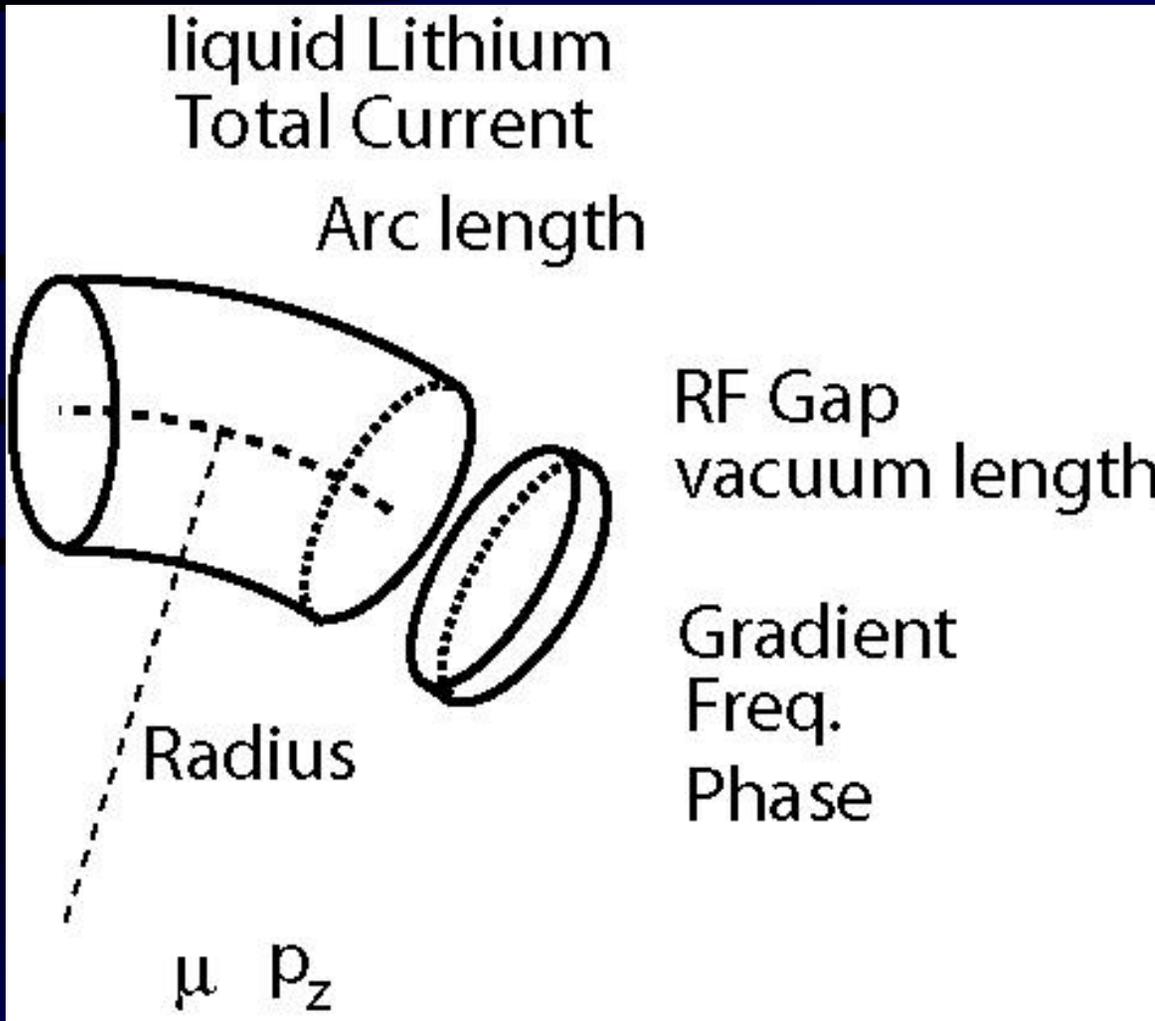


# Ring Models for Emittance Exchange

Yasuo Fukui

- ❑ Develop simple curved Lithium lens rings for 6D Cooling with Emittance Exchange.
- ❑ Compare cooling performance of Curved Lithium lens Rings with various radii,  $\beta$  at 1 cm, 10 cm, a RF gap /10 cm curved Li lens

# Model Parameters



10 cm – 0.5 mm

0.5 mm

100 MHz

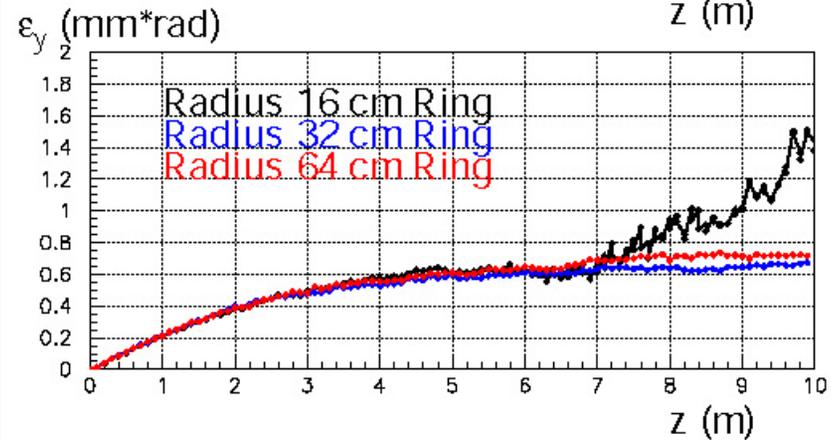
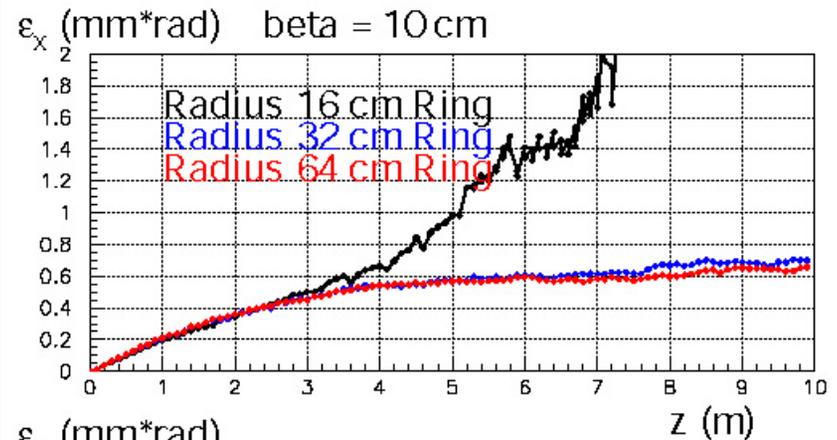
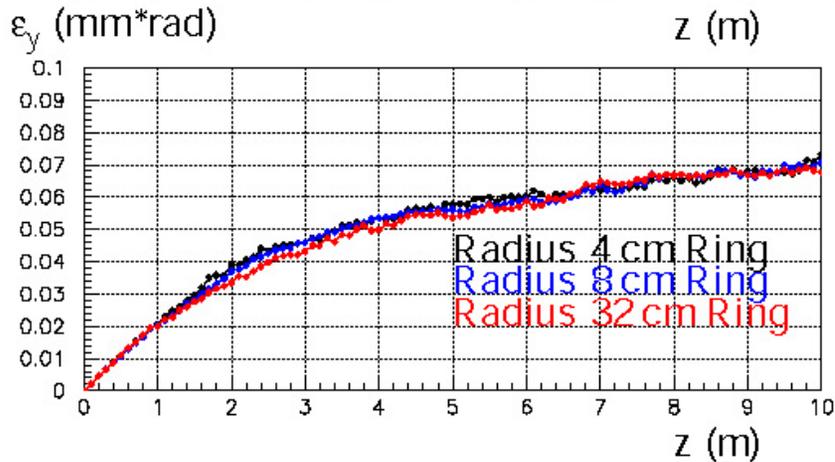
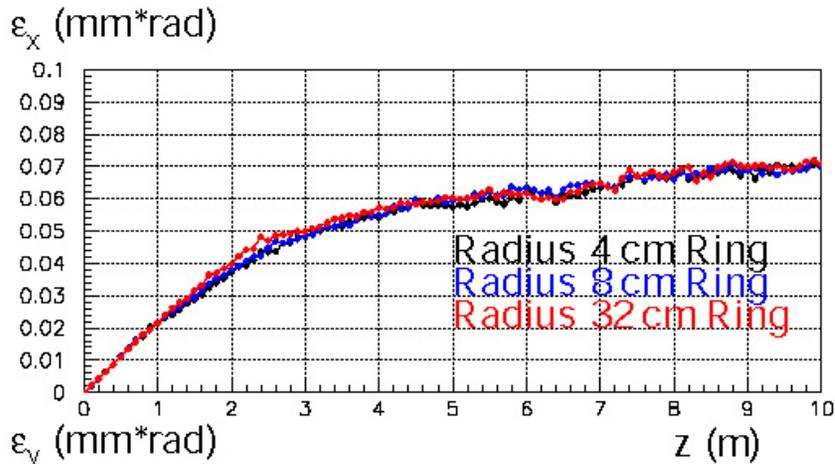
20 deg

250 MeV/c

# Transverse Emittance

$\beta = 1 \text{ cm}$

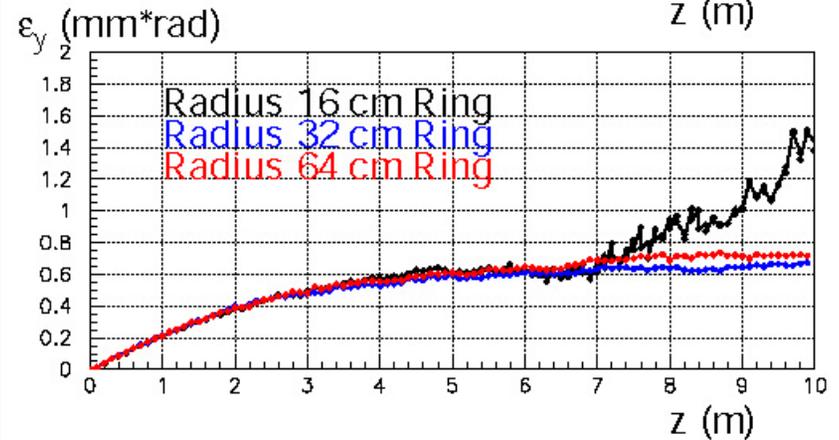
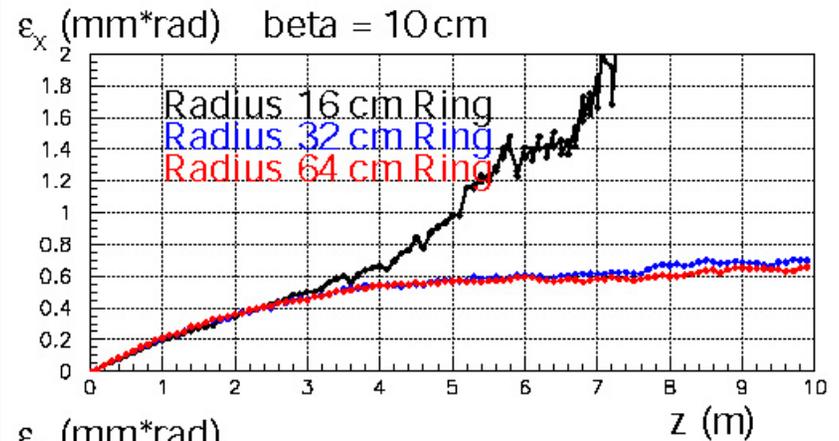
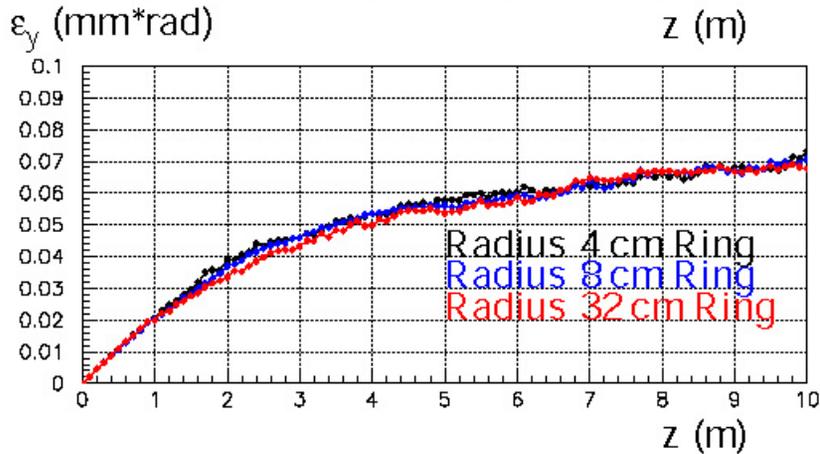
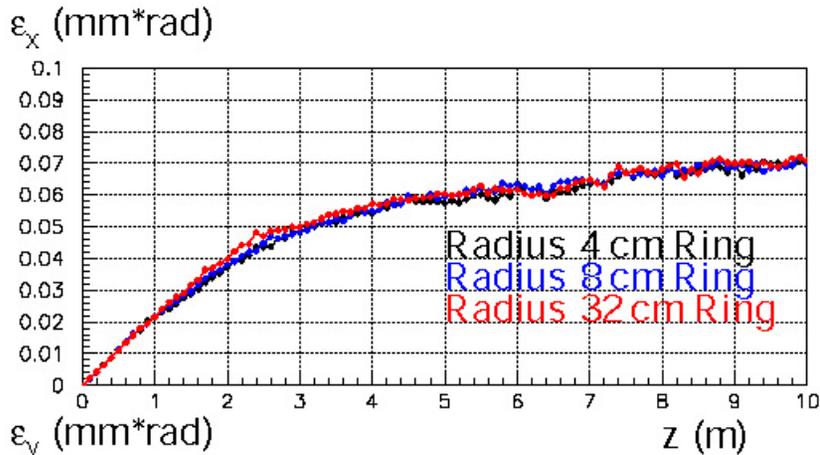
$\beta = 10 \text{ cm}$



# Transverse Emittance

$\beta = 1 \text{ cm}$

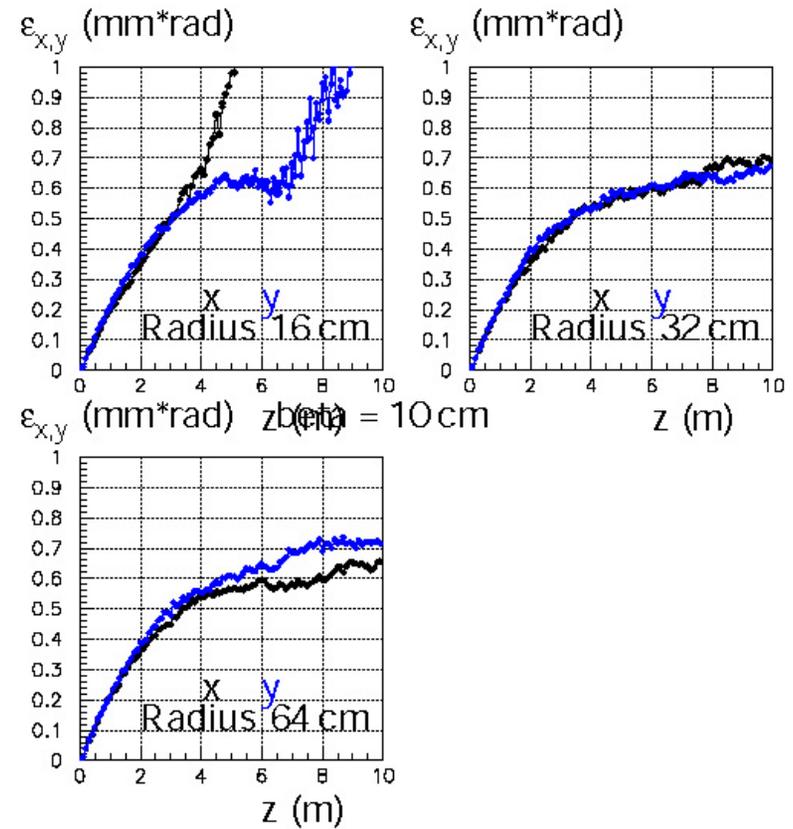
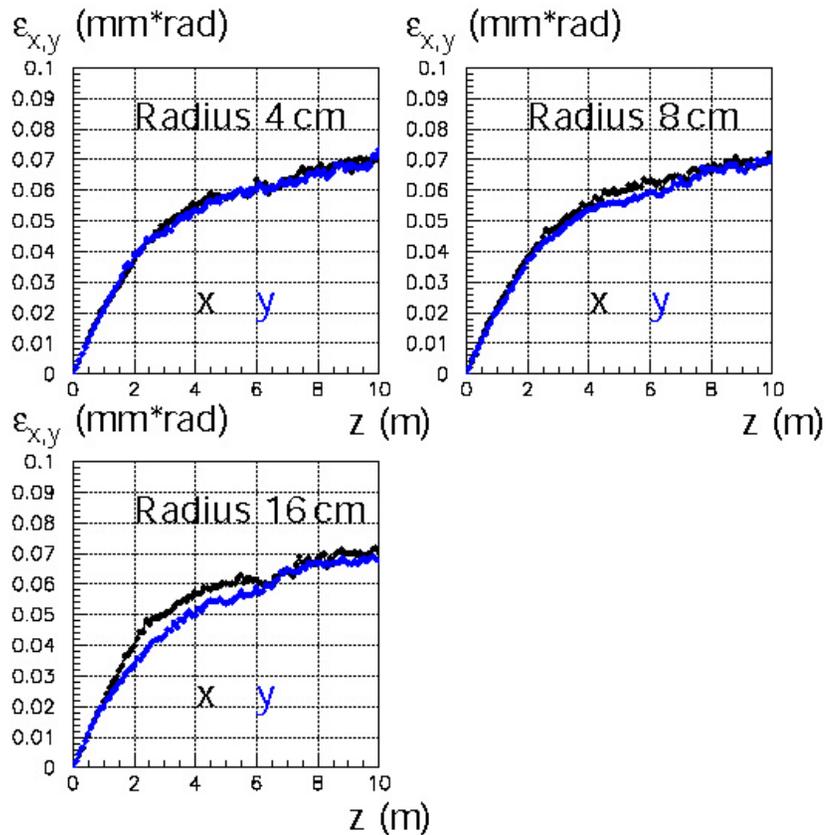
$\beta = 10 \text{ cm}$



# $\epsilon_x, \epsilon_y$ difference

$\beta = 1 \text{ cm}$

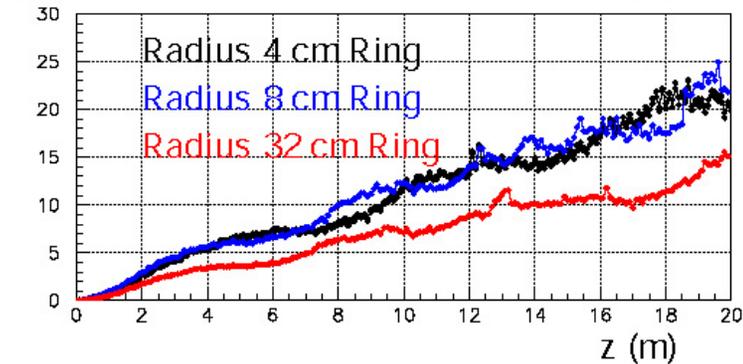
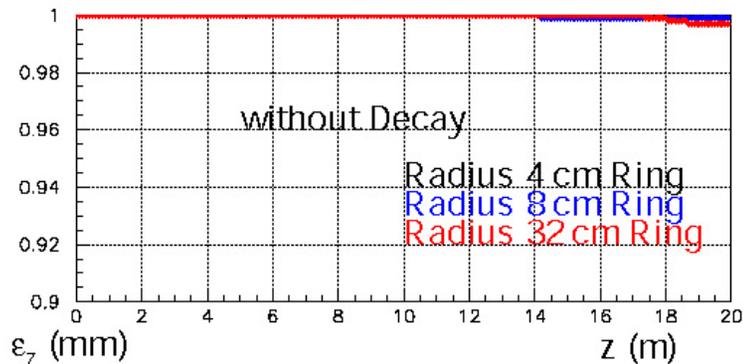
$\beta = 10 \text{ cm}$



# Transmission/Longitudinal Emittance

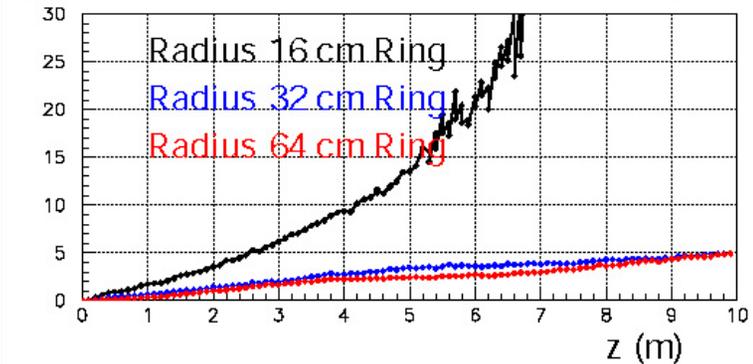
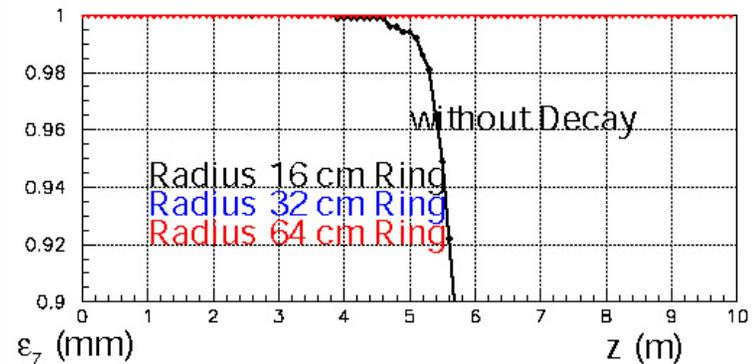
$\beta = 1 \text{ cm}$

Transmission



$\beta = 10 \text{ cm}$

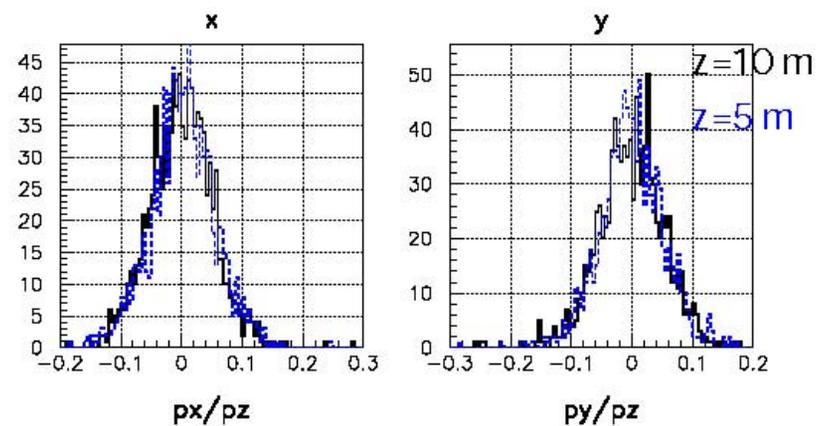
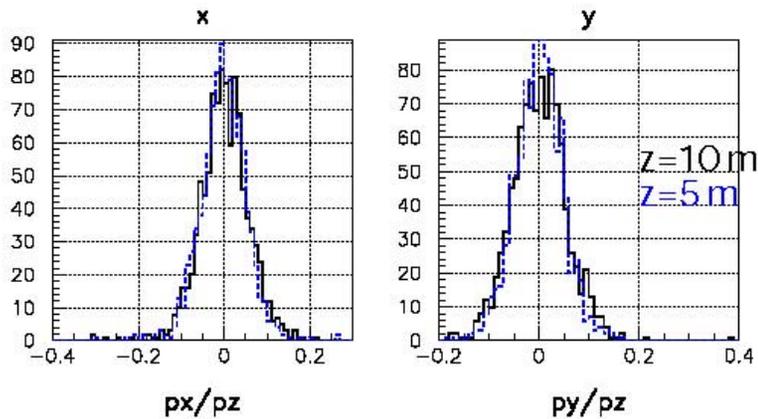
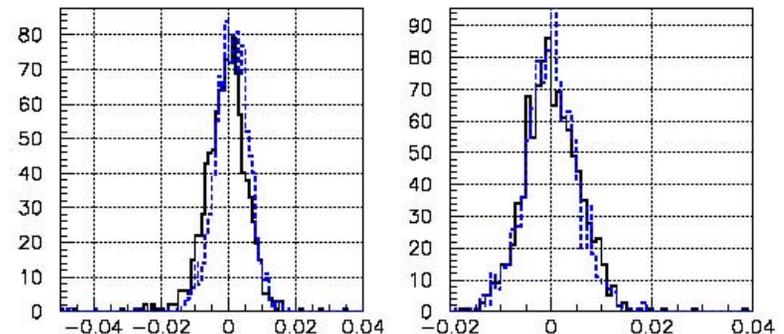
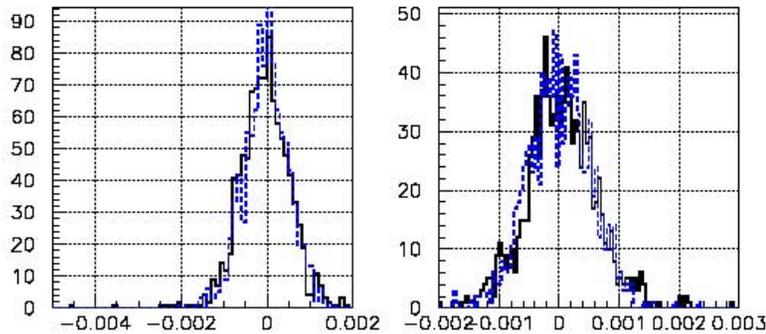
Transmission



# Beam profile

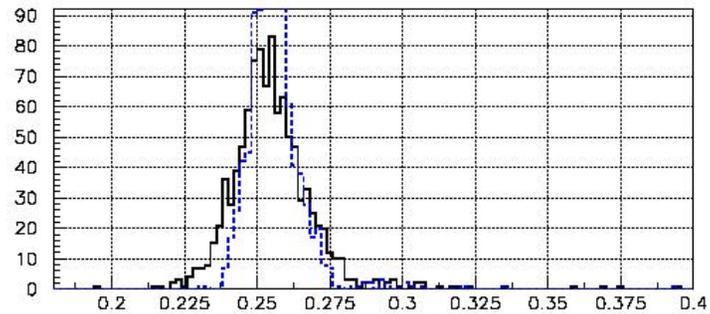
$\beta = 1 \text{ cm}, R=8 \text{ cm}$

$\beta = 10 \text{ cm}, R=64 \text{ cm}$

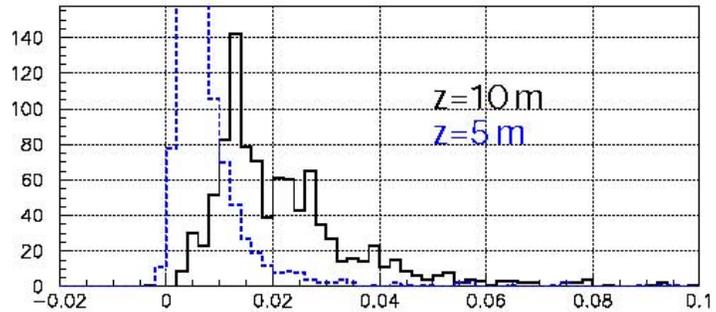


# Beam profile

$\beta = 1 \text{ cm}, R=8 \text{ cm}$

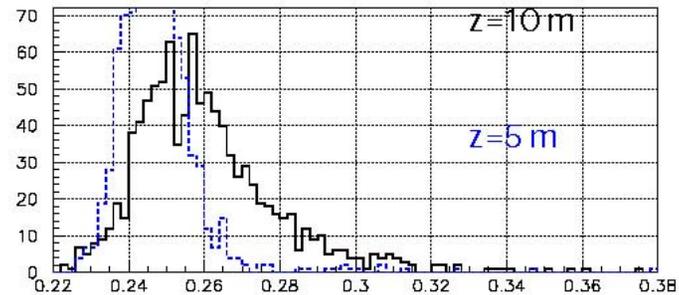


$p_z$

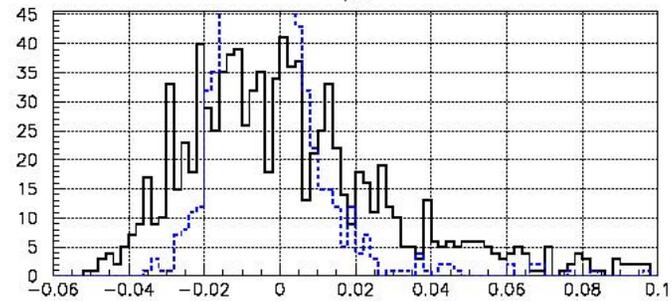


$cdt-10$

$\beta = 10 \text{ cm}, R=64 \text{ cm}$

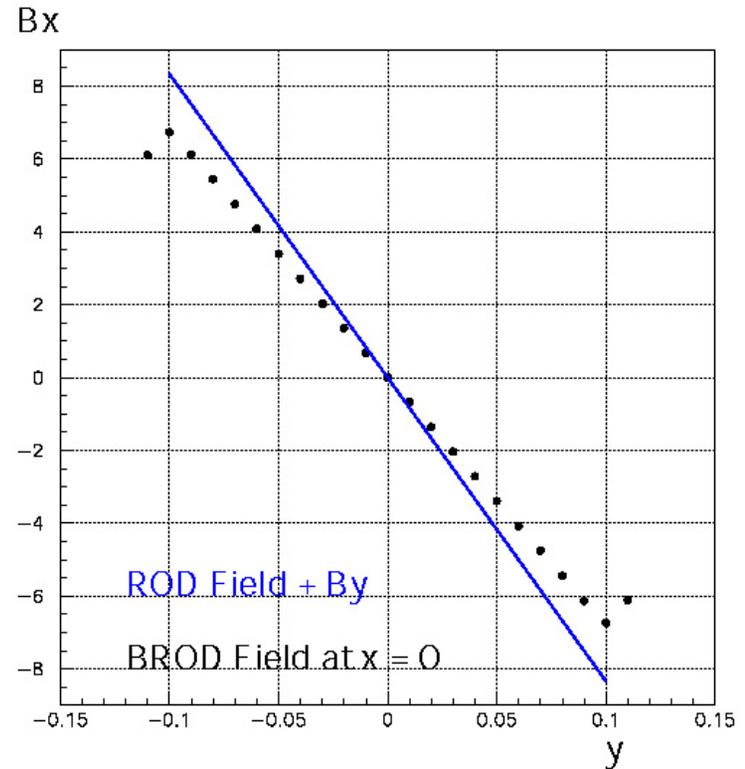
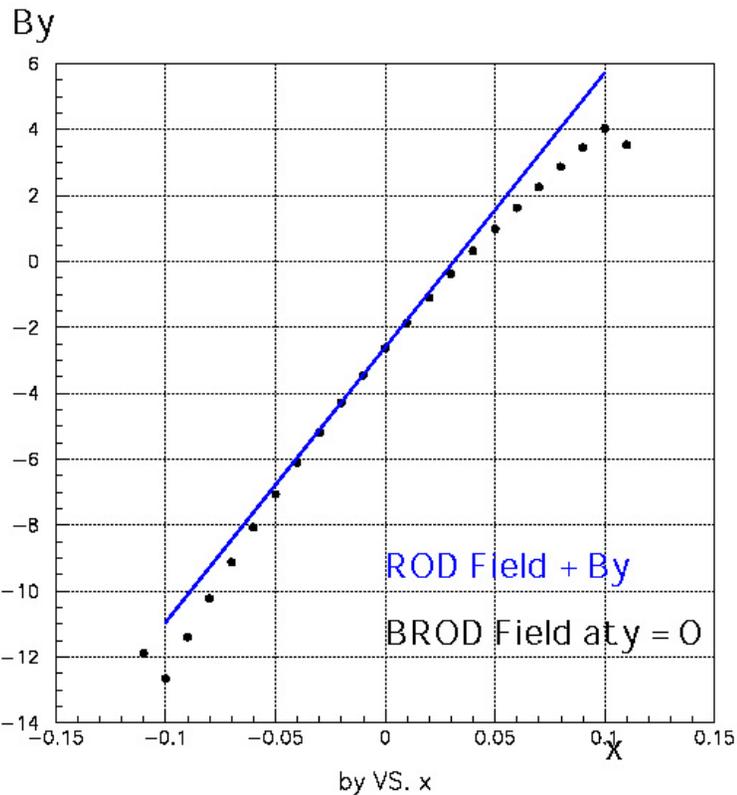


$p_z$



$cdt-10$

# Magnetic Field models



# Summary

- ❑ Radius dependence of the Cooling is observed in the larger beta models.

$$\sigma_x / \text{Radius} \sim 1 \text{ cm} / 32 \text{ cm}$$

- ❑  $\varepsilon_z$  saturation was observed in  $\beta = 10 \text{ cm}$ , Radius 32 cm case.
- ❑ Can we see Emittance Exchange dynamically?  
Strength of Emittance Exchange as a function of  $z$ .
- ❑ Use the model in a single path cooling channel.