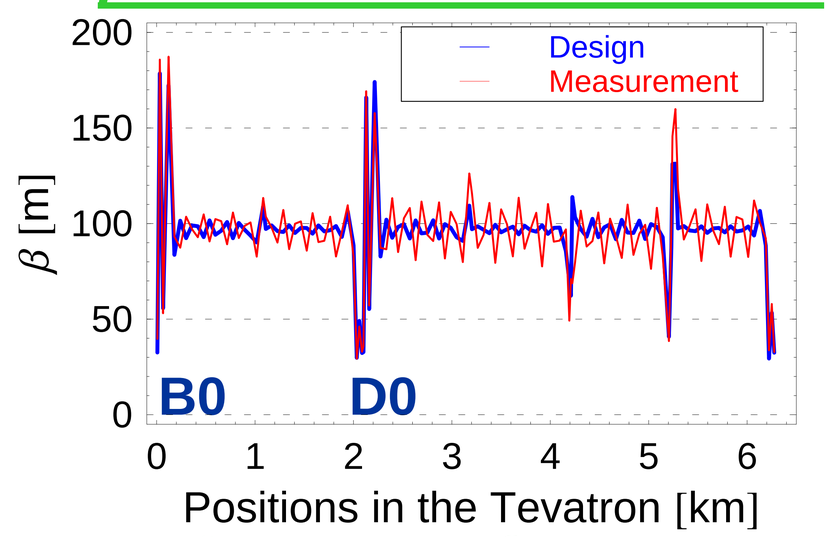
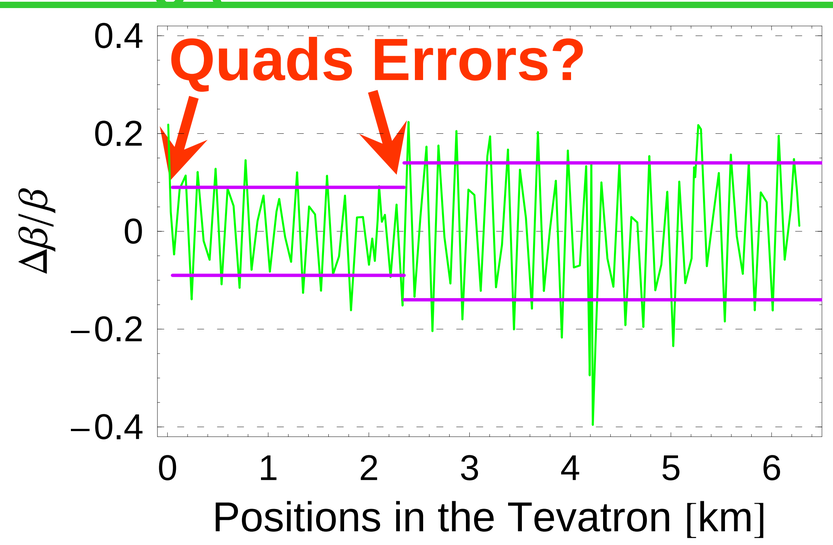
Measurement of Beam Size Growth (2)



Amplitude vs. Driving Frequency (3)



β Function: Measurement



β Beating (Deviation from the Design β)