Measurements in 1995

(two examples)

Single-kick method

Y. Alexahin, CERN-SL-95-110 (AP).

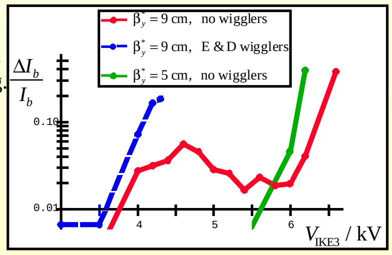
LEP injection kicker IKE3

Experimental 108°/90° lattice, 45.6 GeV electron beam.

2 sextupole families only $\Longrightarrow$ poor momentum acceptance (re-cabling not practicable at the time), Increase horizontal single-kick amplitude until about 50% of bunch lost.

Interpretation of measurement can require detailed modelling.

Explain local increase of losses around 4.5 kV (red)?



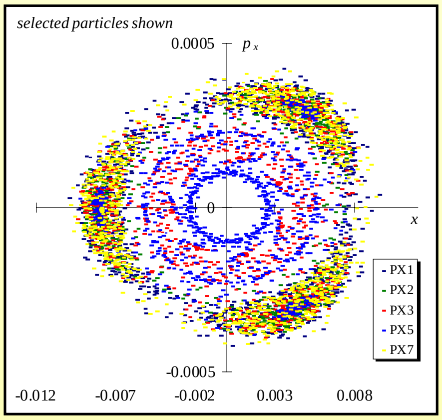
$$6.6\ \text{kV} \Rightarrow\ 10^3\sqrt{A_x/\text{m}} = 2.3 \pm 0.1$$

$$\text{c.f., prediction } 10^3\sqrt{A_x/\text{m}} = 2.5$$

Simulation of machine with imperfections , tracking with quantum fluctuations.

$\Longrightarrow$ large 3rd order resonance in x-p_x plane.

At the right kick value 60% of particles are trapped in islands from where they can later be lost.

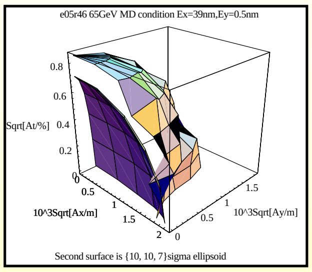


Conclude: compatible with predictions.

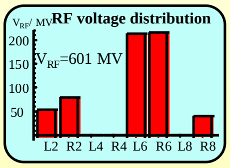
Phase-space inflation method

C. Arimatea et al, CERN SL-MD Note 199 (1995)

Low emittance 108°/60° lattice, 65 GeV positron beam. Horizontal emittance increased with emittance wigglers (EW) and, further by changing f_{RF} (J_x). Discrepancies between measured and computed emittance (optical functions at UV telescope? See references for more details). We use *calculated* values here.



$$\varepsilon_x = \begin{cases} 16\ \text{nm}, & \text{no wigglers} \\ 31\ \text{nm}, & B_{EW} = 1.024\ \text{T},\ J_x = 1 \\ 39\ \text{nm}, & B_{EW} = 1.024\ \text{T},\ J_x = 0.76\ (\Delta f_{RF} = 50\ \text{Hz}) \\ 60\ \text{nm}, & B_{EW} = 1.024\ \text{T},\ J_x = 0.52\ (\Delta f_{RF} = 100\ \text{Hz}) \end{cases}$$



Lifetime reduced at $\varepsilon_x = 60$ nm $\Rightarrow$ $10^3\sqrt{A_x/\text{m}} = 0.24$,

Computed dynamic aperture $10^3\sqrt{A_x/\text{m}} = 2.0$

would be equivalent to about $8\sigma_x$ of the beam.

Conclude: compatible with predictions.