

Aperture Kicker and/or AC Dipole

- Motivation
- Study Types
- Pro&Cons of either Exciter
- Will we get at least one of them??

Motivation

- We need an Instrument to measure at large Amplitude at Collision
 1. Detuning with Amplitude
 2. Measurement of Dynamic Aperture
 3. Measurement and Correction of Resonances, which means Measurement of **specific** Multipoles and their Compensation by Corrector Magnets

Study Types

We need to study over a **Range A** of Amplitudes

- $0\sigma < A \leq 8\sigma$
- Problems for Machine Protection are obvious
- However, Studies can be split
 1. Rare Checks at **large** Amplitude (*Aperture*)
 2. Routine Measurements at **small** or **medium** Amplitude (*AC Dipole*)

In particular: Dynamic Aperture

1. At Injection \Rightarrow to go beyond 3σ (limit of Q-Kicker) in view of 12σ expected D.A.
2. At Collision \Rightarrow $9-12 \sigma$ expected D.A. (0.8σ limit of Q-Kicker)
3. Beam-Beam (weak-strong)
 - a) Injection \Rightarrow 9σ expected D.A.
 - b) Collision \Rightarrow $\leq 5 \sigma$ expected D.A.
4. Specially **HIGH** Pick-Up Resolution at least **1** better **4** (x, x', h, v) to be able to measure pilot bunch

Pro&Cons of either Exciter I

Both Aperture Kicker and the AC Dipole are fine
There are pro & cons for either option

- Aperture Kicker
 - ✓ Free Oscillation => Easy Analysis
 - ✓ Easier to build and handle and somewhat cheaper
 - ✓ 8σ Kick Strength
- o Destructive Measurement
- o Large Kicks may endanger the machine

Pro&Cons of either Exciter II

- AC Dipole
 - ✓ Non-Destructive Measurement possible, in principal emittances will **not** blow up
 - ✓ Resonance Analysis possible => Rogelio's Thesis
 - ✓ Machine Protection easy since adiabatic Switch-on
 - ✓ In principal like a Kicker if Switch-off in one Turn possible
 - o Complex Operation (Distance to tune Lines etc)
 - o Analysis more difficult
 - o More expensive
 - o Reliability remains to be demonstrated (RHIC&SPS)
 - o Just **4 σ** Kick Strength

Will we get at least one of them???

- Ideally we want both Aperture **(D.A)** first and AC Dipole **(routine)** from Operation budget later.
- Big Danger that we loose the Aperture Kicker without getting the AC Dipole!!
- We need **1** but much better **4** pickups (x, x', h, v) with **highest** resolution to measure pilot bunch