

# Update on CDF Beam Width Measurement

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# Fit Method

- Fit the beam width at CDF according to the following model:

$$\sigma_{beam} = \sqrt{\sigma_{obs}^2 - k^2 \langle \sigma_{vtx}^2 \rangle} = \sqrt{\epsilon \left[ \beta^* + \frac{(z - z_0)^2}{\beta^*} \right]}$$

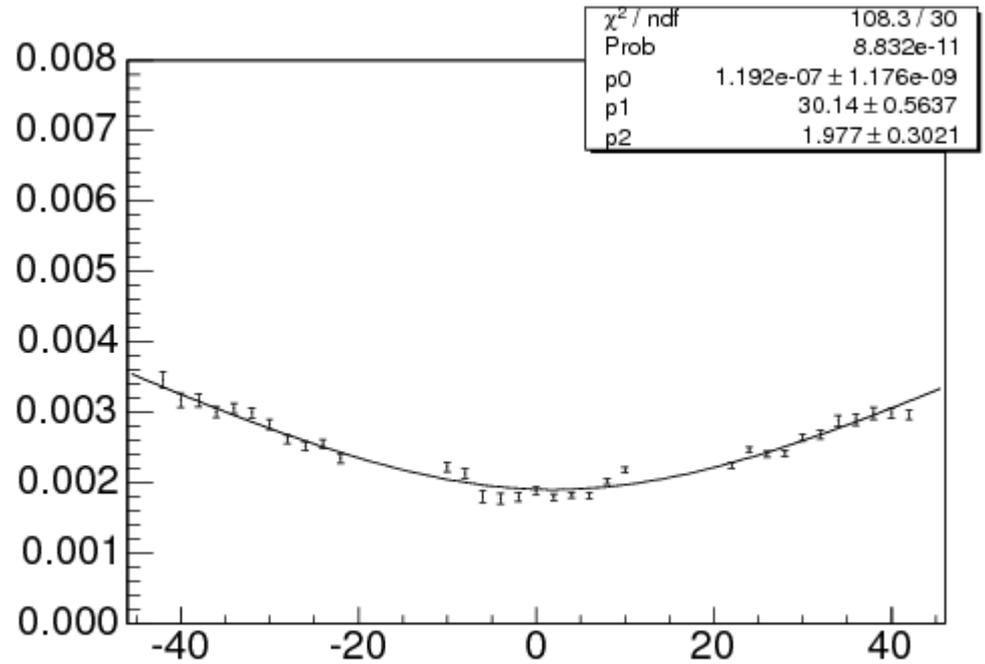
- Where  $k=1.5$  (scale factor for underestimated measurement uncertainty)
- $\sigma_{obs}$  : width of the (*vertex - beamline*) distribution
- Beam width is fitted vs  $z$  to extract the parameters

# Input Data

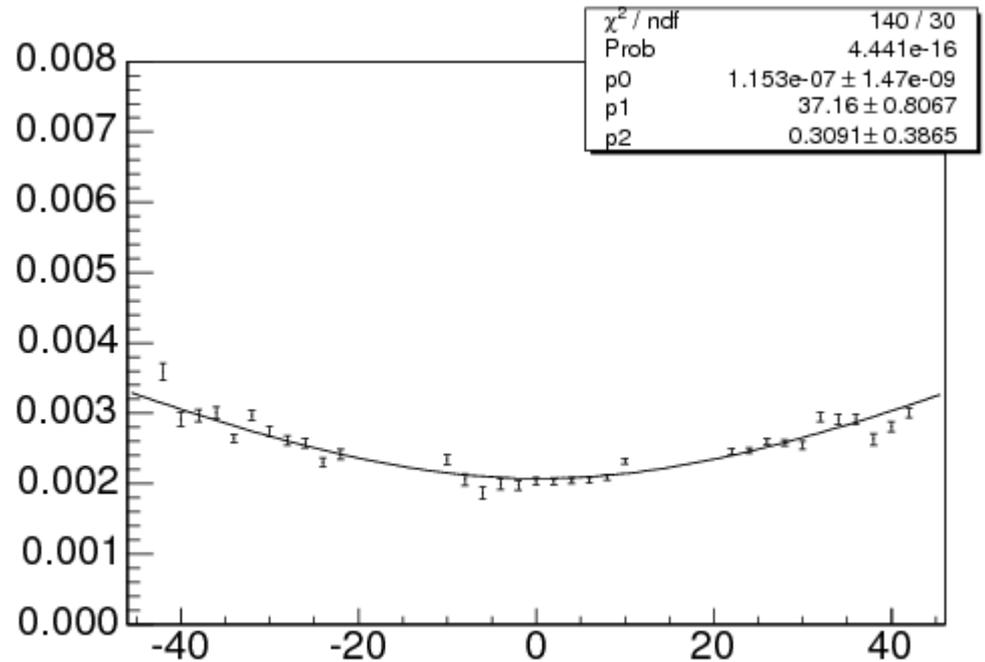
- Use data between Jan. 5, 2009 and Dec. 13, 2009
  - Stores 6705 – 7433 (runs 271122 – 286374)
    - last useful store: 7422, Dec. 9
  - Calibration data with jet triggers
- Stores with SVX efficiency  $> 85\%$
- Runs with at least  $1 \text{ pb}^{-1}$  integrated luminosity
  - 1-2 longest runs in each store
- Run by run measurement

# Example fit for Store 7422

Fit in x-direction



Fit in y-direction



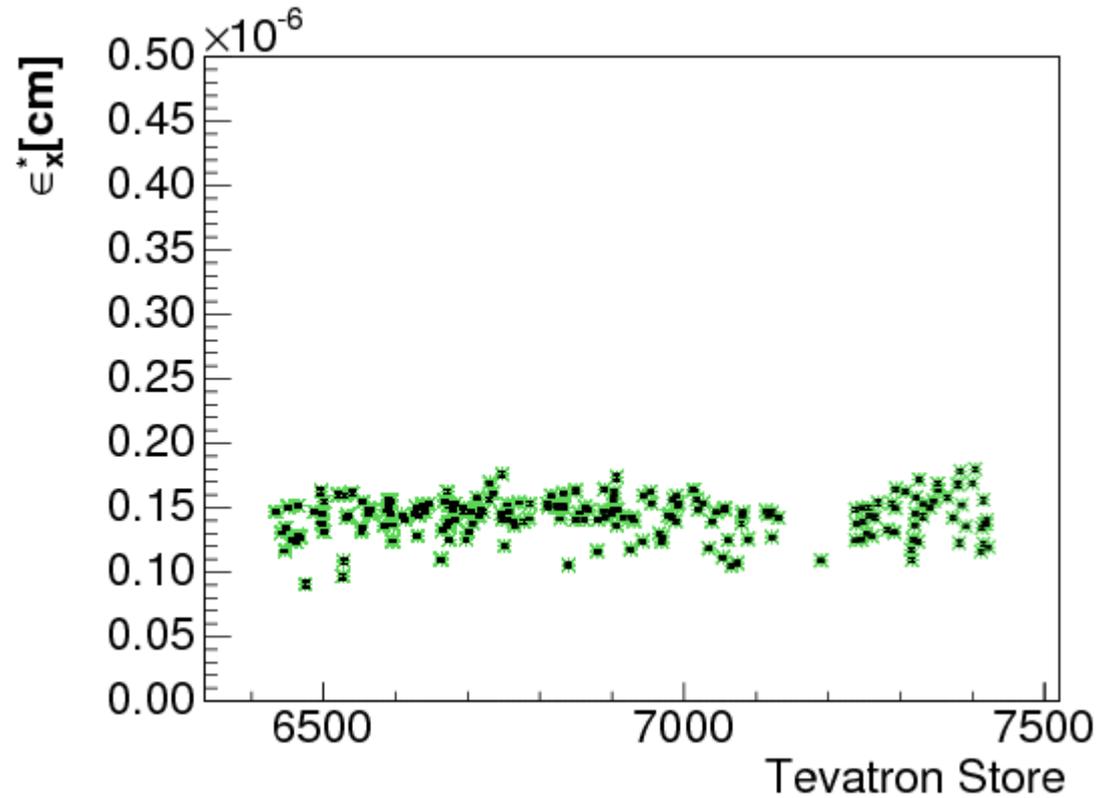
Parameters:

P0:  $\epsilon$

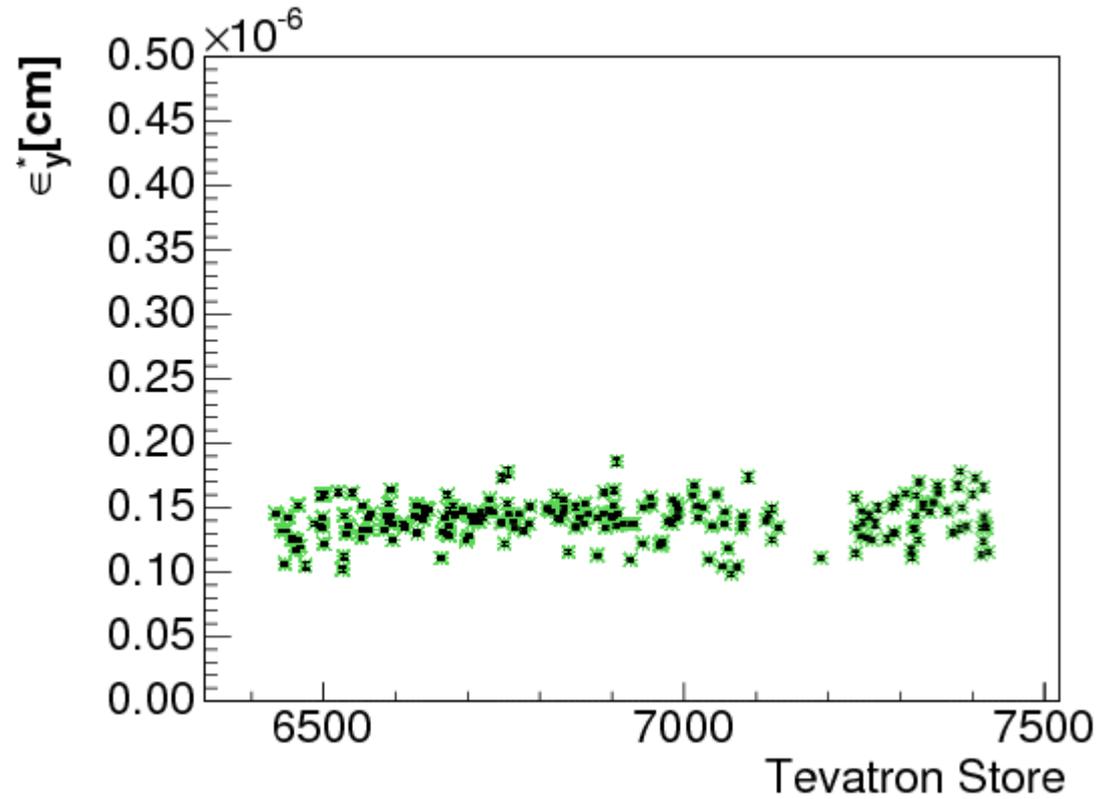
P1:  $\beta^*$

P2:  $z_0$

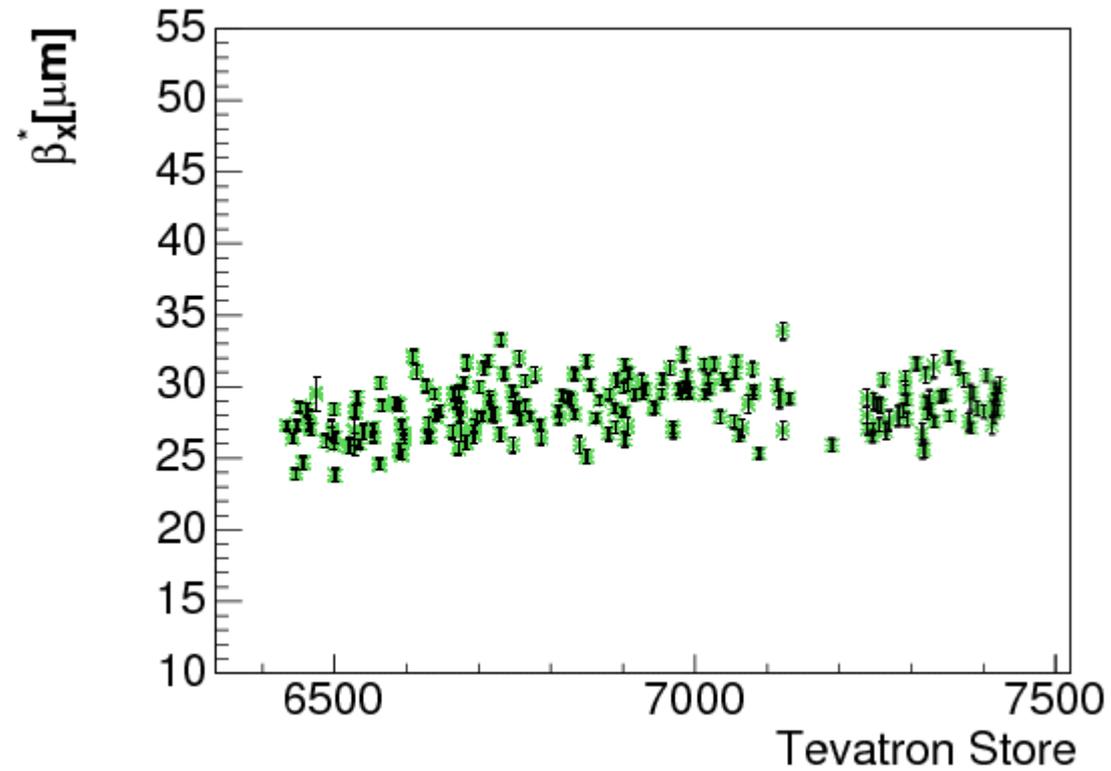
# Emittance in x-direction



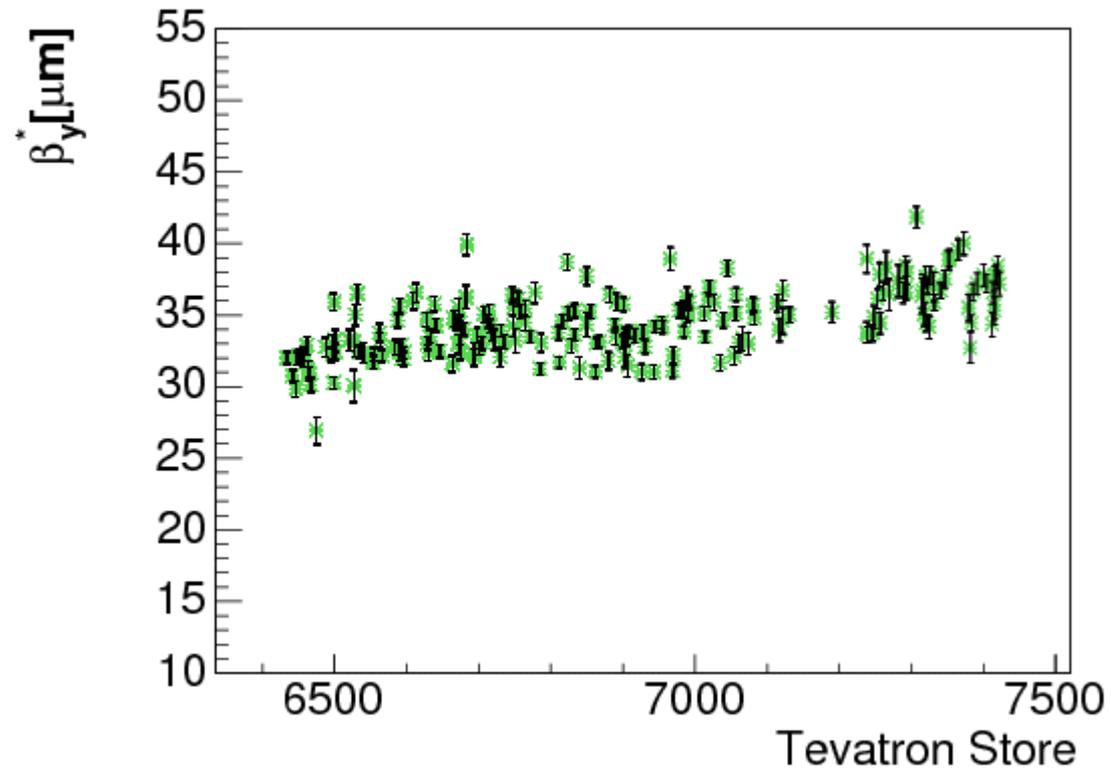
# Emittance in y-direction



# $\beta^*$ in x-direction



# $\beta^*$ in y-direction

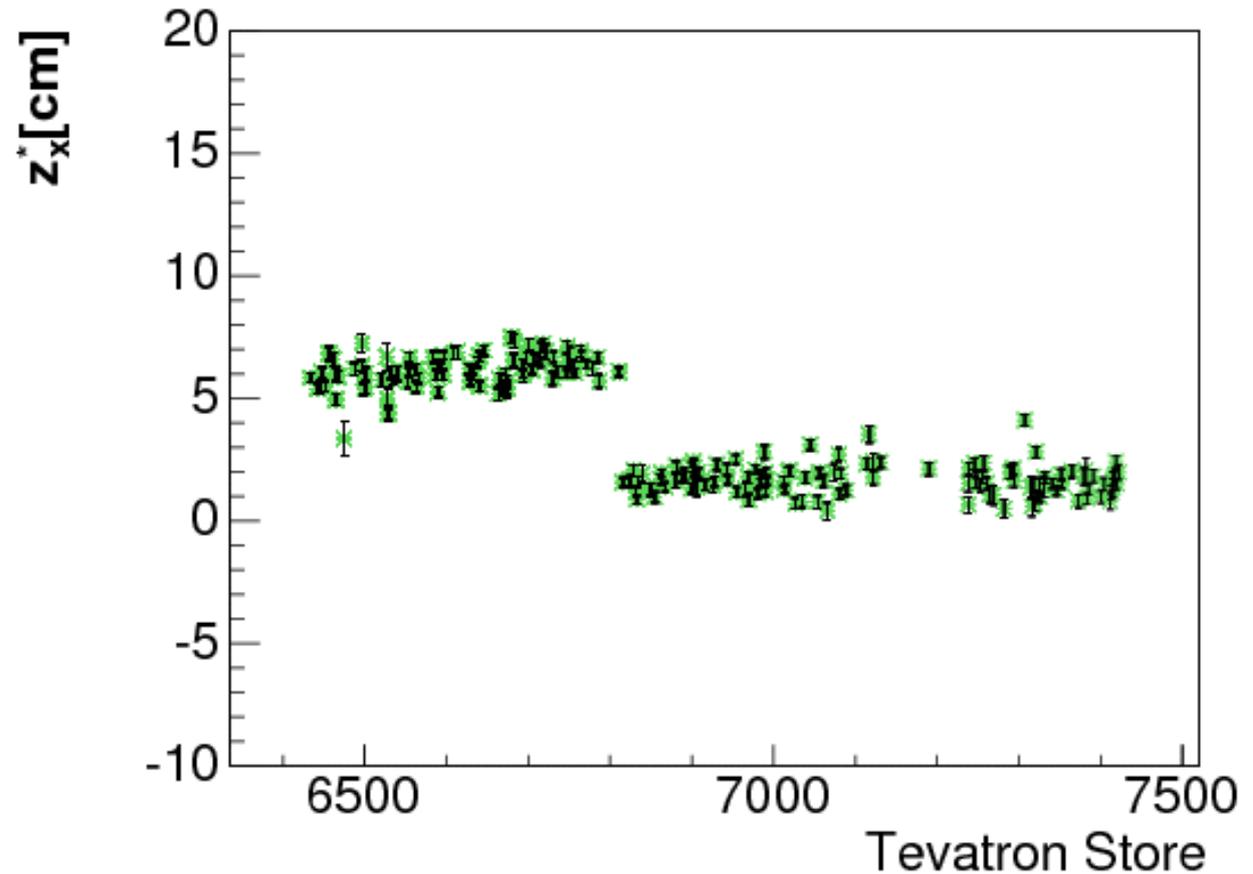


# $z_0$ in x-direction

Jump at Feb 10-16  
Between stores 6792  
and 6809

From elogs:

Quench  
Power outage  
"orbit smoothing"





# Conclusions

- No significant changes for beam width parameter
  - $\beta_y^*$  slightly increasing?
- But: Jump in  $z_0$  on Feb. 10-16