

β^* @ DØ -- Update

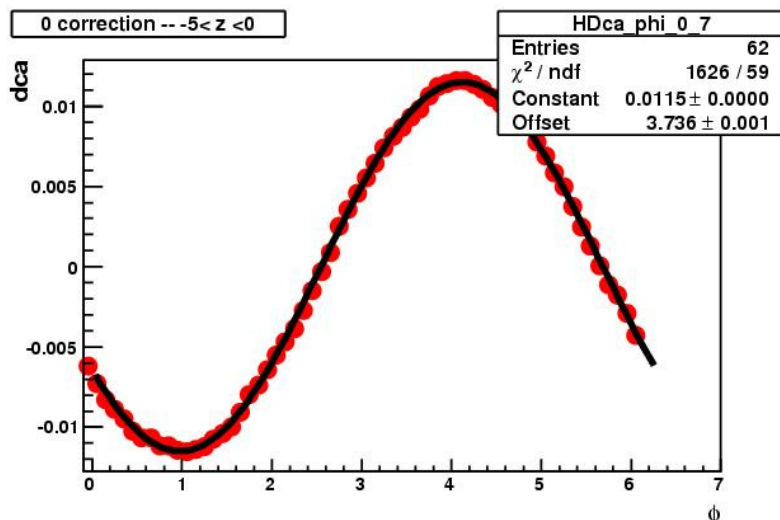
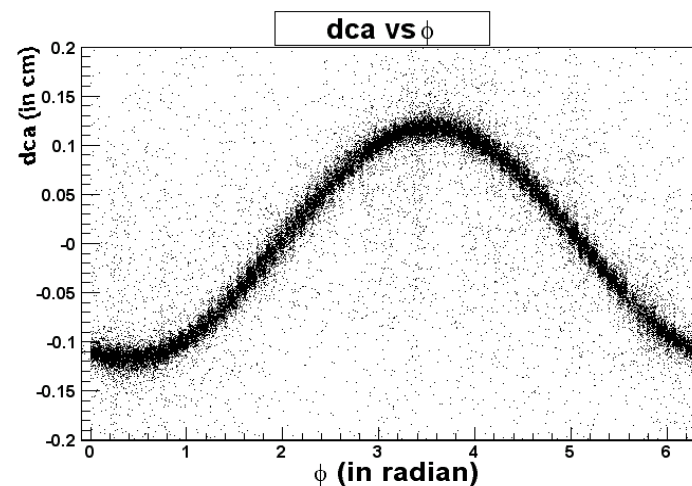
Avdhesh Chandra
Rice University

Luminosity Meeting
Dec 16 2009

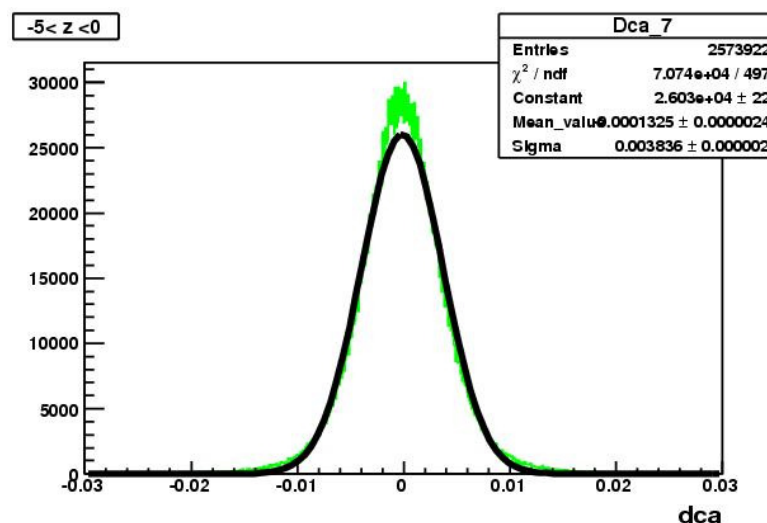
Equations

- Interaction region is from -40cm to +40cm on z-axis, dividing data in slices of 5 cm each on z-axis, total 16 division (say z-region)
- For each z-region, dca vs ϕ plot is of sinusoidal shape because of

$$dca = y_v \cos\phi - x_v \sin\phi$$



$$y_v \cos\phi - x_v \sin\phi \cong A \sin(B + \phi)$$

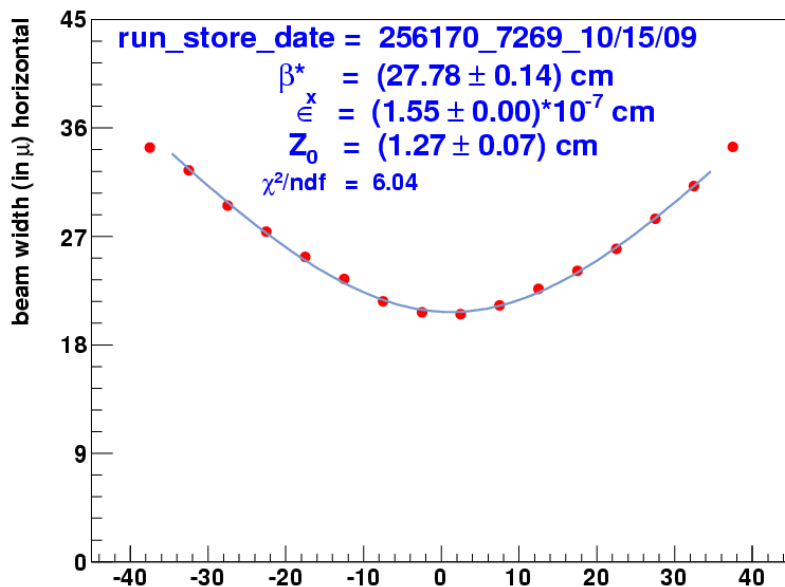


Equations

$$\langle d_1 d_2 \rangle = \frac{1}{2} (\sigma_2^2 - \sigma_1^2) \cos(\phi_1 + \phi_2) + \frac{1}{2} (\sigma_2^2 + \sigma_1^2) \cos(\phi_1 - \phi_2) - T \sin(\phi_1 + \phi_2)$$

where, σ_1 , σ_2 and T are parameters

- x_v & $y_v \rightarrow$ (x, y) coordinate of the vertex
- d_1 & $d_2 \rightarrow$ impact parameter of two tracks from the same vertex
- σ_1 & $\sigma_2 \rightarrow$ beam width in horizontal and vertical plane
- $T \rightarrow$ correlation between σ_1 & σ_2

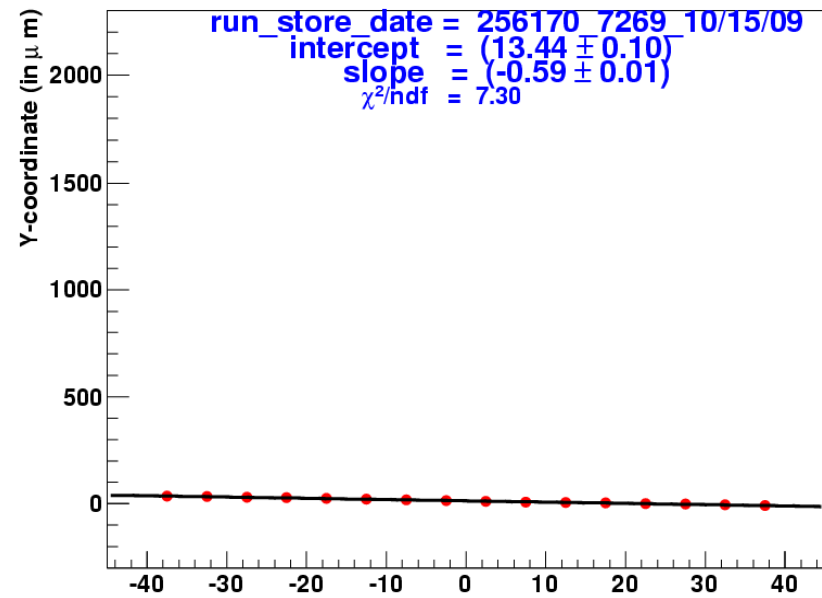
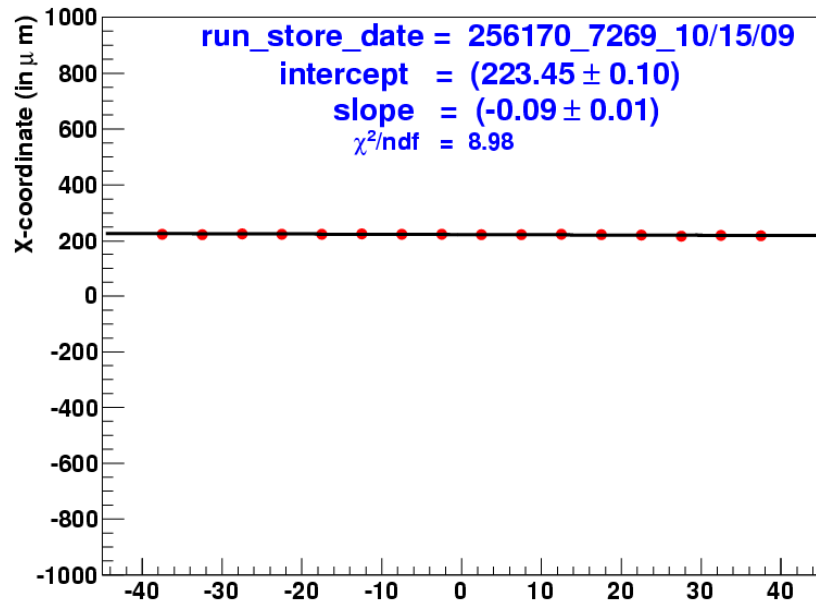


The interaction region is a drift in the Tevatron, z dependence of beam width given by following formula

$$\sigma^2 = \epsilon_{eff} \left[\beta^* + \frac{(z - z_0)^2}{\beta^*} \right]$$

Corrections \rightarrow (x,y) coordinate

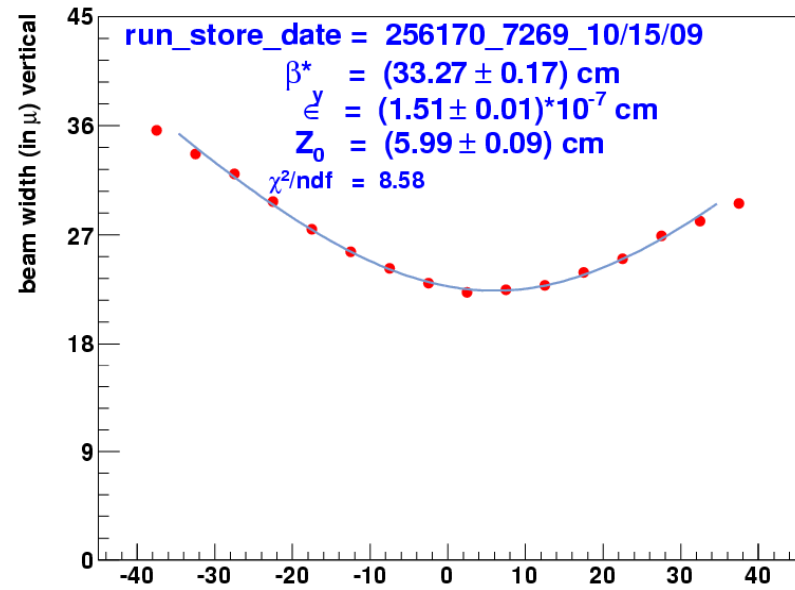
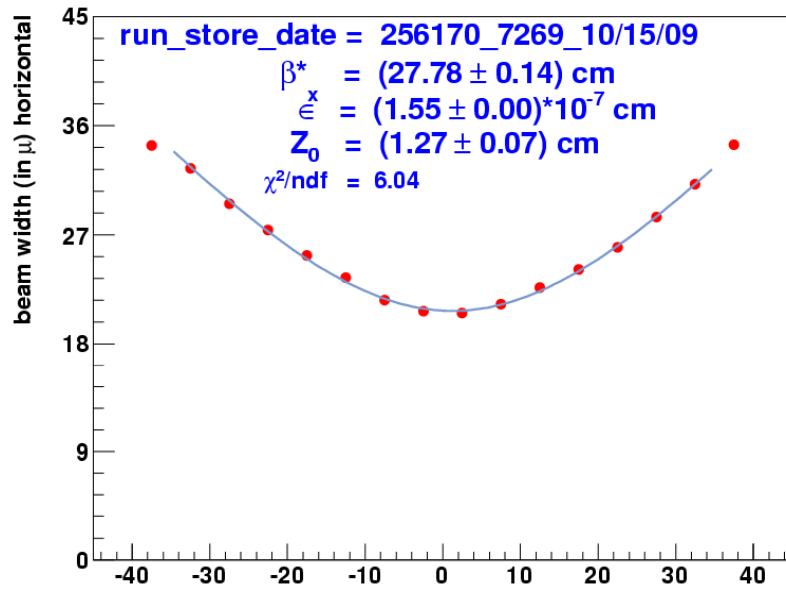
$$y_v \cos\phi - x_v \sin\phi \cong A \sin(B + \phi)$$



← Z-axis (cm) →

$$\sigma_i \rightarrow \beta_i^*$$

Red dots corresponds to beam width (in micron m)

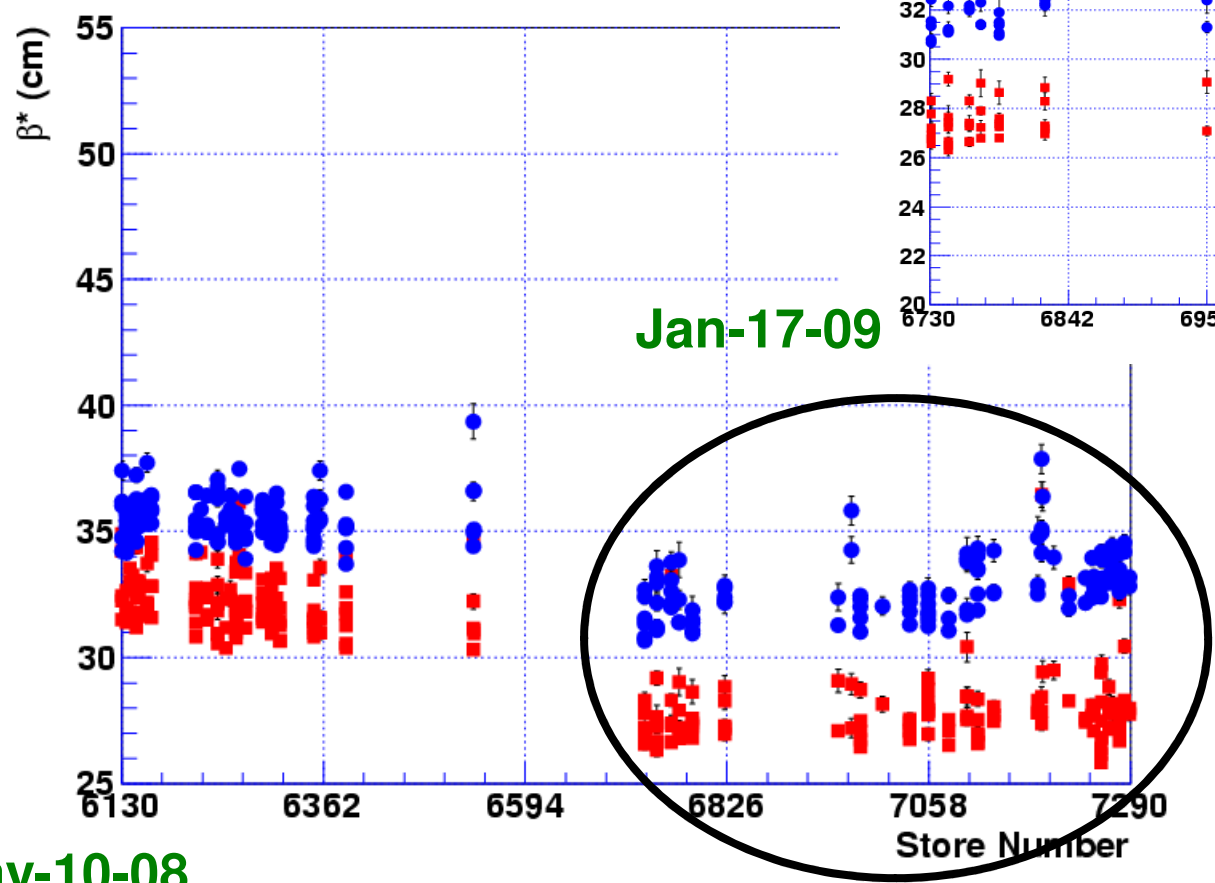


← Z-axis (cm) →

$$\sigma^2 = \epsilon_{\text{eff}} \left[\beta^* + \frac{(z - z_0)^2}{\beta^*} \right]$$

β_i^* vs Store

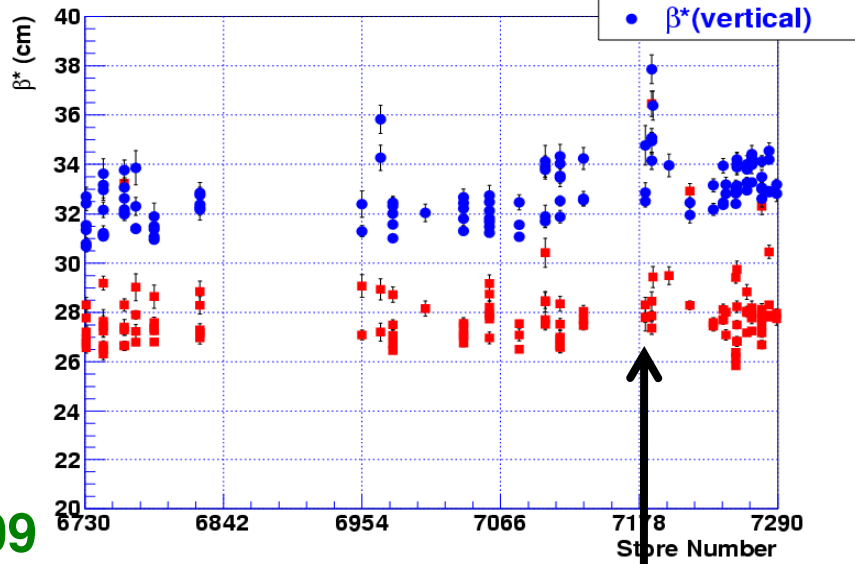
beta* Vs Store



May-10-08

Jan-17-09

beta* Vs Store

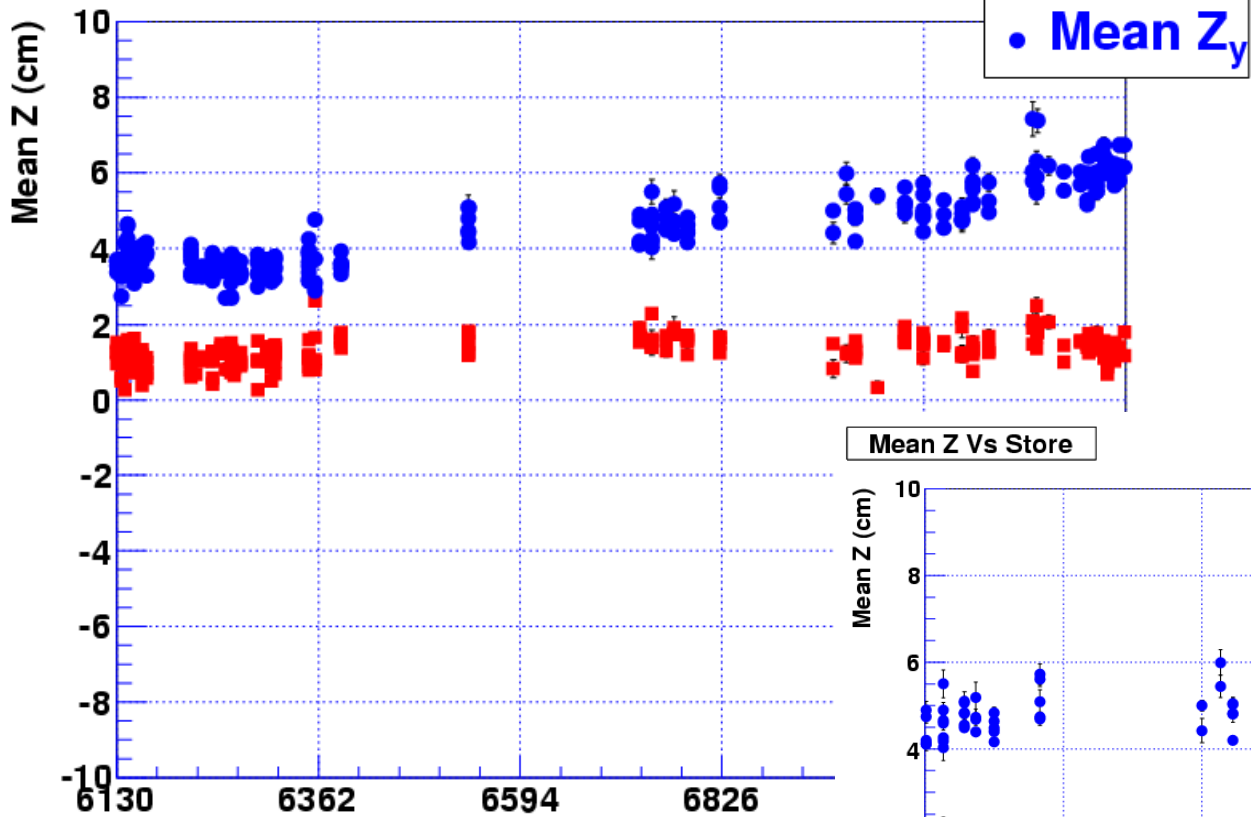


After Shutdown
7183, 09-16-09

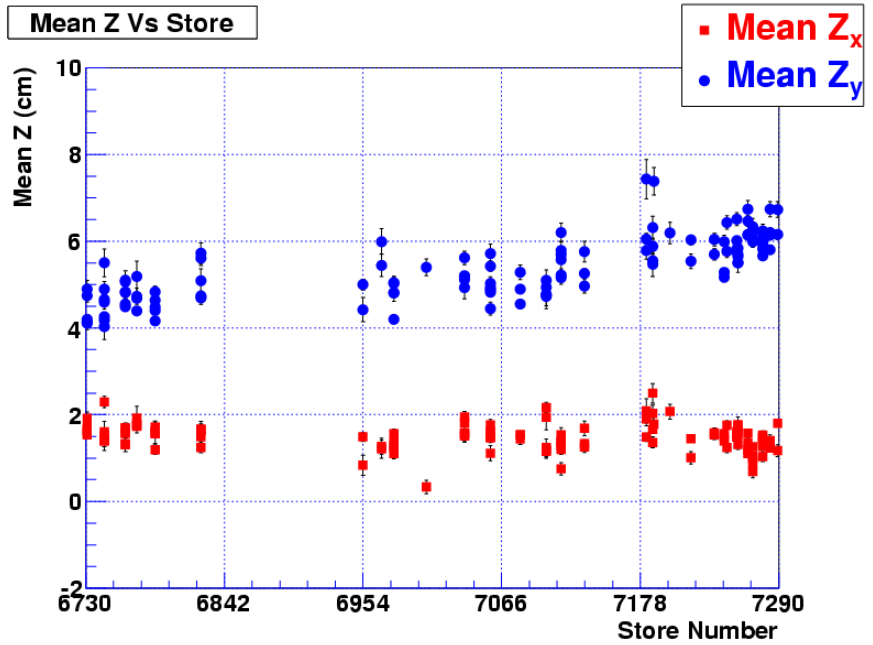
Oct-23-09

$$\sigma_i \rightarrow Z_i$$

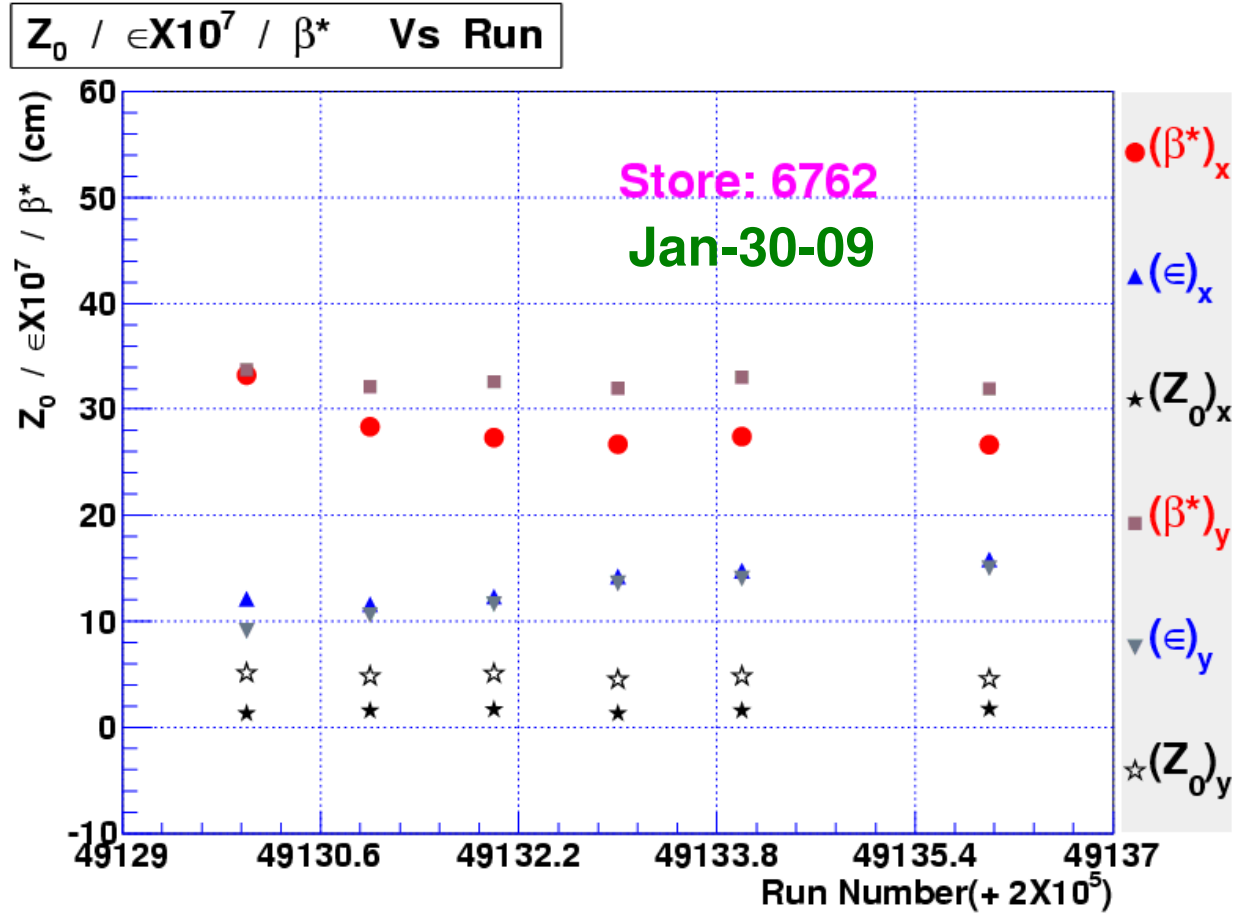
Mean Z Vs Store



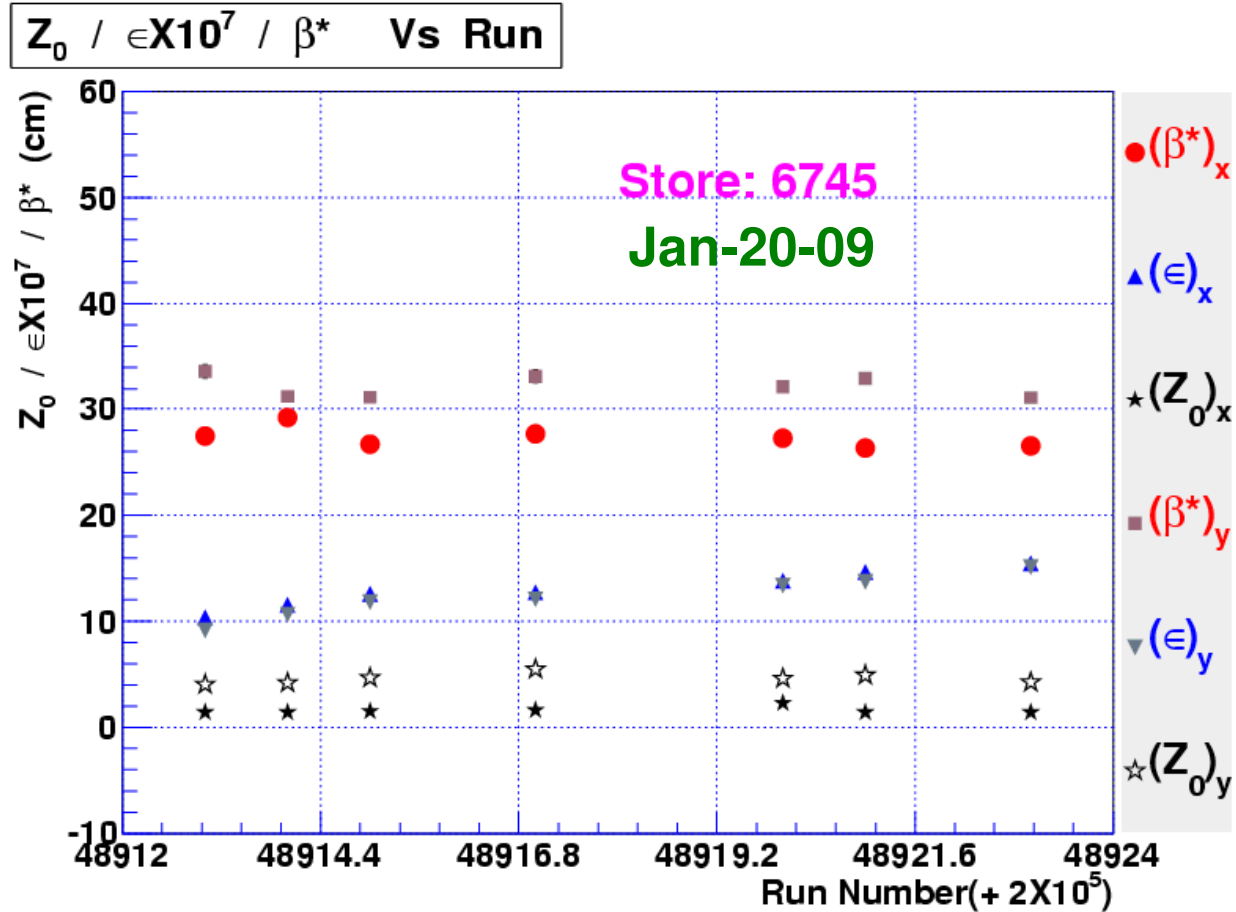
Mean Z Vs Store



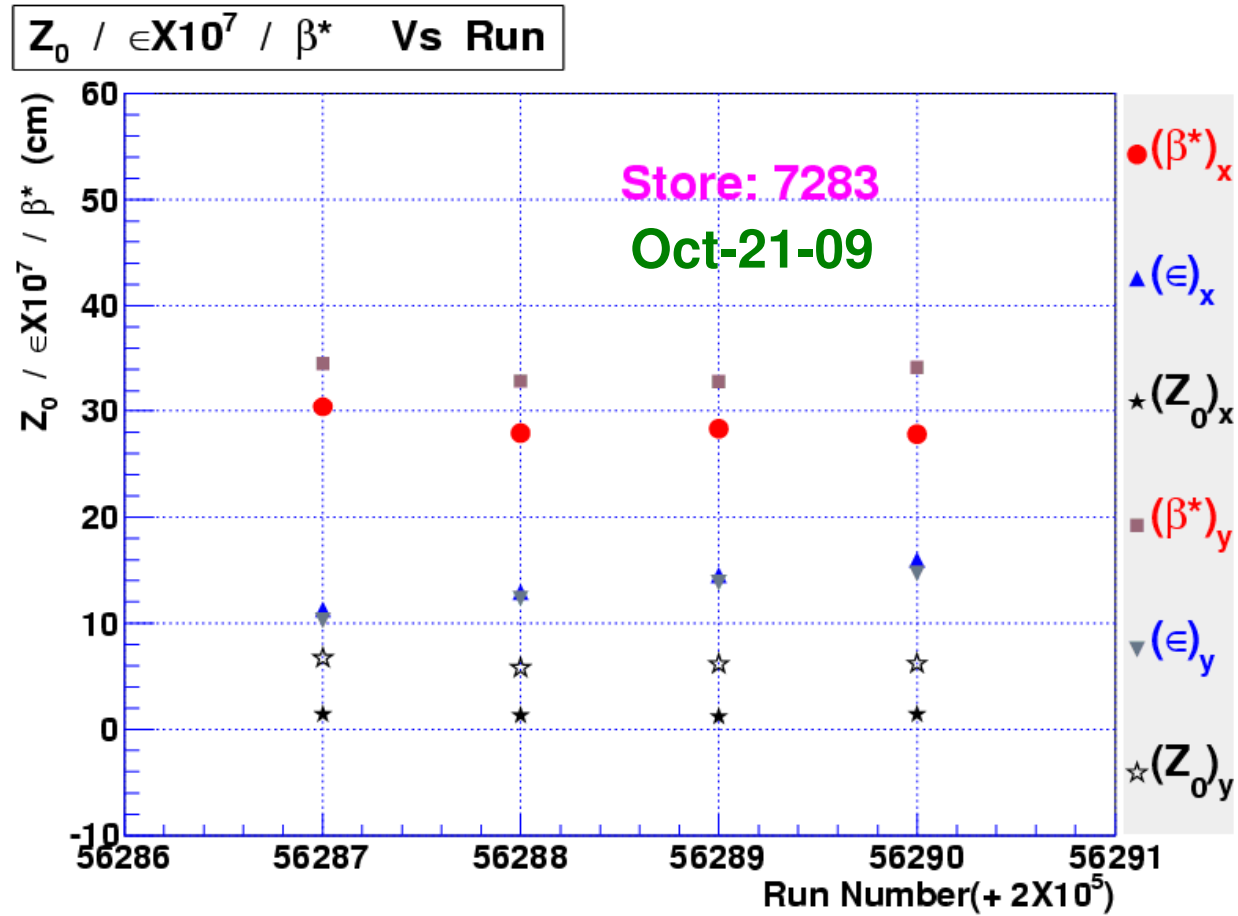
During a Store



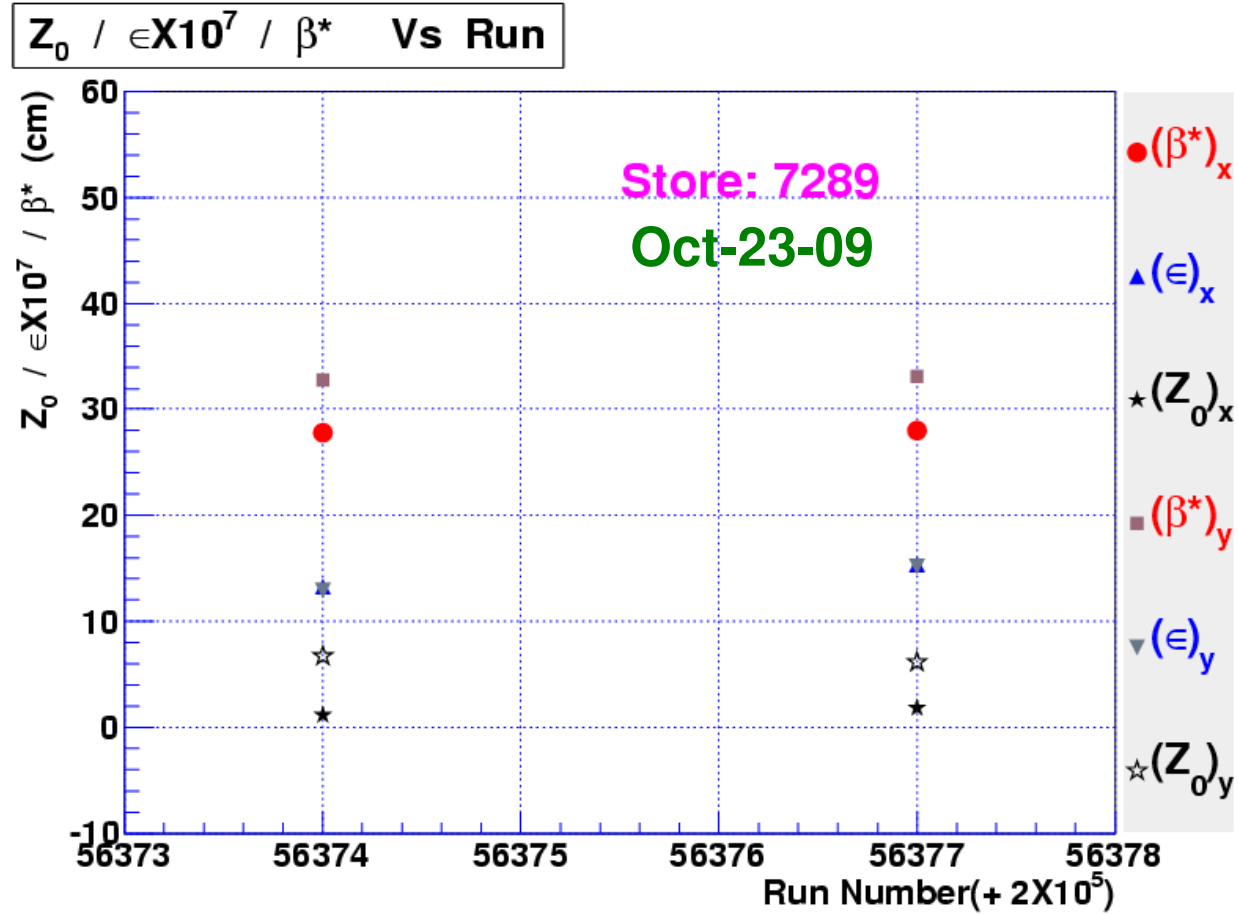
During a Store



During a Store



During a Store



Summary

- ❖ Measurement shows that β^*_x/β^*_y not changed significantly from last reported measurement but there is a indication of increased β^*_y (slide 6)
- ❖ There is a evidence of an increased separation between the waists in X and Y (slide 7)
- ❖ Post shutdown measurements look normal and consistent with pre shutdown measurements
- ❖ Updated results are available at:
http://www-clued0.fnal.gov/~avdhesh/Beam_main.html