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SUBJECT

Fast Extraction from the 30 GeV Synchrotron

1. Introduction:

Fast Extraction is obtained with the help of kicker and septum magnets. The septum magnet stays out of the normal beam path and the beam is diverted into its field with the help of the kicker magnets. The kicker gives a small deflection which should be large enough for the entire beam to reach the septum magnet. Here the beam gets a large deflection to get completely away from the normal circulating path.

2. Extraction System of the Main Synchrotron

The proposed extraction system of the 30 GeV main ring for the TRIUMF Kaon Factory (Ref. 1, Fig. 4) consists of two 4 m long .05 Tesla kicker magnets and one 4 m long .5 Tesla septum magnet. Both kickers gives a deflection of 2 mrad and the septum magnet gives 20 mrad. The deflection from the first kicker alone is not strong enough to bend the whole beam into the septum magnet. Therefore another identical kicker is placed after a phase advance of about 2π and also just before a defocusing magnet. This magnet enhances the deflection because the entire beam has been brought to one side of its optical axis with the help of the second kicker. When the beam enters the septum magnet it is already 4 cm away from the original optical axis and the septum gives the required large deflection. Again the septum is placed before a defocussing magnet.

Fig. 1 shows the trajectories of five selected particles during the extraction process. Fig. 2 shows the deviations from the original trajectories in the absence of the extraction system. Fig. 3(i) to Fig. 3(v) are the phase space plots of these particles during the extraction.

Reference:

1. R.C. Gupta, Methods of Designing Synchrotrons with High Transition Energy, TRI-DN-36

BEAM EXTRACTION (PARTICLES OF VARIOUS PHASE POSITIONS)

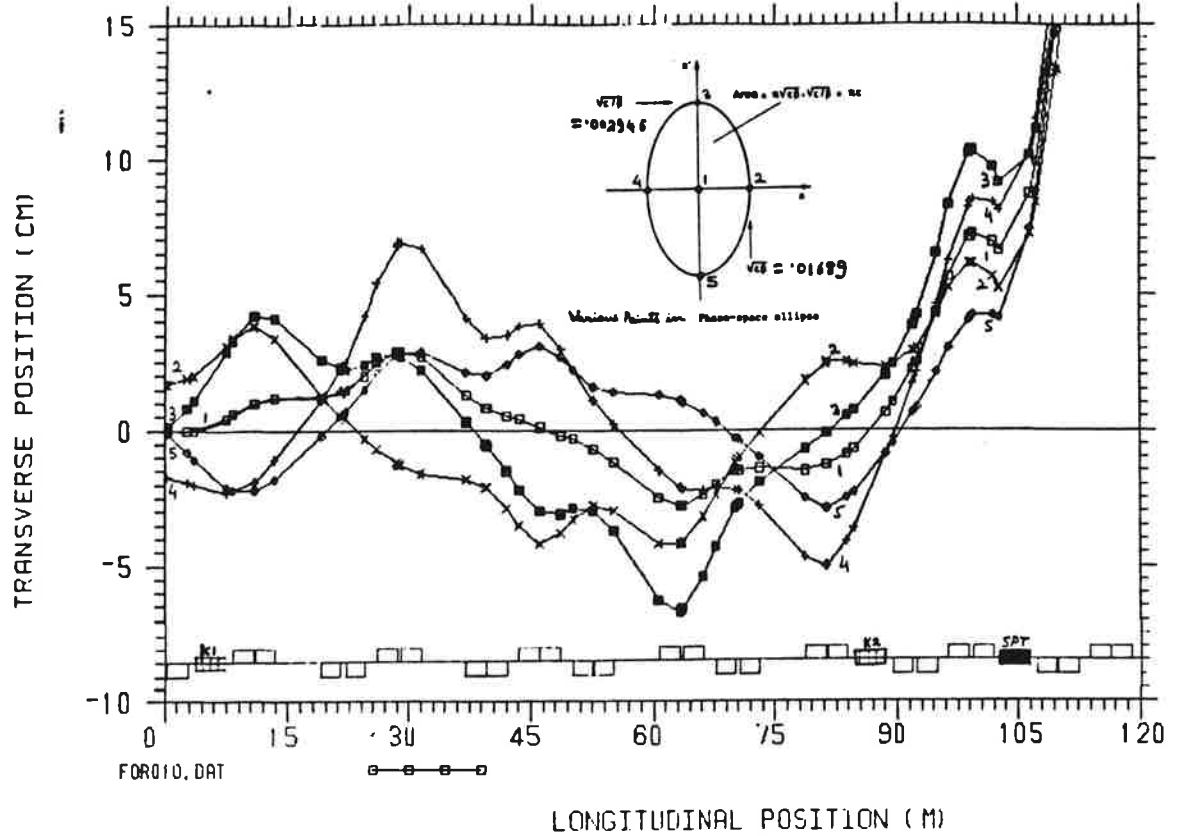


Fig 1

FAST EXTRACTION FROM THE MAIN SYNCHROTRON

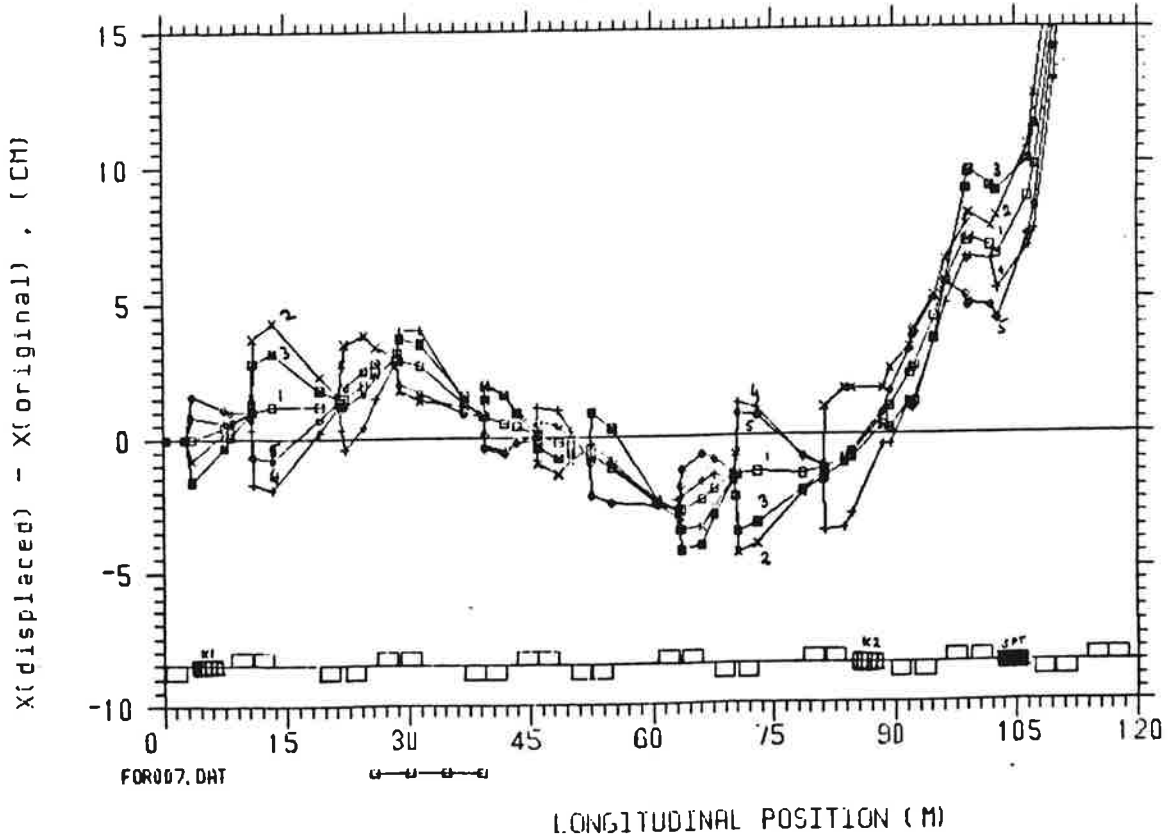


Fig 2

Fig 3 (v)

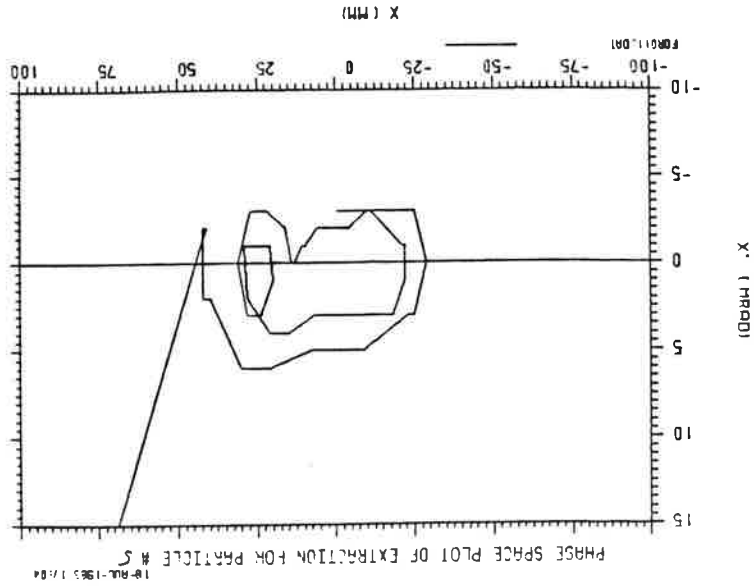


Fig 3 (iv)

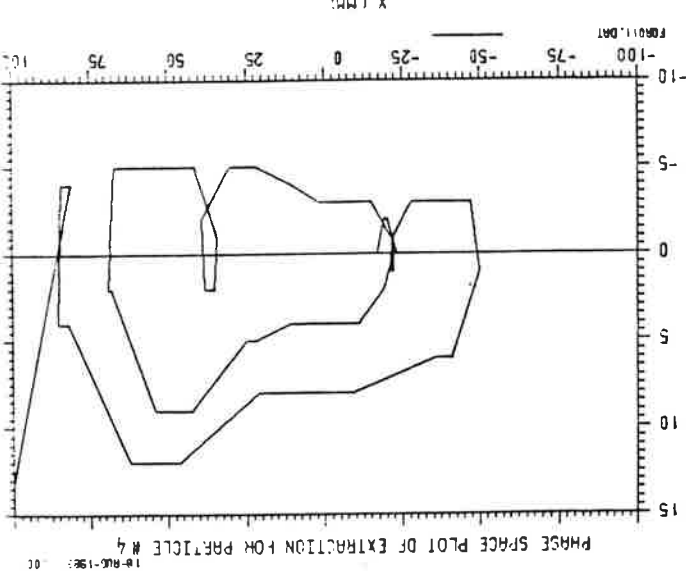


Fig 3 (iii)

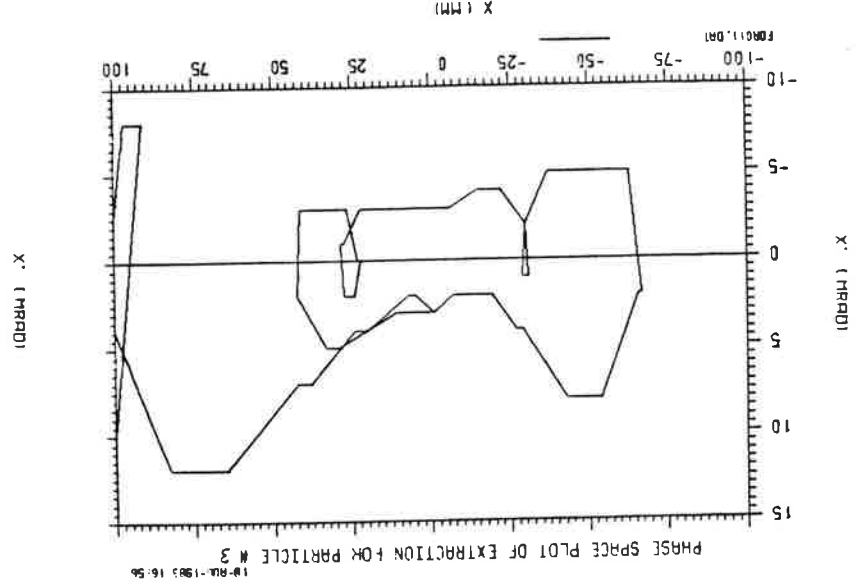


Fig 3 (ii)

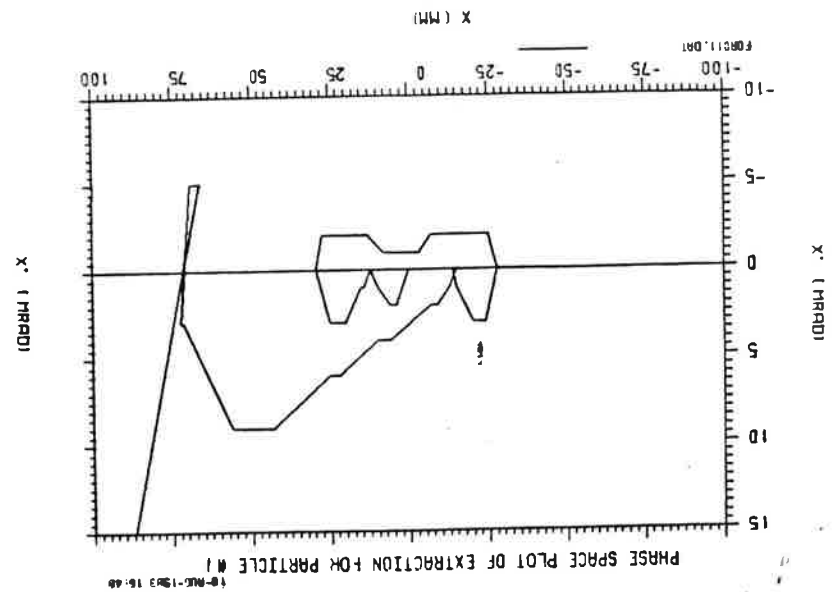


Fig 3 (i)

