EXPERIMENTAL STUDY OF SPACE-CHARGE WAVES IN INTENSE HEAVY ION BEAMS *

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When a short-duration, small-amplitude energy perturbation is applied to an intense heavy-ion beam, positive- and negative-going longitudinal space charge waves are generated on the beam [1]. Longitudinal diagnostic kickers that provide ~1% energy perturbation have been implemented for generating space-charge waves on HCX and NTX beams. The kickers consist of specially-designed fast pulse generators combined with an existing aperture or ESQ structure to provide the longitudinal perturbation to the beam. The amplitudes of the resulting density waves are ~10%, measured a few meters downstream of the kicker. The time of flight of the wave provides an accurate measure of the beam energy. The time of flight measurements will be described. Comparison of measured waves with a simple 1-D fluid model [2] of the beam will be presented.

[1] Martin Reiser, Theory and Design of Charged Particle Beams, Wiley Interscience, 1994.
[2] John Barnard, HIF Note 96-12, LLNL Internal Memo, Sept. 26, 1996.

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