

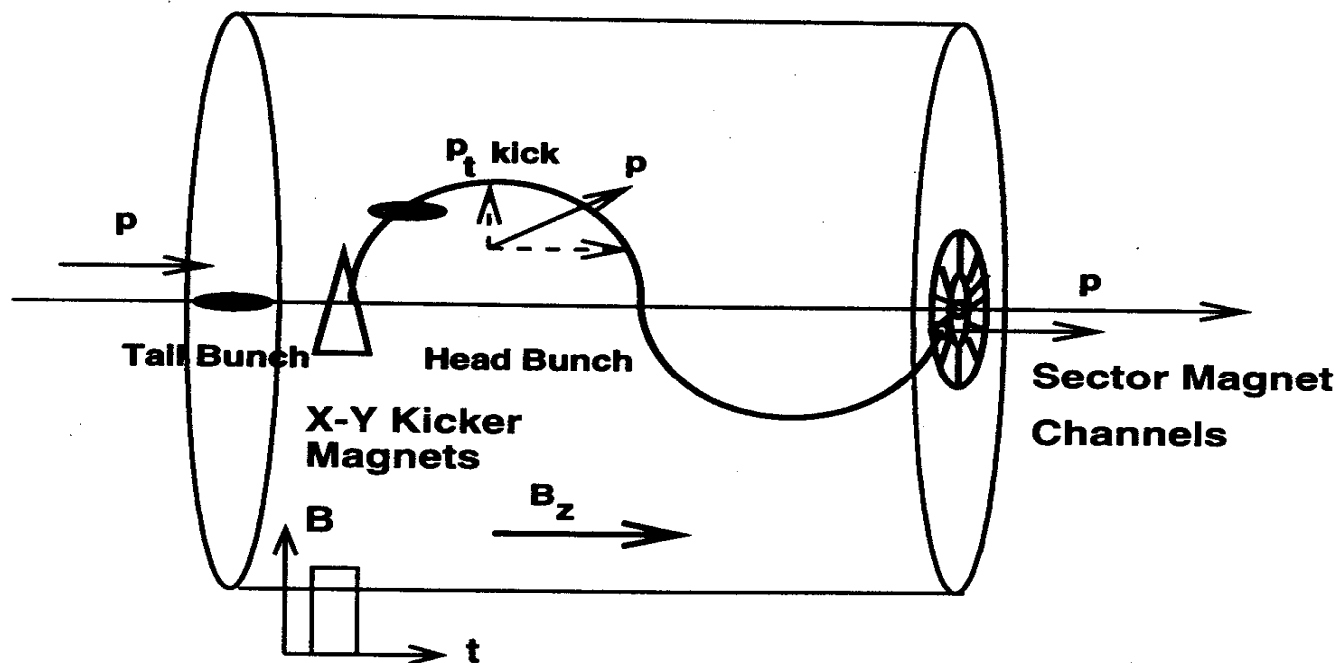
Stacking mini- μ bunches for Emittance Exchange (III)

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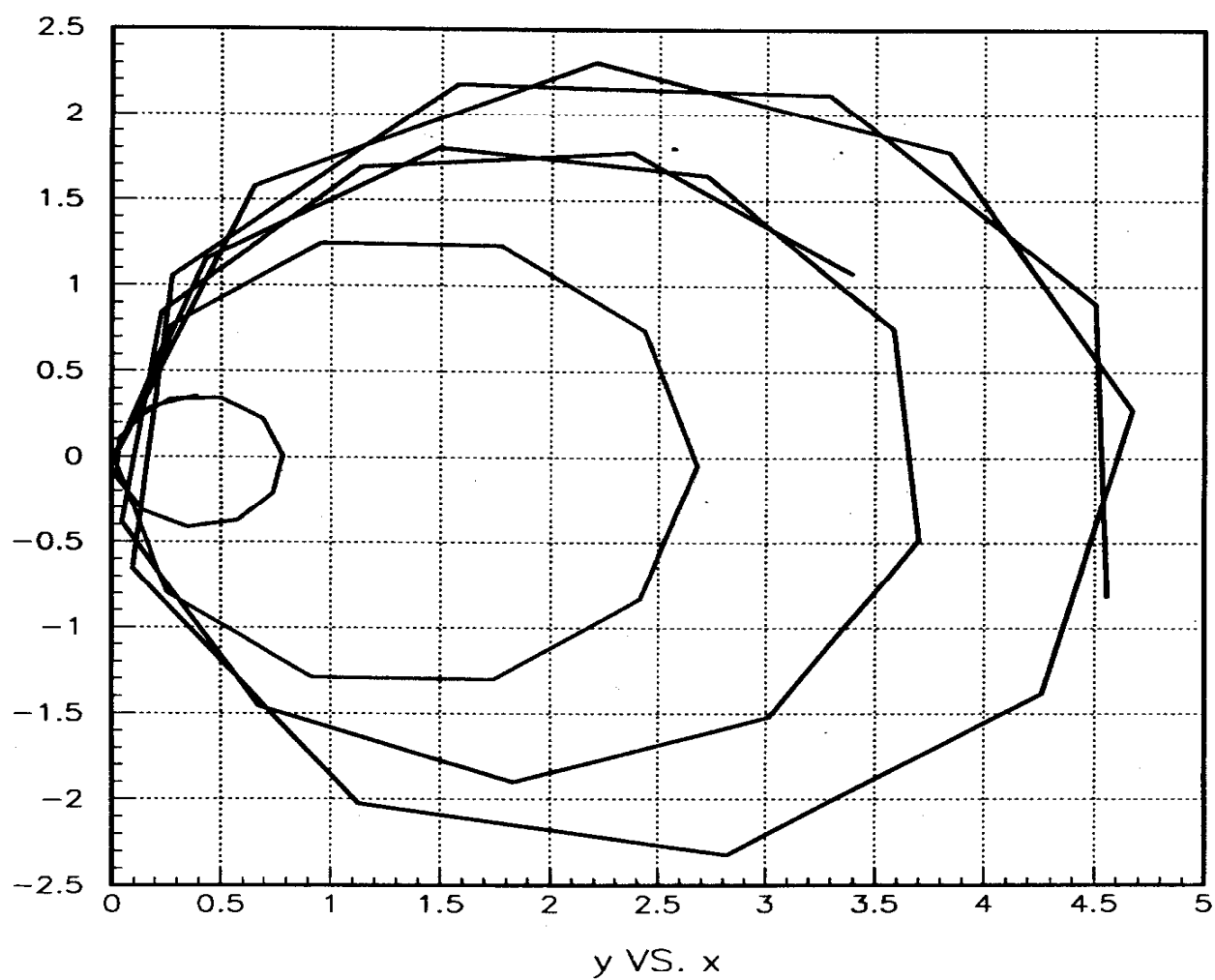
- Getting closer to the C. Kim's model in using
 - X and Y kicker magnets with time structure to make delays in a large solenoid
Developing an ICOOL test module.
 - Sector magnet channels with X and Y kicker magnets at the end. DC or pulsed.
Developing an ICOOL test module.
 - useful to have a mini-bunches generator module.
 - each mini-bunch will go through the middle of the sector magnet opening.
- With ONE Larmor turn, stacked 10 mini-bunches in a simple solenoid channel by using β_z (change vertical bending angle) adjustment. An example stacking is shown with ithout ICOOL kicker, without ICOOL sector magnet channels.

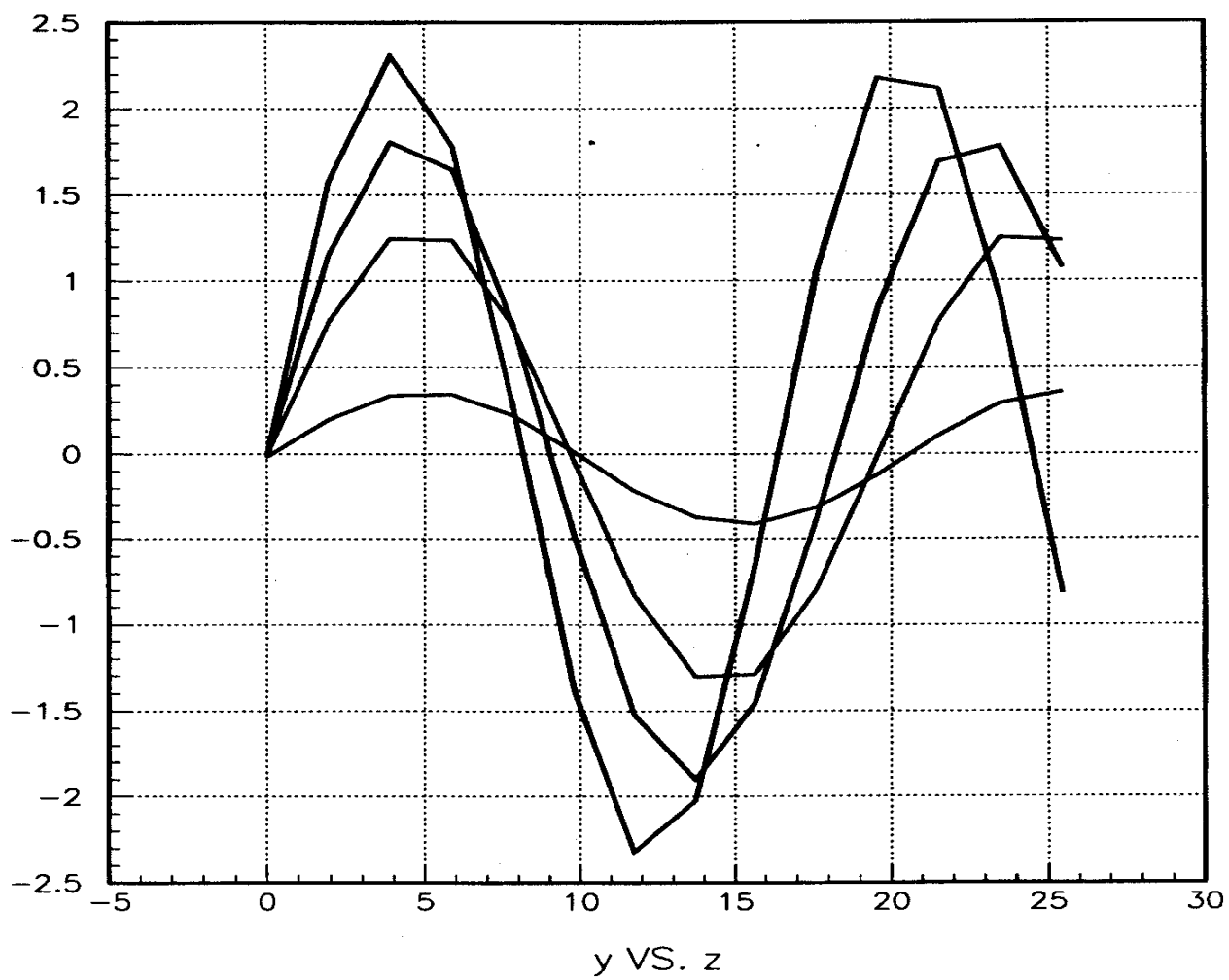
1 Larmor Turn Scheme

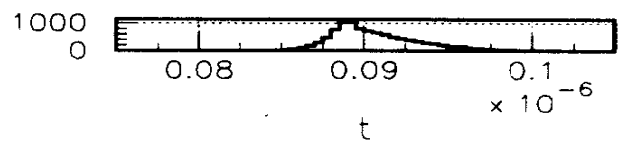
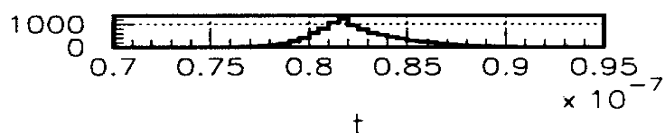
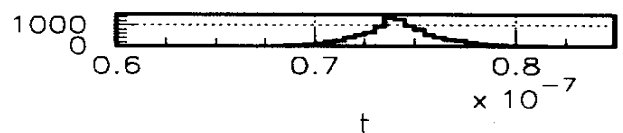
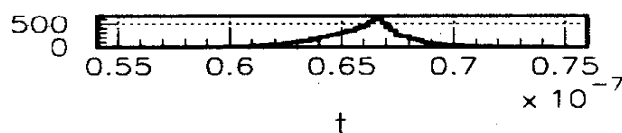
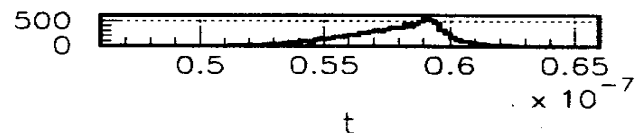
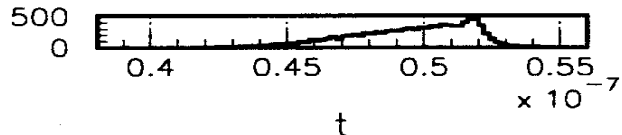
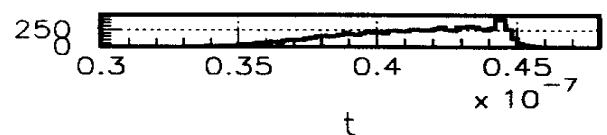
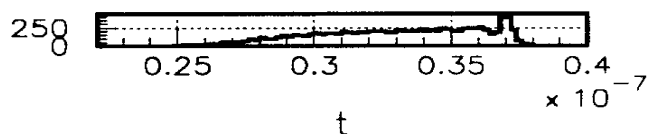
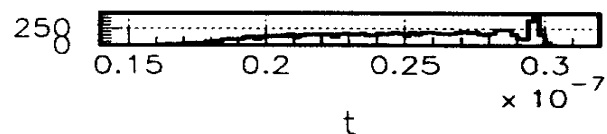
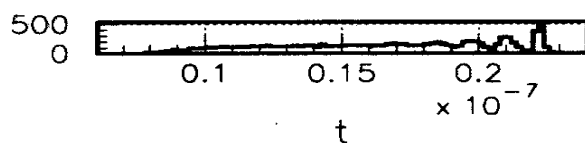
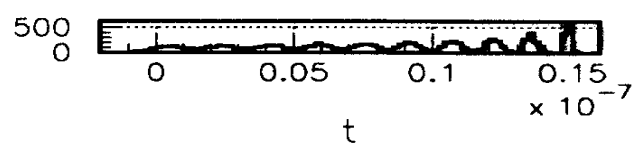
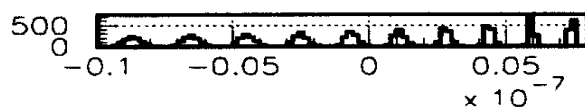
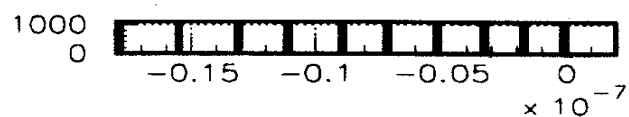


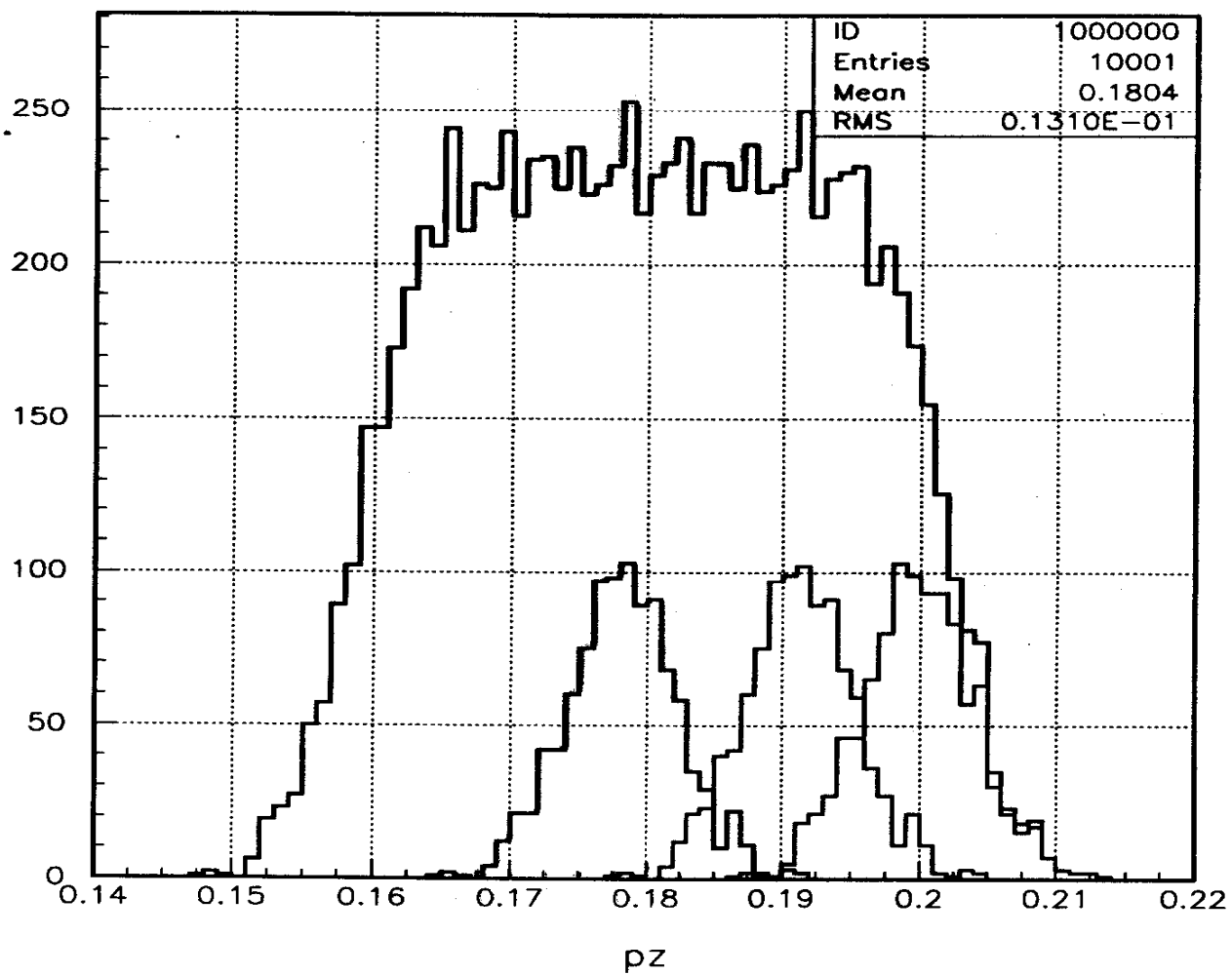
Parameters

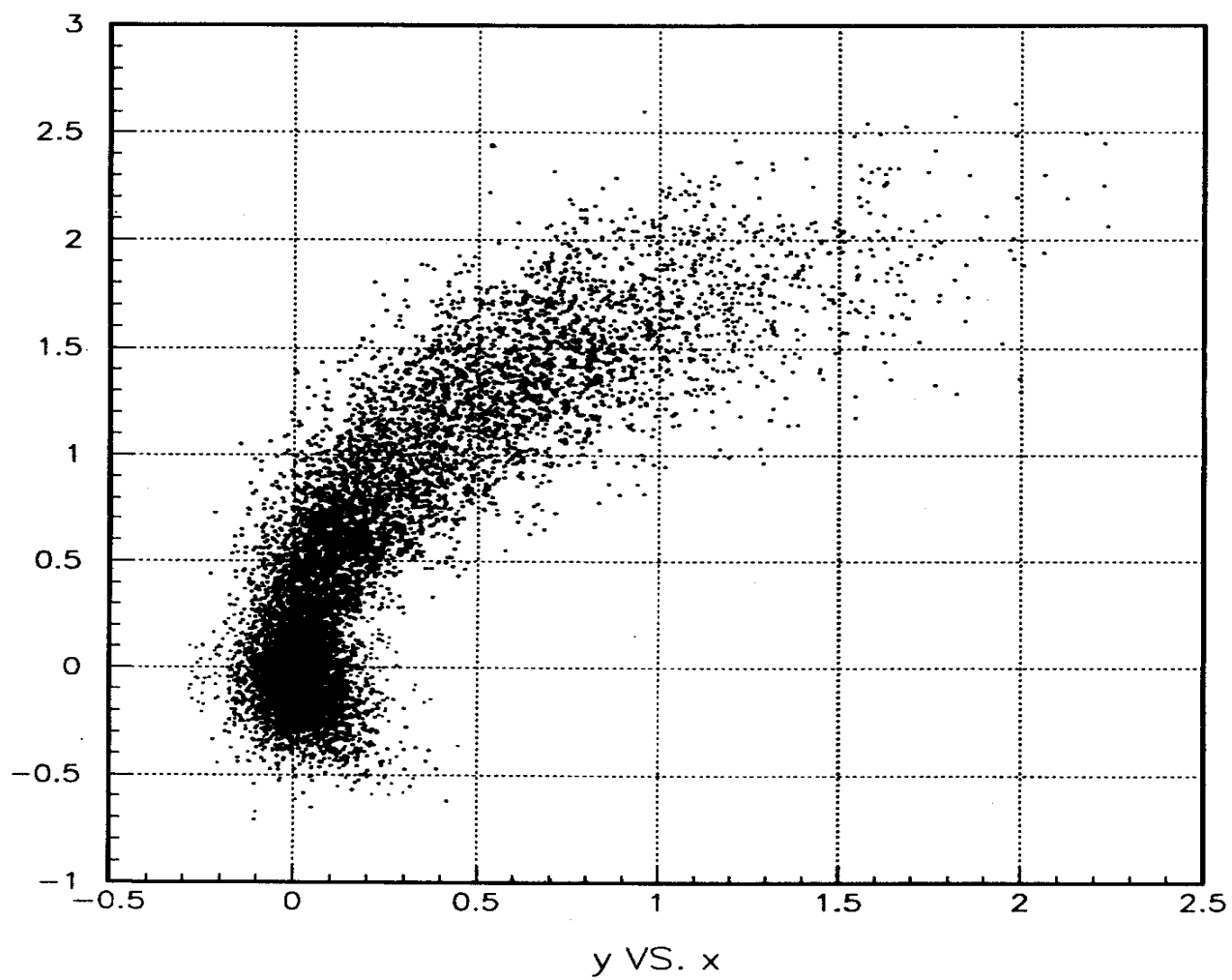
- Number of mini-bunches 10
- mini-bunch separation 42 cm (800 MHz)
- mini-bunch σ_x 5 cm, σ_y 5 cm, σ_z 10 cm,
 $\langle p_z \rangle$ 200 MeV/c, σ_{p_x} 14 MeV/c, σ_{p_y} 14 MeV/c, σ_{p_z}
4 MeV/c (2 % $\Delta p/p$)
- total length of the solenoid delay channel 19.6 m
- solenoid radius 5 m
- B_z 0.2 Tesla
- dimension of the sector magnet channel openings

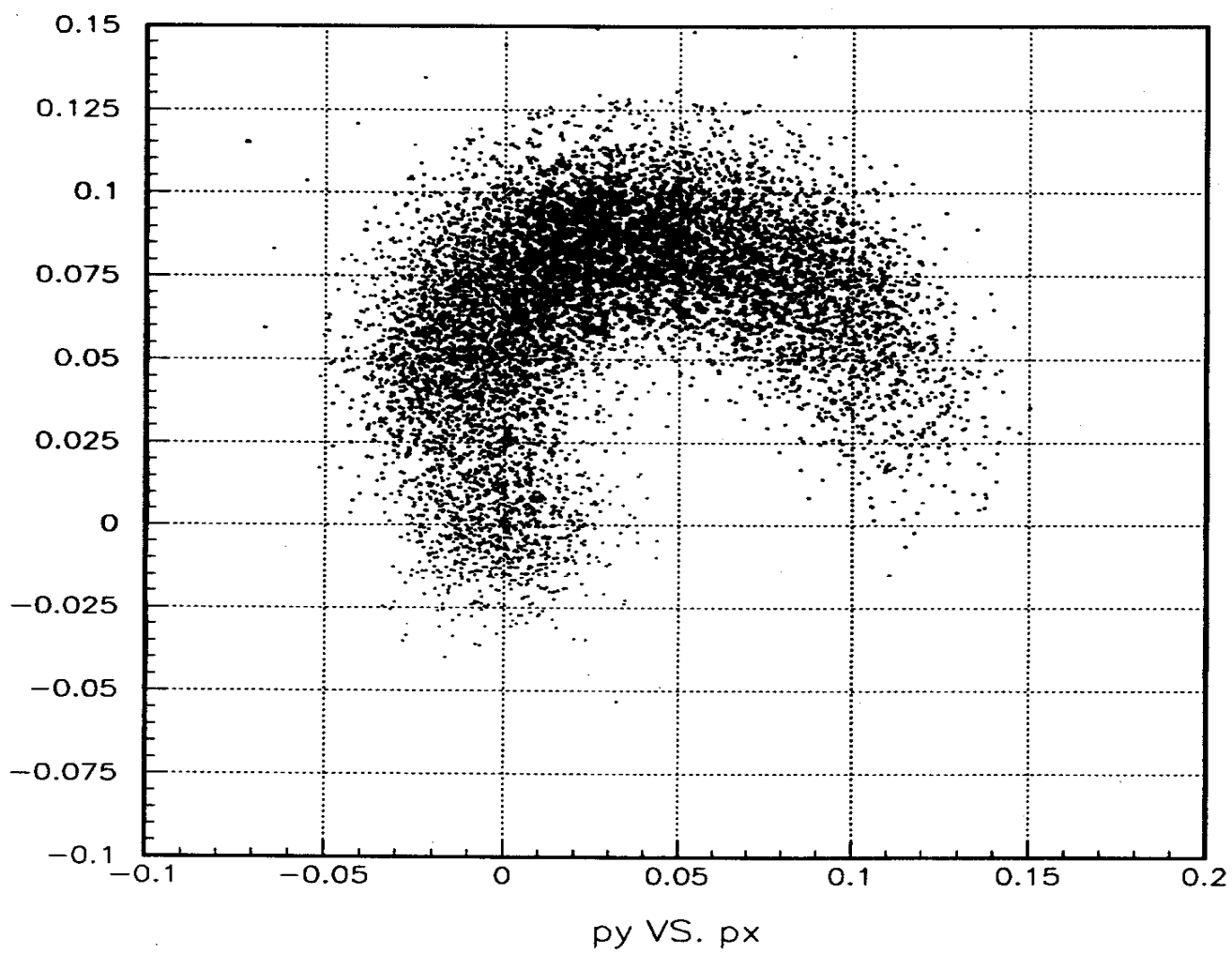










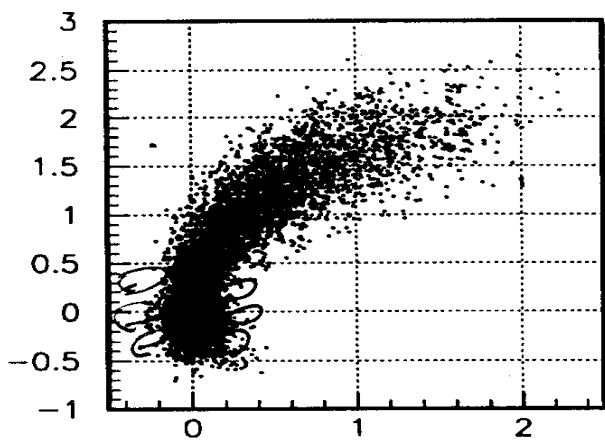


$$\beta'_2 \rightarrow \frac{L-d}{L} \beta_2$$

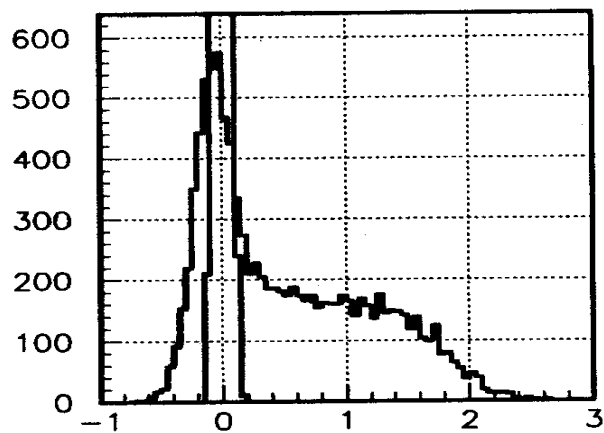
$$L \propto \beta_2$$

x

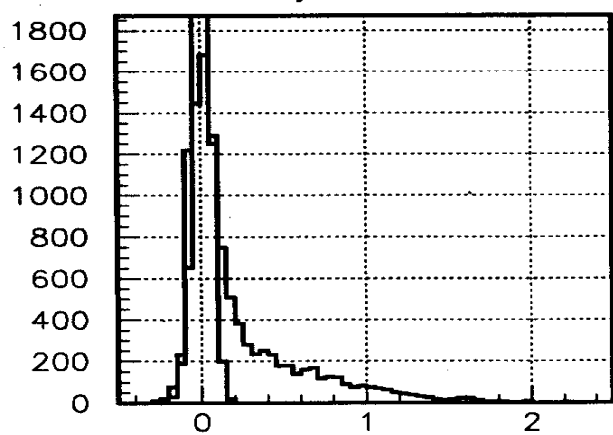




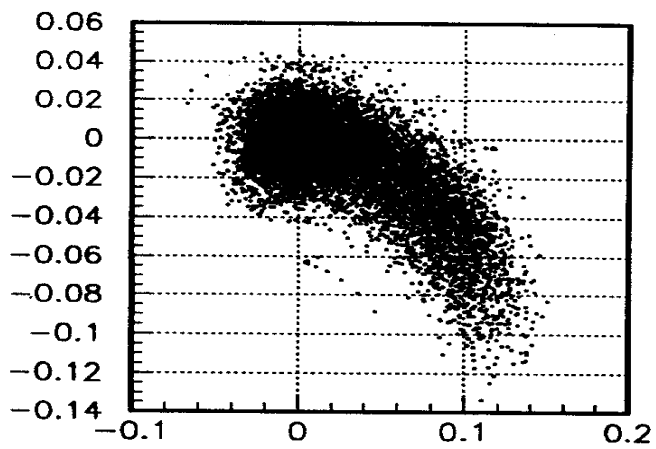
y VS. x



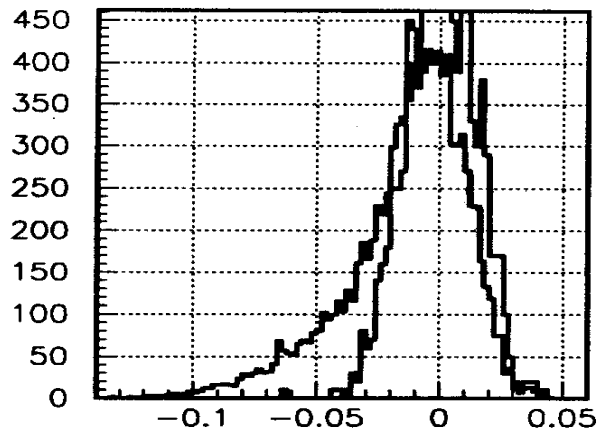
y



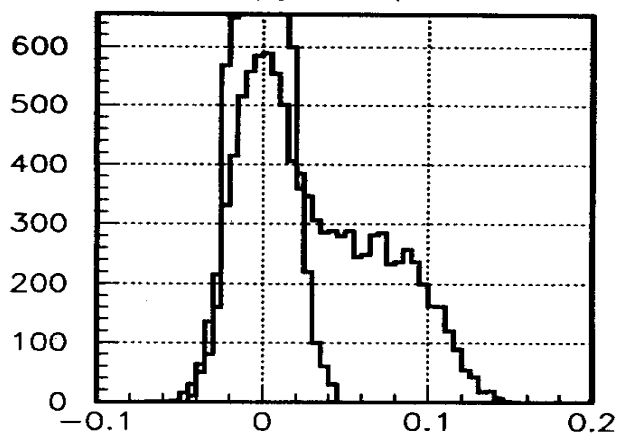
x



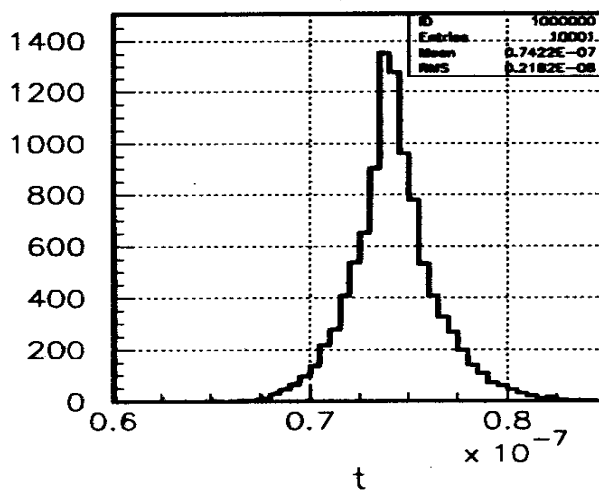
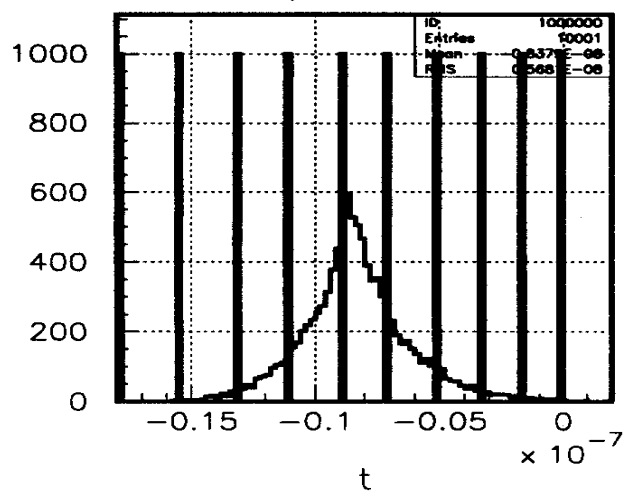
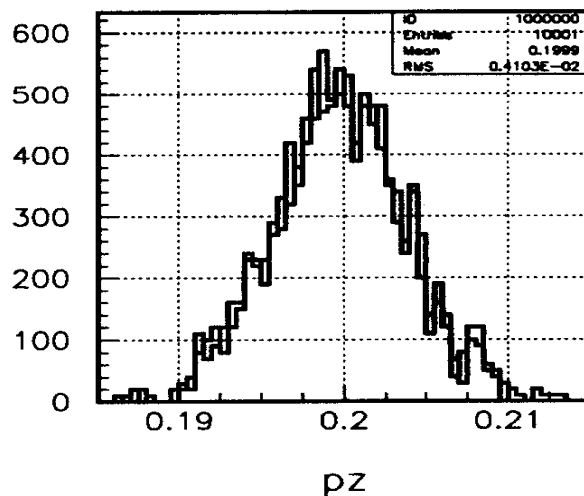
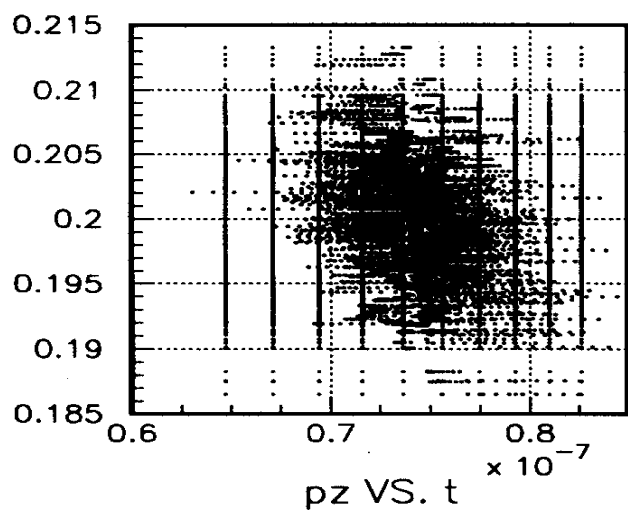
py VS. px



py



px



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*****
SIGMACUT =   T   Weighted NORMALIZED 2-D EMITTANCES   *****
PXYCORR =   F   PZCORR =   F   SIG_CUT =   50.0

des   No       N       emitX       emity       emitZ       Tr       fET       fEL
      [m]      [m]      [m]
  4 10000. 10000. 0.6630E-02 0.6805E-02 0.5837E-01 1.000 1.000 1.000
 22 10000. 10000. 0.7925E-01 0.1194E+00 0.1978E-01 1.000 210. 0.33

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Summary

- Work in progress to complete all simulation in one ICOOL run
 - Bunched beam generation
 - initial kicker magnets
 - Sector magnet channels
- mini-bunch elongation was shown which gives x3 reduction in the longitudinal norm. emittance (not x10) with 10 mini-bunch stacking.
- Transverse norm. emittance will blow up because of the non-Gaussian stacking(stack side by side in X-Y plane).
- Transmission depends on the mini-bunch separation in the transverse phase space.
- Need more work to implement the independent delay channels
 - Kicker EM field
 - Solenoid channel to Conventional channel
 - Conventional channel to Solenoid channel