

# **200 MHz Buncher Section**

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# Buncher Section

## Purpose:

- Split long bunch from rf rotation section (induction linac) into string of 200 (0r 175) MHz bunches for cooling section
- Transverse match from induction linac ( $B=1.25$  T) Into cooling channel

## Baseline Beam parameters from rf rotation

$$P_{\mu, \text{central}} \cong 200 \text{ MeV/c}$$

(Kinetic energy  $\cong 120$  MeV)

### Longitudinal

$$L_{\text{total}} \cong 100 \text{ m } (\sigma_z \cong 16\text{m})$$
$$\sigma_p \cong 8 \text{ to } 10 \text{ MeV/c } (\text{PJK} \sim 4\text{MeV/c})$$

### Transverse:

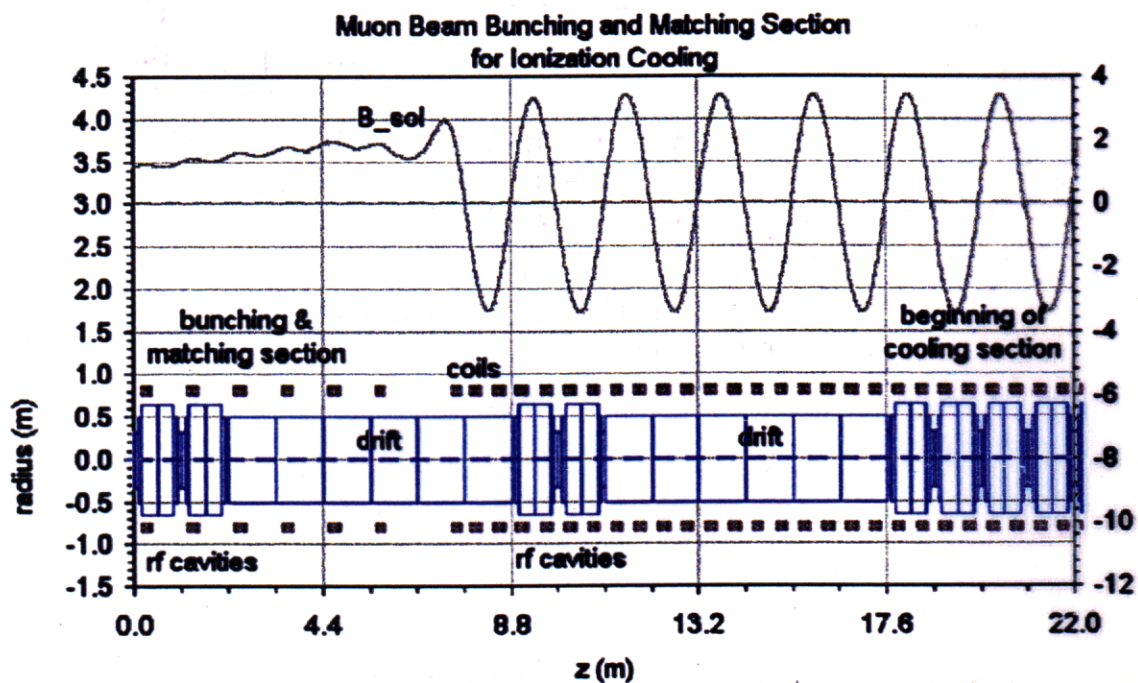
$$\epsilon_{T,N} \cong 0.015 \text{ m } (\sigma_x \cong 8\text{cm})$$

## Cooling Channel beam parameters:

$$\sigma_z \cong 10\text{cm}; \sigma_p \cong 15 \text{ MeV/c}$$
$$\beta_{\perp} \cong 0.3\text{m } (\sigma_x \cong 5\text{cm})$$

# Possible Configuration

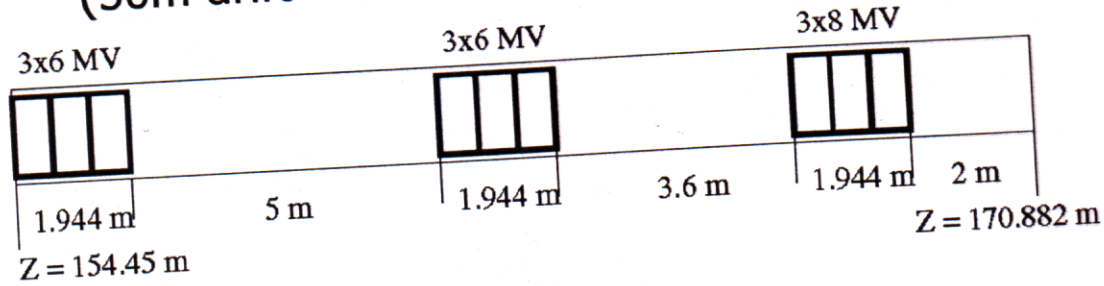
(C. Kim - 2-step buncher, 1.1m cells):



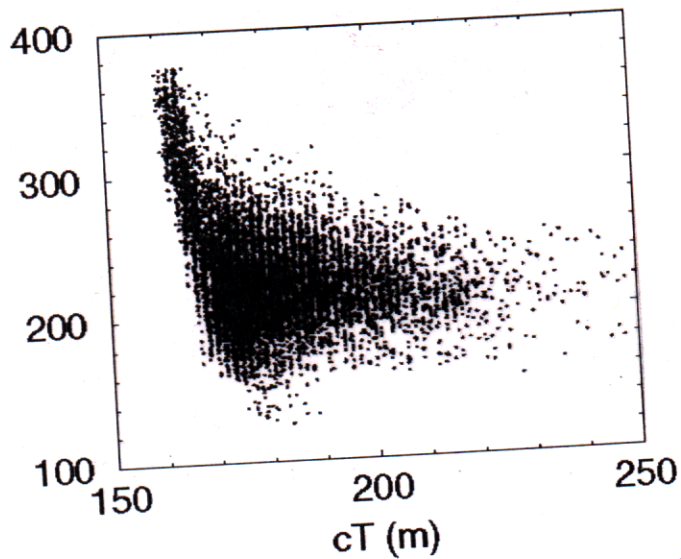
Case includes transverse matching solenoids

# Feasibility study buncher:

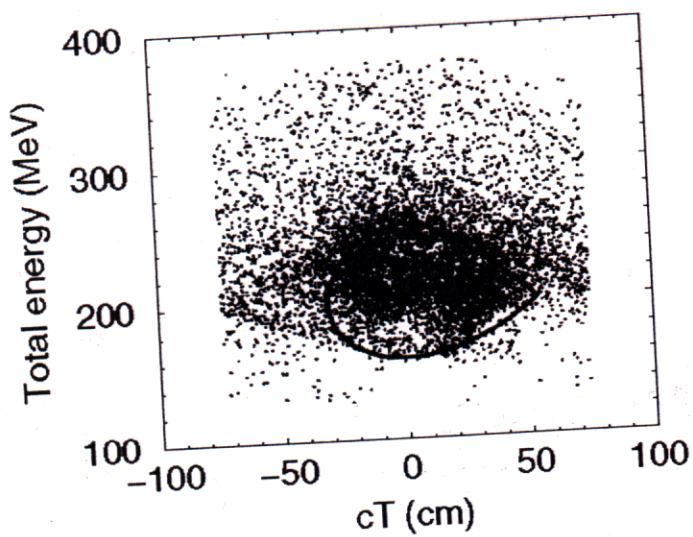
(50m drift + 100m induction linac + "minicool")



## Beam after Buncher:



## Distribution folded over 200 MHz periodicity:



## **R&D to do:**

Optimize/ improve scenarios

**Rf capture**  $\Rightarrow$  **Cooling**

## **Need more 6-D, integrated simulations**

At output of induction linac,  **$\Delta E$  is too large**

$\Rightarrow$  Output of buncher has  $\epsilon_L$  **is too large**  
(overfills rf cooling bucket)

$\Rightarrow$  Large losses in buncher and cooling channel

$\Rightarrow$  **Need energy cooling**

$\Rightarrow$  Emittance exchange workshop (July at BNL)

## **Correlations –**

$\delta p$ - $A^2$  correlation has not been matched.

Study effects and optimization possibilities.