

Plans for Nonlinear Experiments at RHIC

Beam Experiments Meeting on
August 2, 2002

- Aims:
 - Improving beam lifetime
 - Beam size growth
 - Improving transition crossing efficiency

- Nonlinear characteristics:
 - Dynamic aperture
 - Amplitude dependent tune spread
 - Nonlinear chromatism
 - Resonance strength
 - Diffusion caused by nonlinearities or tune modulations.

- Immediate operation tasks:
 - IR corrections at IR8, IR2(?)
 - 0.2 and 0.25 resonance correction at transition

- Last run data:
 - Lifetime versus beta*
 - IR closed bumps measurements at IR8 and IR2
 - Resonance measurements at injection.
 - Nonlinear chromaticity measurements (brief data)
 - Schottky spectra

- Theoretical studies are needed:
 - Previous studies done for a lattice with beta* configuration: $4 \times 10 \text{m} + 2 \times 1 \text{m}$
DA=4-5 sigma with IR correction for 40Pi emittance
 - Lack of detailed studies for the present lattice and planned lattice: $4 \times 2 \text{m} + 2 \times 1 \text{m}$

The tracking studies must be done before the new run starts.

- Possible experiments:
 - Nonlinear chromatism:
 - chromaticity with radial scans (top)
 - beta and dispersion function chromatism;
with AC Dipole? (top)
 - Beam frequency response studies (P.Cameron);
To reveal resonances, tune spread
(top+ramp+injection)
 - Action-angle jump technique (Javier) ;
Fast diagnostic of IR nonlinearities (possibly sextupole
and octupole) (top)
 - Tune dependence on closed orbit;
Two corrector scan, tune shifts versus amplitude and
phase of the orbit. (top, injection)

- Tune scans, working point studies;
Lifetime versus working point. Experiment time issue.
(top)

- AC dipole experiments:
 - driving resonance terms; SUSSIX (Mei, F.Schmidt)
(top+injection)
 - smear measurements (Todd) (top+injection)

- Beam losses while increasing the beam emittance;
Tune meter kicks; Dynamic aperture measurement
(top)

One beam versus colliding beams comparisons