

EXPERIMENTAL STUDIES OF BEAM-BEAM EFFECTS IN THE TEVATRON

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Abstract

The long-range beam-beam interactions limit the achievable luminosity in the Tevatron. During the past year several studies were performed on ways of removing the limitations at all stages of the operational cycle. We report here on some of these studies, including the effects of changing the helical orbits at injection and collision, tune and chromaticity scans and coupling due to the beam-beam interactions.

GENERAL OBSERVATIONS

Beam Loss Through Shot

The beam loss through the shot setup is shown below.

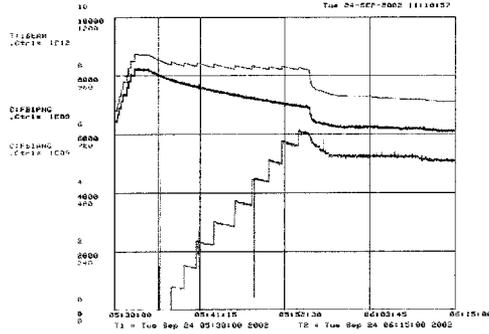
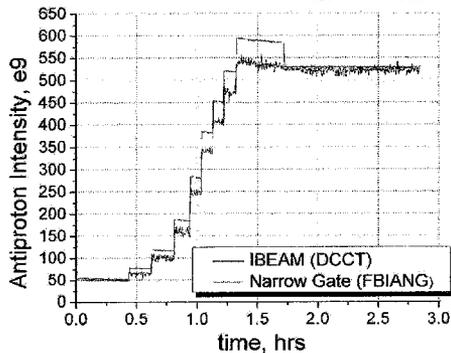


Figure 1: Beam intensity and loss

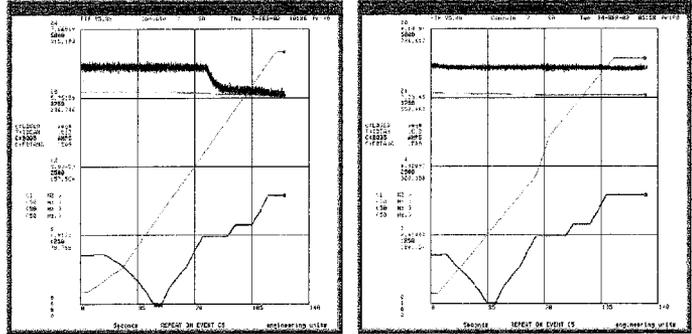
Loss at every step of antiproton only store is showing below.

Antiproton only

Antiproton Only Store: 1% loss on ramp, $\tau_{150} = 20$ hrs, $\tau_{980} = 160$ hrs



Sequence #13 Improving

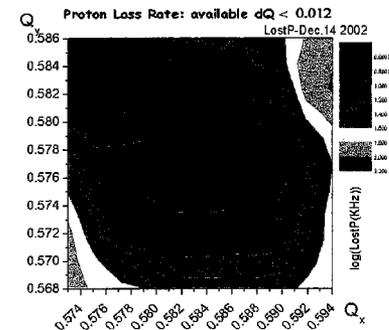
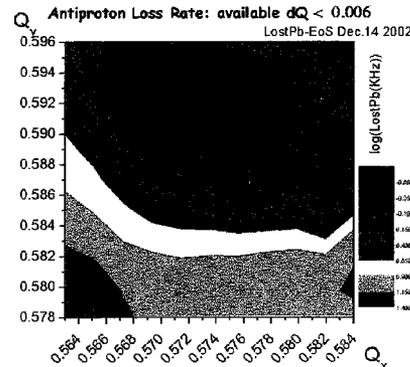


TUNE MEASUREMENT

The tunes of proton and antiproton can be measured by Schottky spectrum with three different ways of excitation.

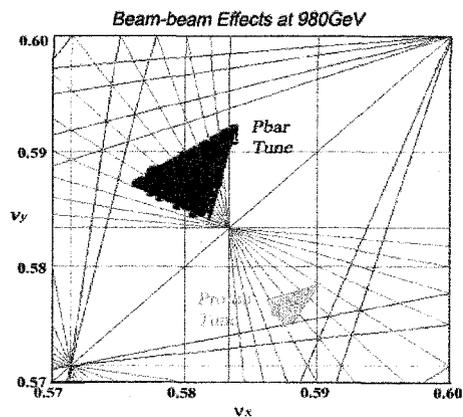
Tune Scan at the End of Store

The base tune scan shows the best working point for proton and antiproton.



Tune Diagram

Tune diagram of proton and antiproton.



ACKNOLEGEMENT

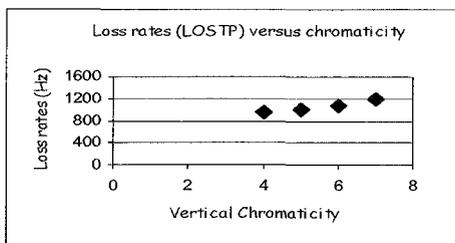
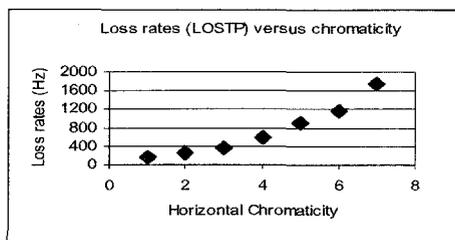
We thank crew of operations for their kind helps and patience during our studies.

REFERENCES

[1] V. Shiltsev, DOE review.

EFFECTS OF THE CHROMATICIY

The effects of the chromaticity is showing below.



EFFECTS OF HELIX SIZE

The effects of the helix size is showing below:

