

TRD Reconstruction

Resolution Updates

clusters-tracklets-tracks

ALICE Offline Week

16-20 March 09

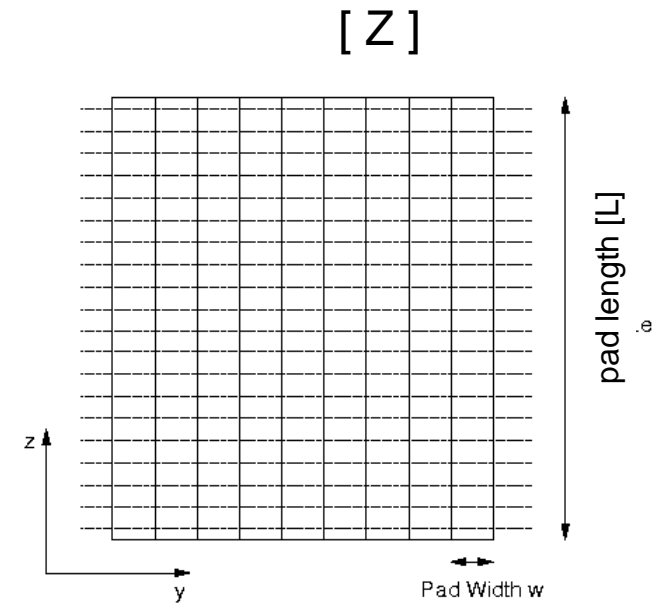
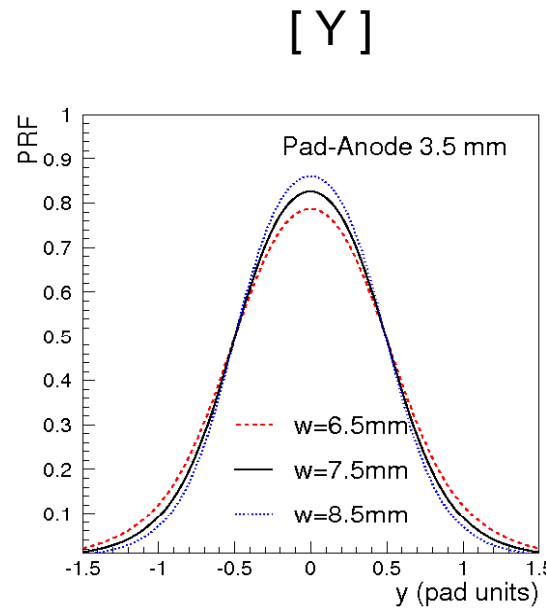
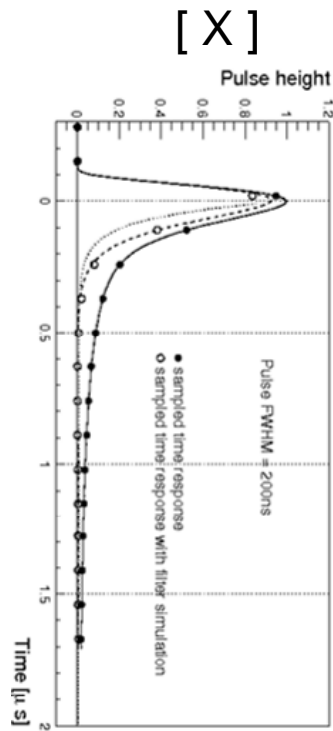
Alexandru Bercuci

GSI

Outline

1. Release updates
2. Trunk updates
3. Open issues

Cluster position



$$x = t_d v_d$$

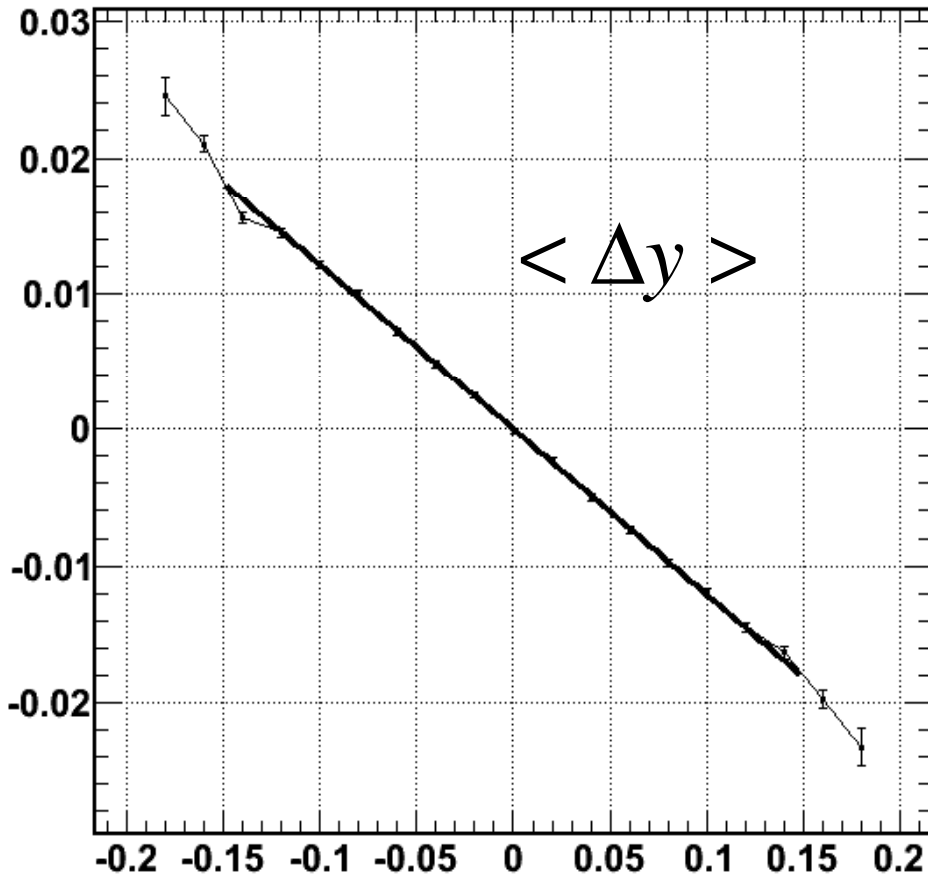
$$y = LUT(q_1, q_2, q_3) \quad z = z_0 + L/2$$

The Method

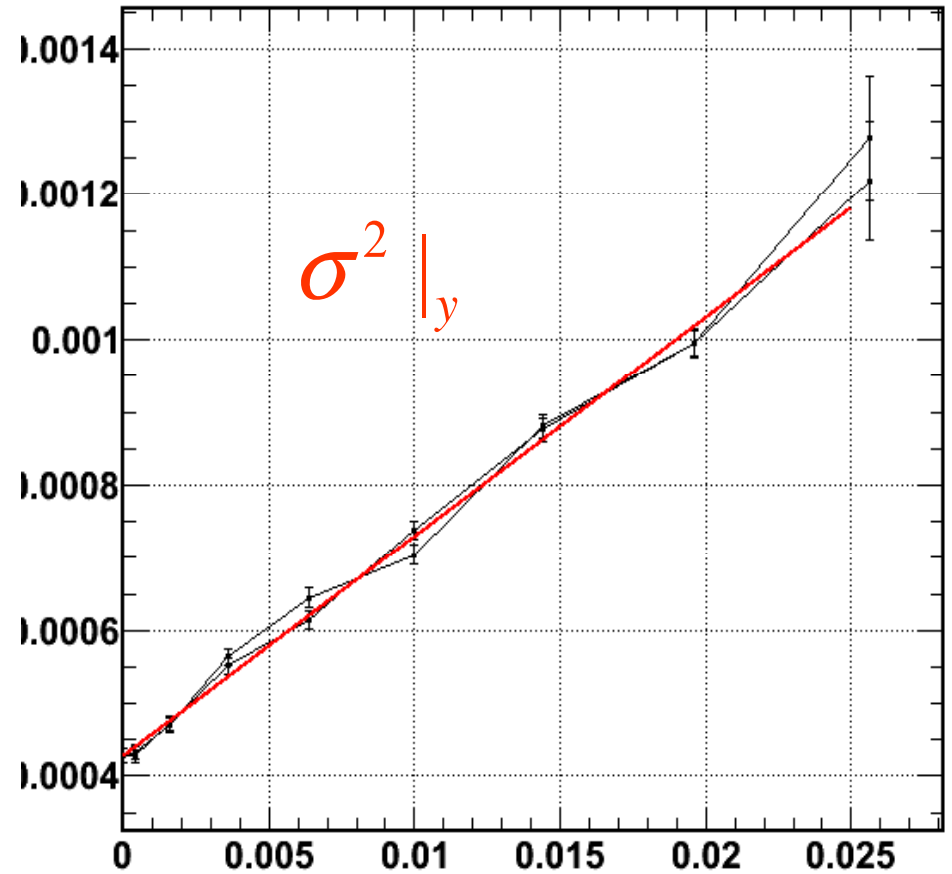
$$\langle \Delta y \rangle = \left(\frac{dy}{dx} - h \frac{dz}{dx} \right) \langle \cancel{\delta x_c} + \delta x_d \rangle + \text{tg}(\cancel{\alpha_L}) \langle \delta x_d \rangle - \langle \cancel{\delta y} \rangle$$

$$\sigma^2 |_y = \sigma_y^2 + \text{tg}^2(\cancel{\alpha_L}) \sigma_{x_d}^2 + \text{tg}^2(\phi - \cancel{\alpha_L}) (\sigma_{x_d}^2 + \cancel{\sigma_{x_c}^2})$$

The Method (II)

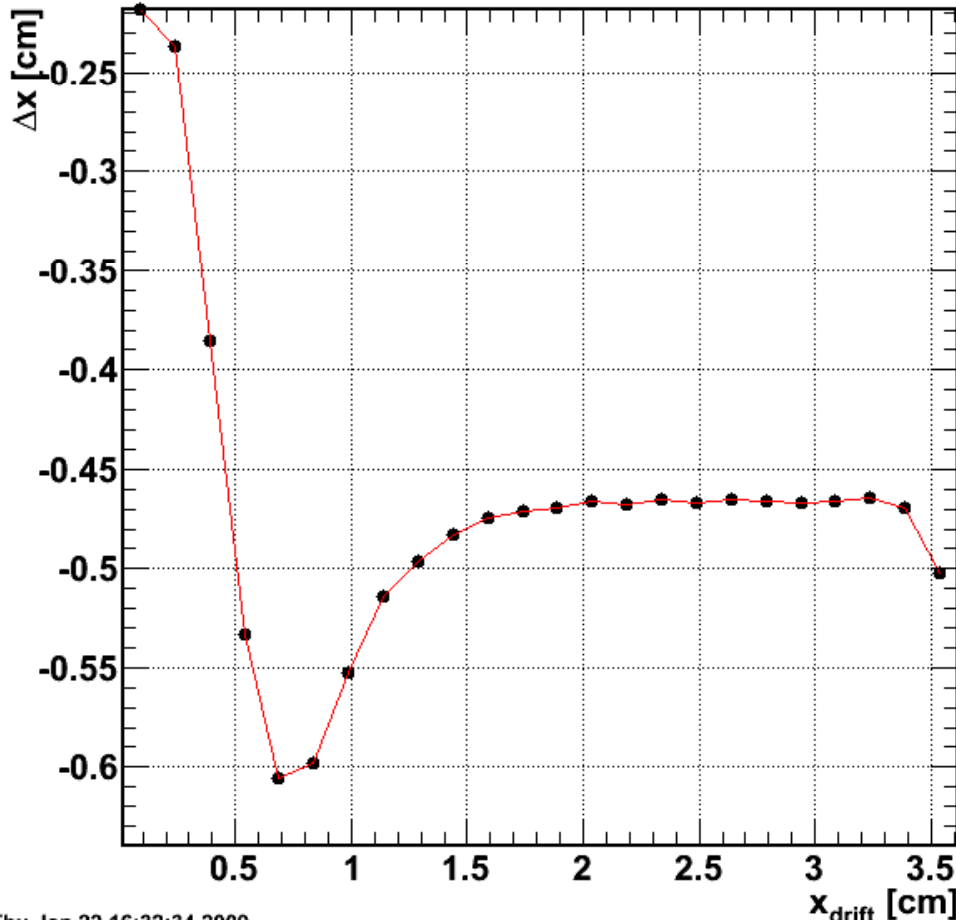
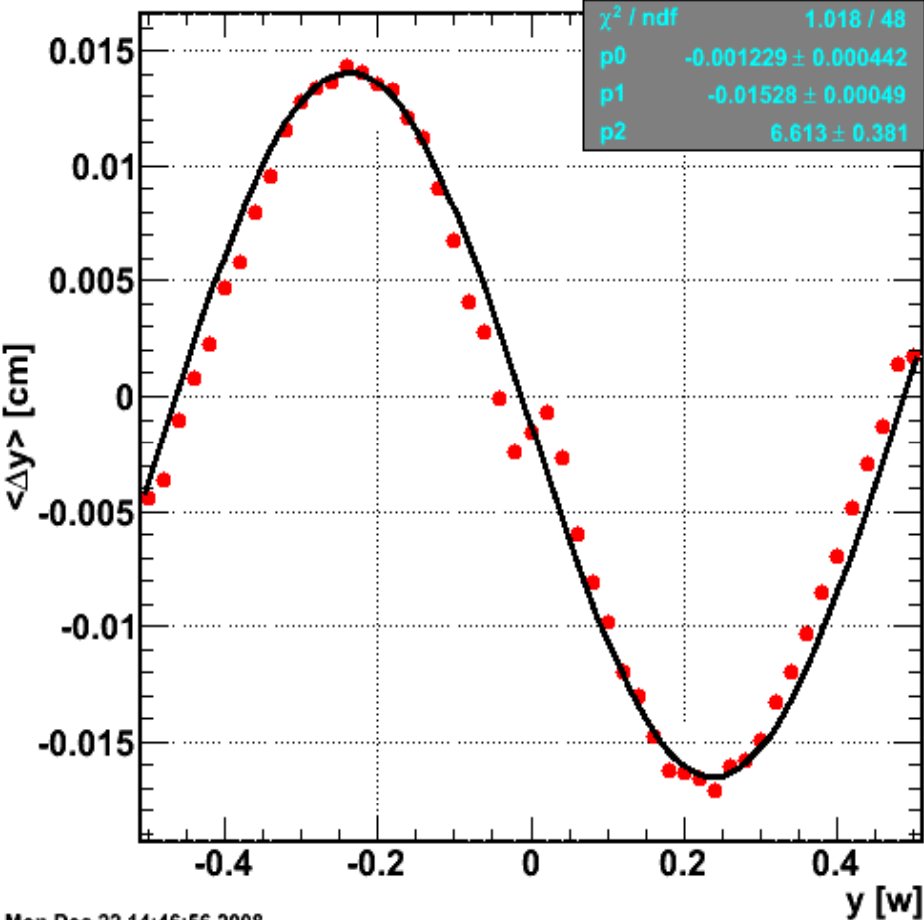


Tue Jan 6 11:48:37 2009

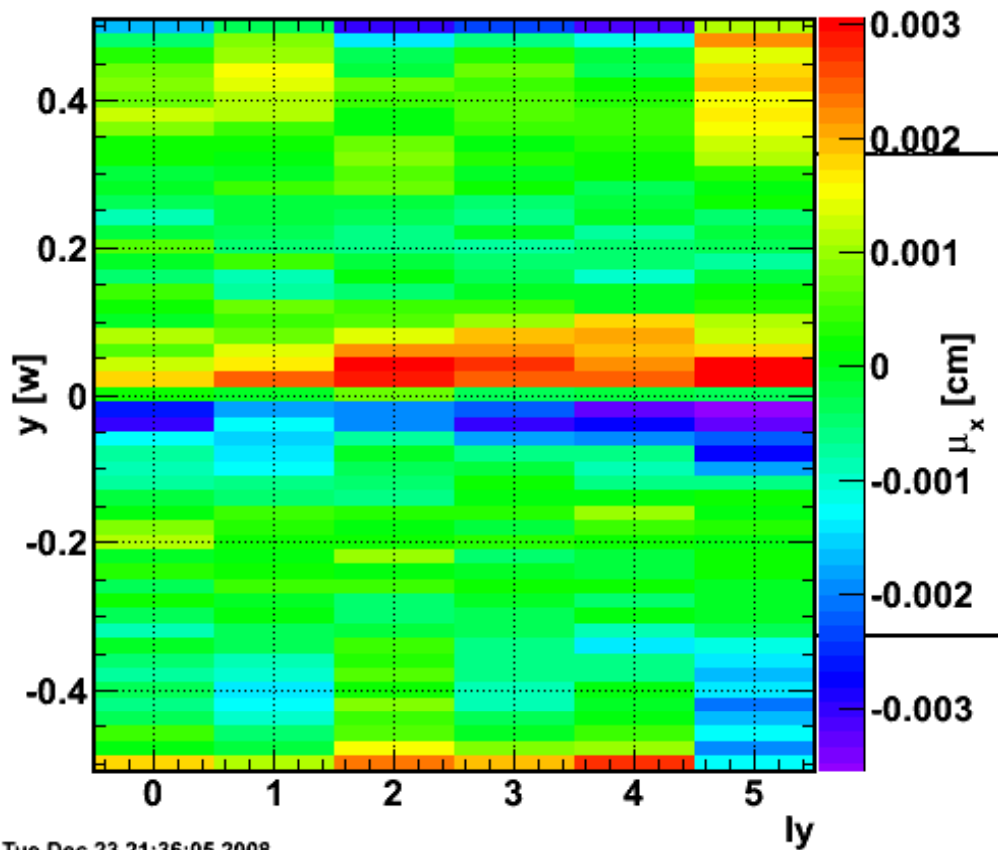


Tue Jan 6 11:39:25 2009

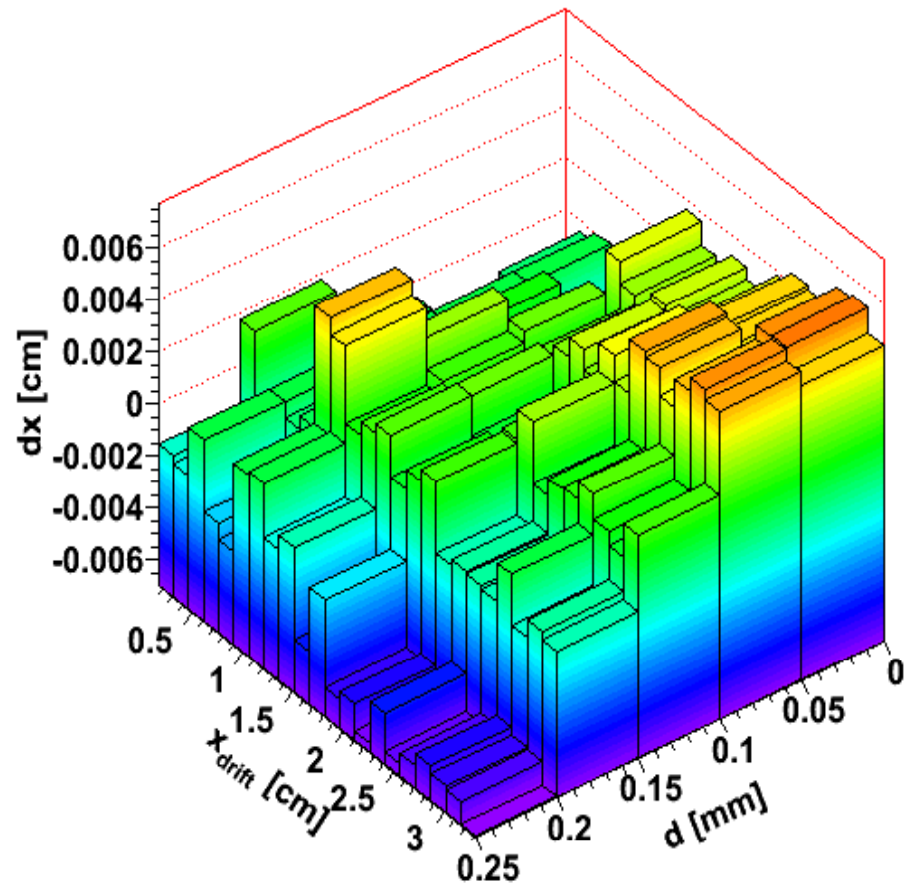
Cluster shift (I)



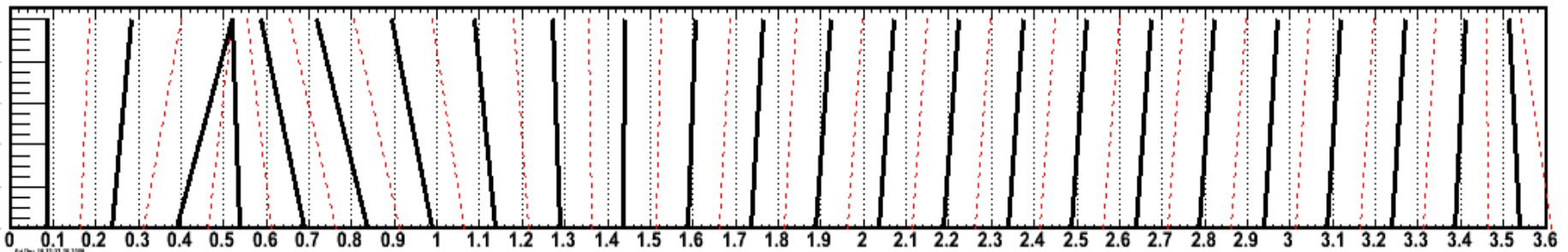
Clusters corrected



Tue Dec 23 21:36:05 2008

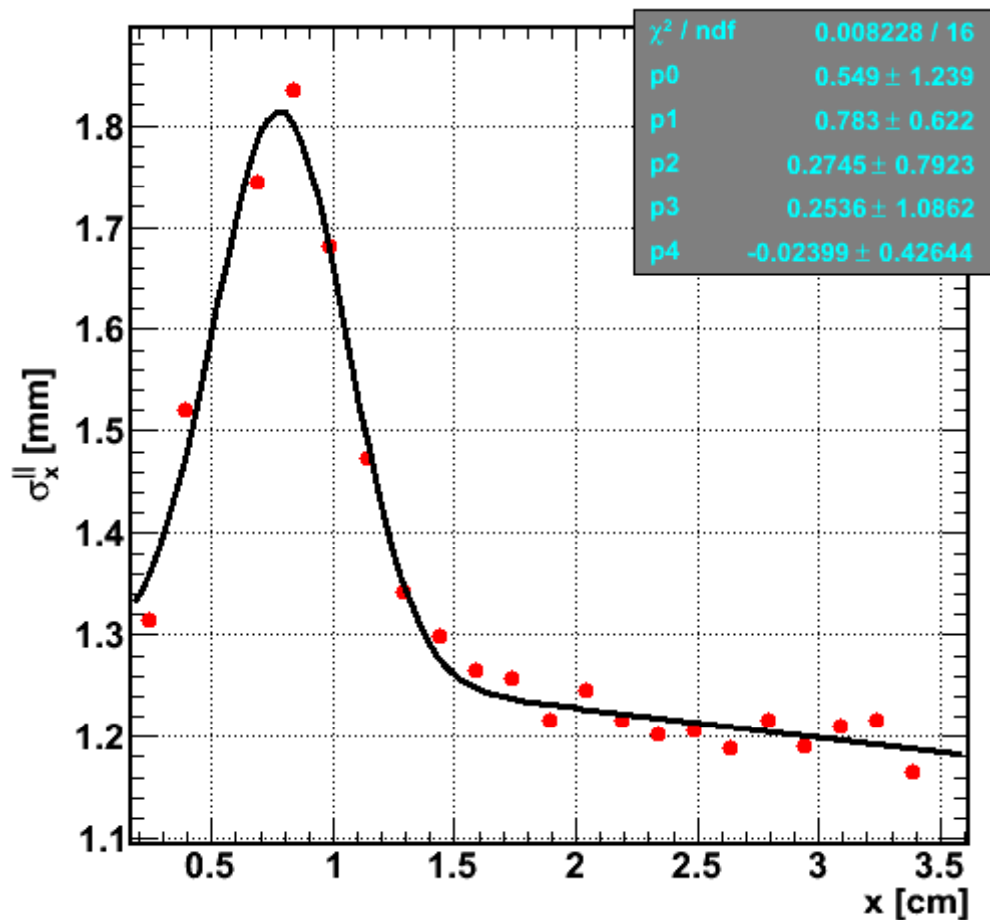


Wed Jan 7 09:53:50 2009



Fri Dec 19 21:37:38 2008

S_x parametrization



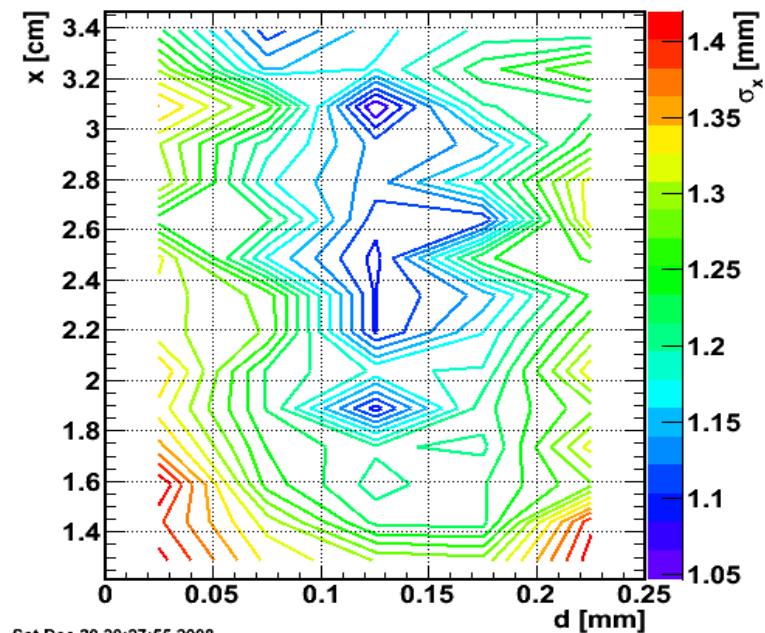
Sat Dec 20 22:24:48 2008

$$\sigma_x^{\parallel}(x_d) = \text{Gauss} + \text{Exp}$$

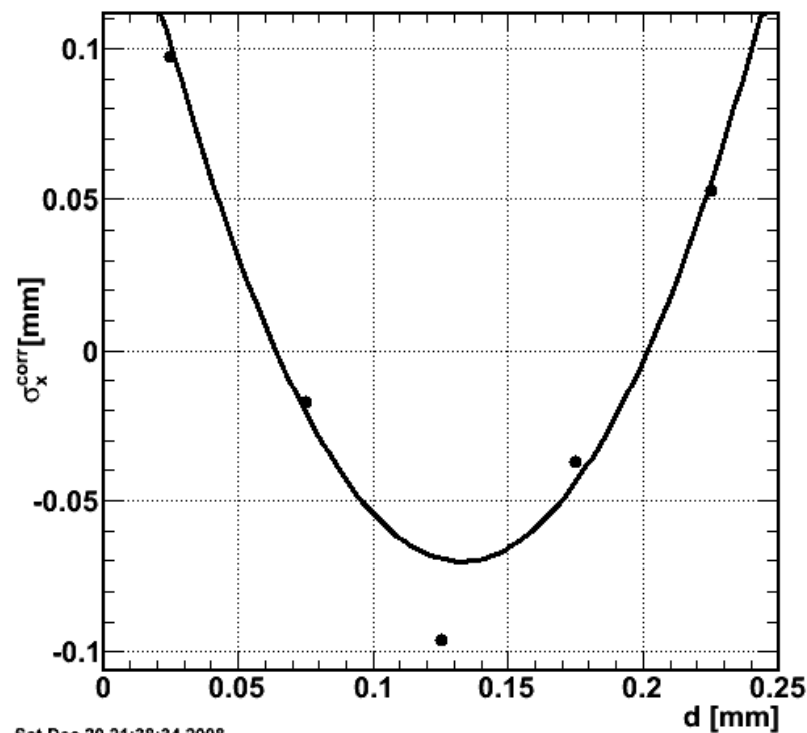
$$\sigma_x^{\perp}(d) = \text{Pol2}$$

19-Mar-09

TRD Resolution

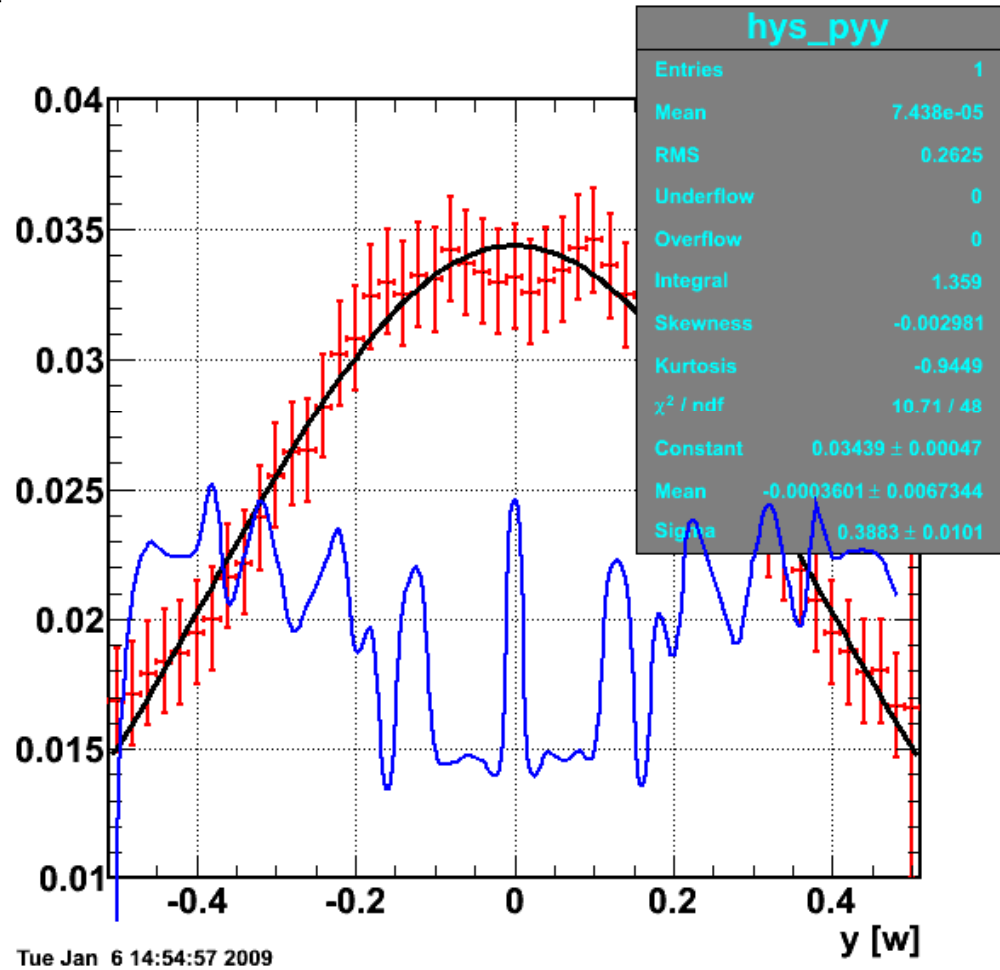
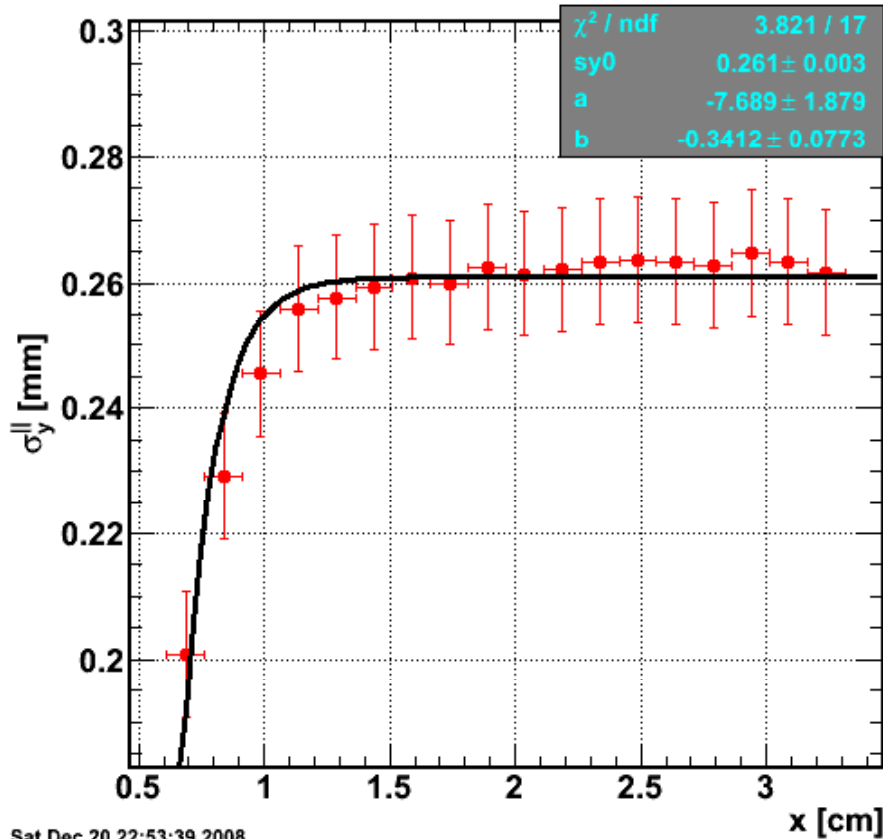


Sat Dec 20 20:27:55 2008



Sat Dec 20 21:38:34 2008

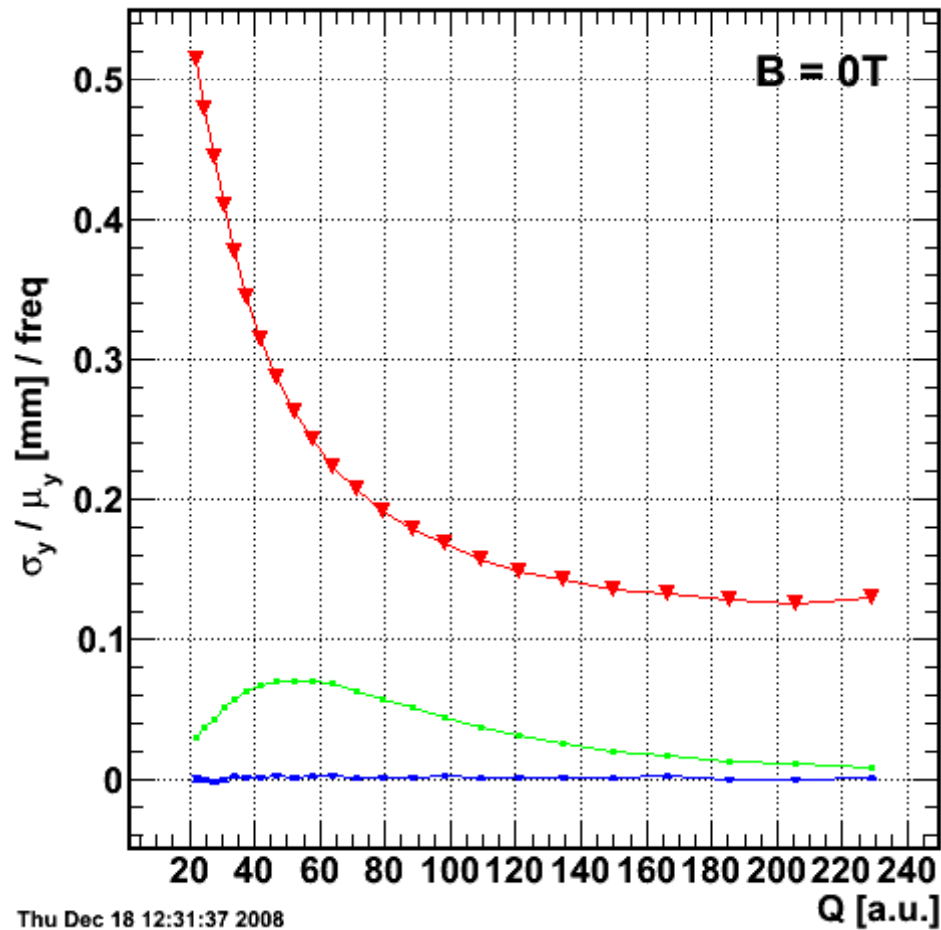
S_y parametrization



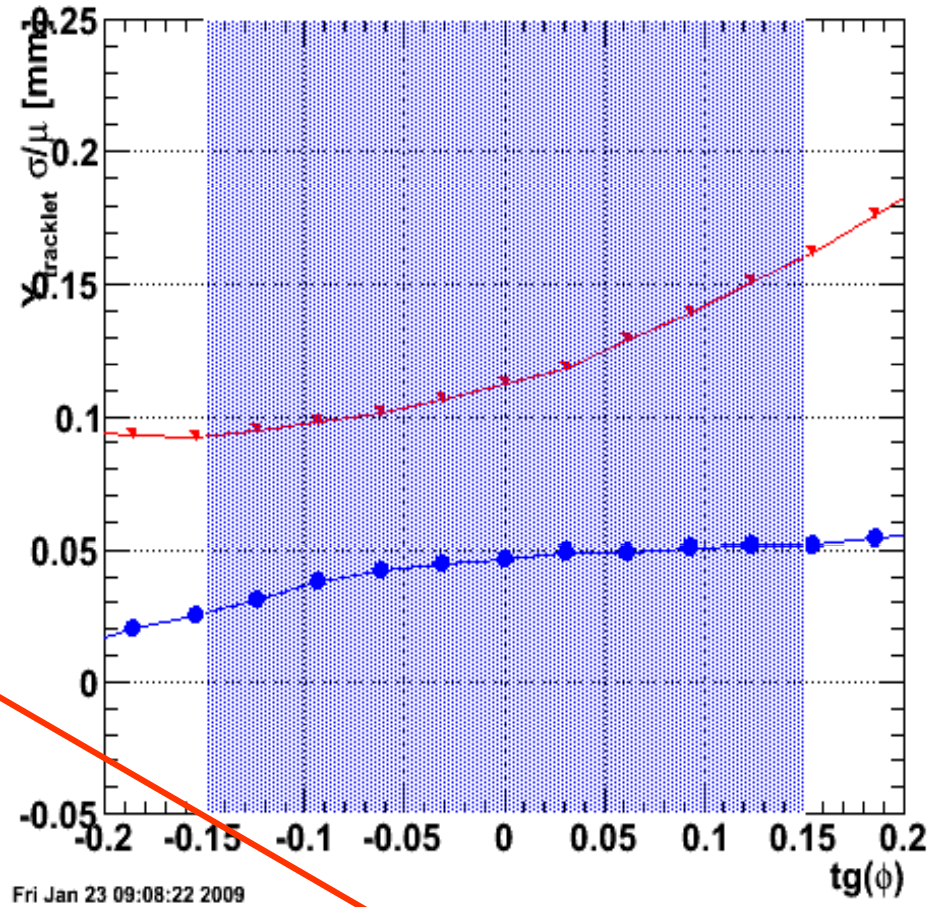
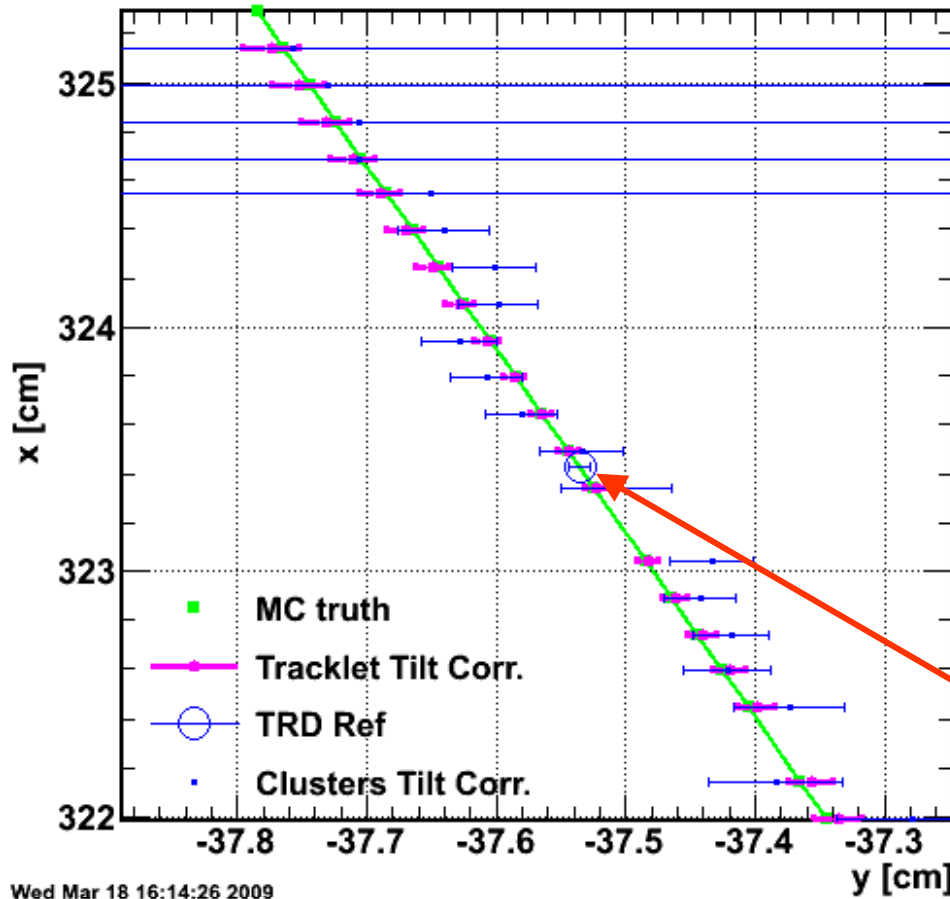
$$\sigma_y^{\parallel}(x_d) = \sigma_y^0 + \exp(-a(x_d - b))$$

$$\sigma_y^{\perp}(w) = \text{Gauss}$$

S₀ parameterization



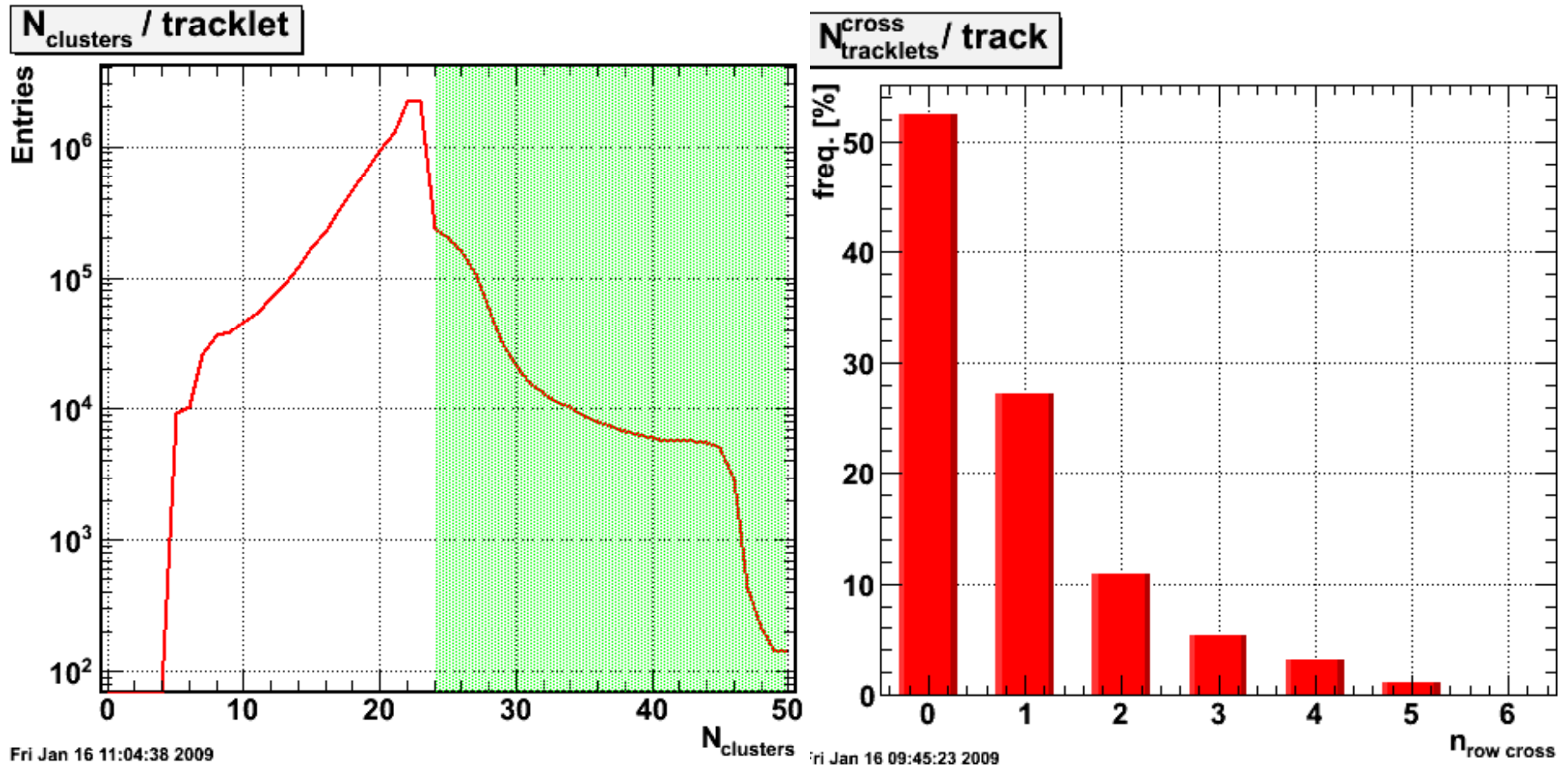
Tracklet fit



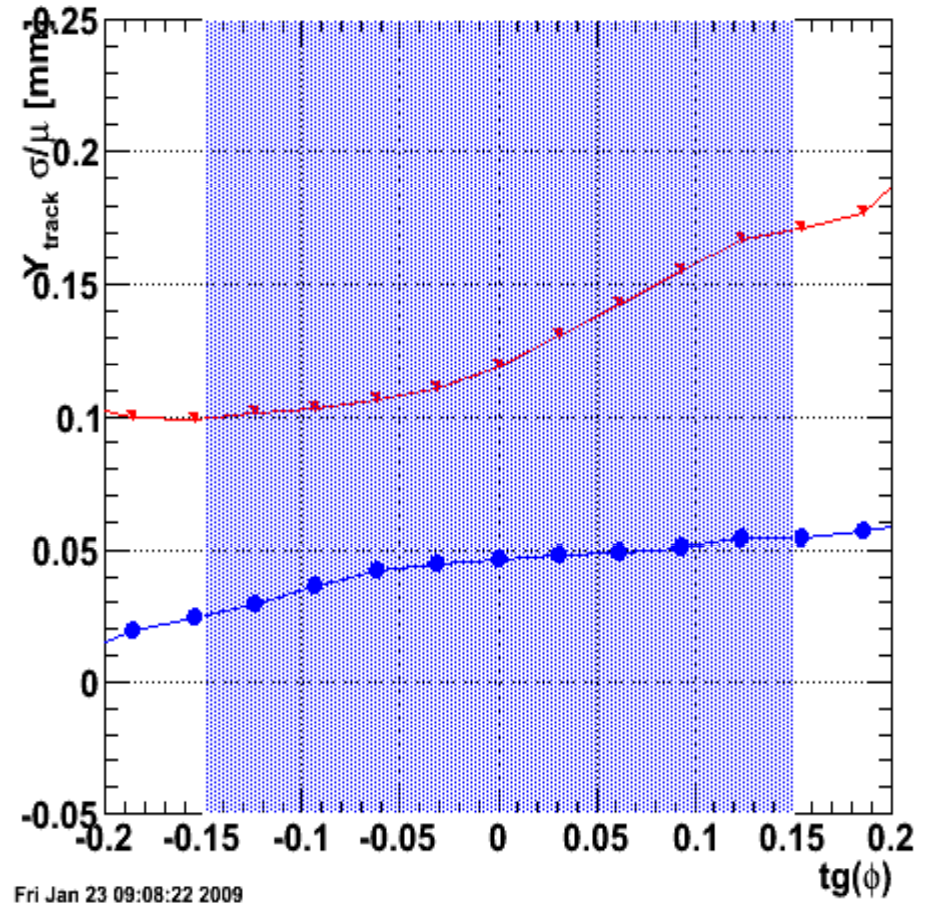
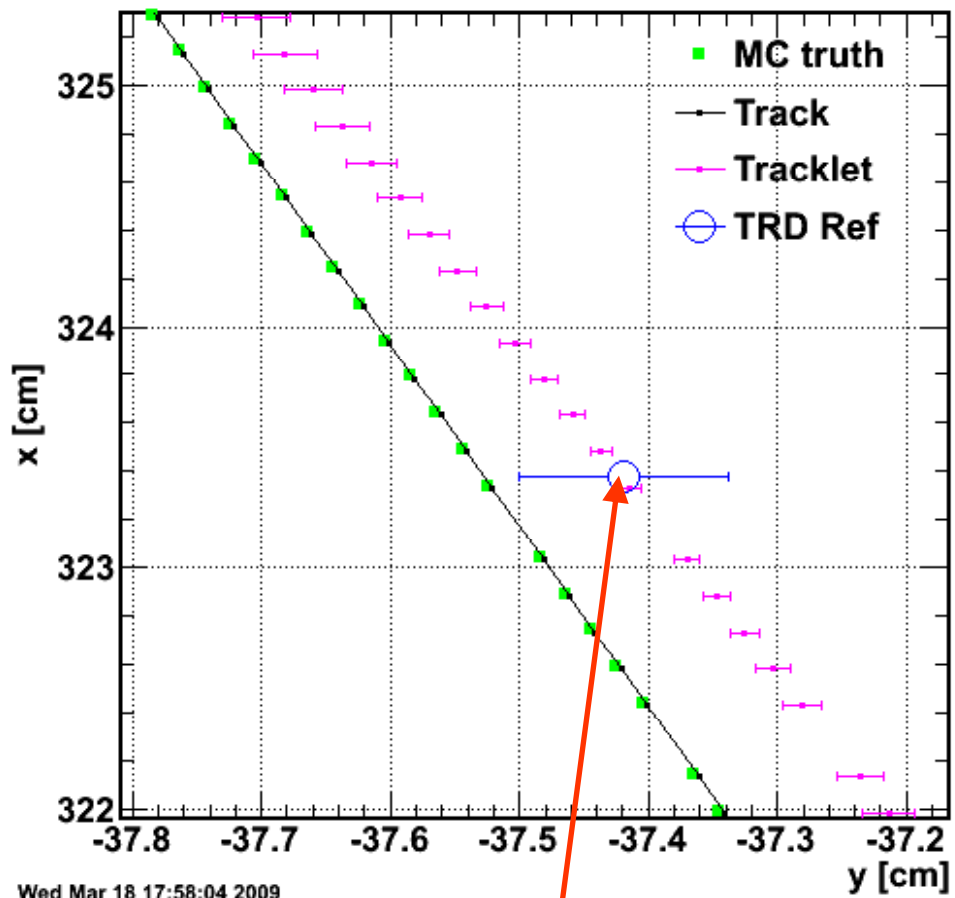
$$y = y_0 + \frac{dy}{dx} x \quad \sigma^2(x) = \sigma_{y_0}^2 + 2x \text{cov}(y_0, \frac{dy}{dx}) + x^2 \sigma_{dy/dx}^2$$

$$-\frac{\text{cov}(y_0, dy/dx)}{\sigma_{dy/dx}^2}$$

Also in the Release ...

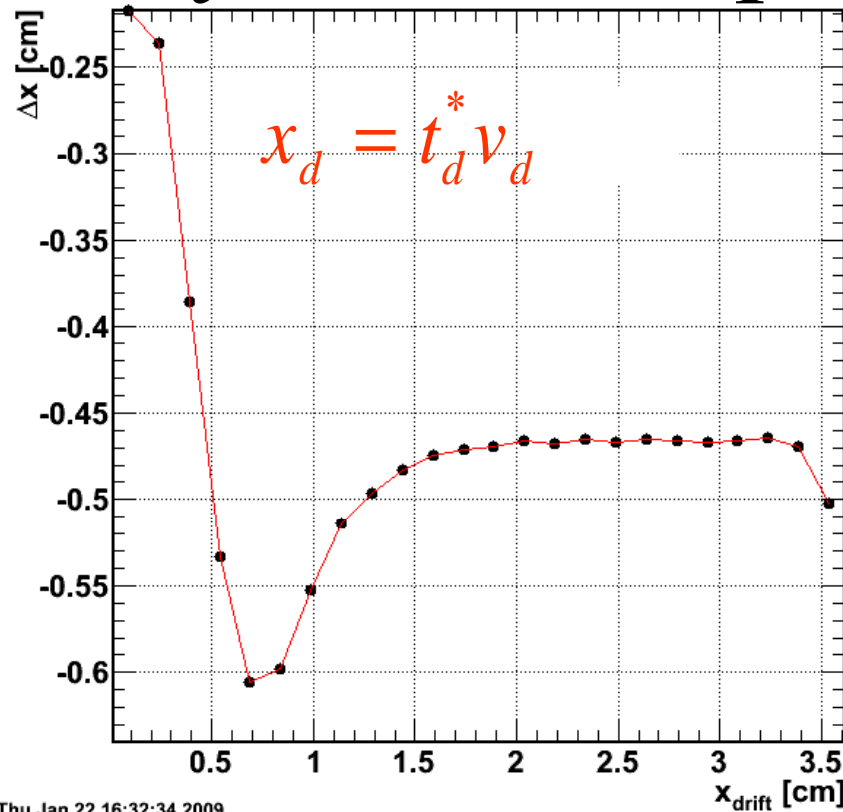


Tracklet-Track resolution

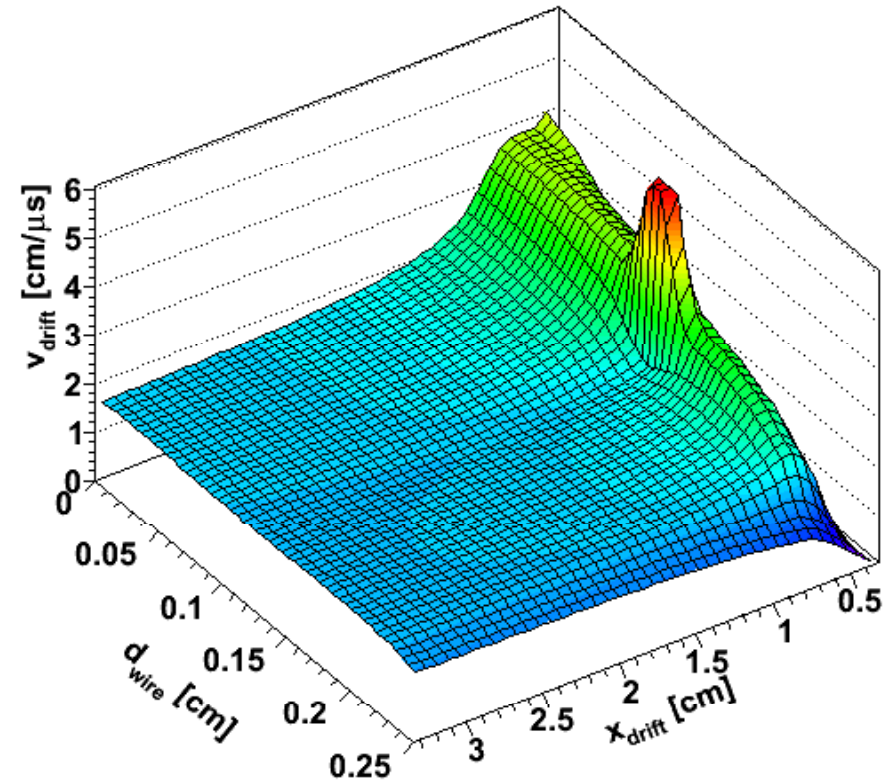


$$C_{YZ} = \frac{1}{1 + \text{tg}^2 \alpha} \begin{pmatrix} \sigma_y^2 + \sigma_z^2 \text{tg}^2 \alpha & \text{tg} \alpha (\sigma_z^2 - \sigma_y^2) \\ \text{tg} \alpha (\sigma_z^2 - \sigma_y^2) & \sigma_z^2 + \sigma_y^2 \text{tg}^2 \alpha \end{pmatrix} \cong \begin{pmatrix} \sigma_y^2 & \text{tg} \alpha (\sigma_z^2 - \sigma_y^2) \\ \text{tg} \alpha (\sigma_z^2 - \sigma_y^2) & \sigma_z^2 \end{pmatrix}$$

Analytic cluster position (I)



Thu Jan 22 16:32:34 2009



Tue Mar 17 15:15:26 2009

$$P(y) \approx e^{-y^2/2\sigma_y^2}$$

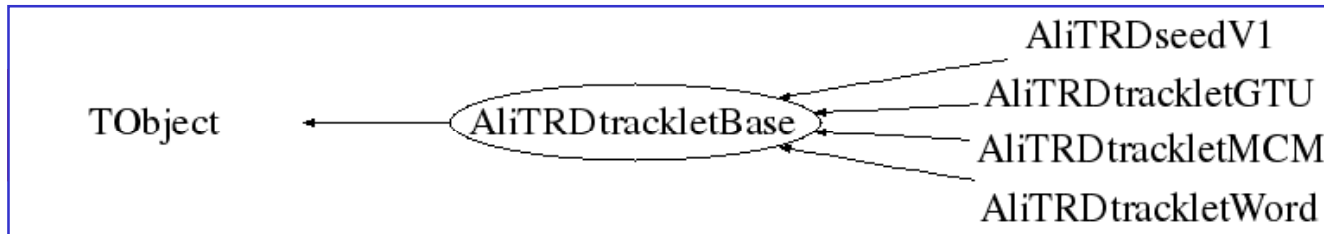
$$y = \frac{1}{q_{i-1}^2 + q_{i+1}^2} \left[q_{i-1}^2 \left(\frac{\sigma_y^2}{w} \ln \frac{q_i}{q_{i-1}} - \frac{w}{2} \right) + q_{i+1}^2 \left(\frac{\sigma_y^2}{w} \ln \frac{q_{i+1}}{q_i} + \frac{w}{2} \right) \right]$$

19-Mar-09

$$\sigma_y^2 = \sigma_{PRF}^2 + \sigma_{diff}^2(x_d, B) + \sigma_\phi^2$$

14

Analytic cluster position (II)

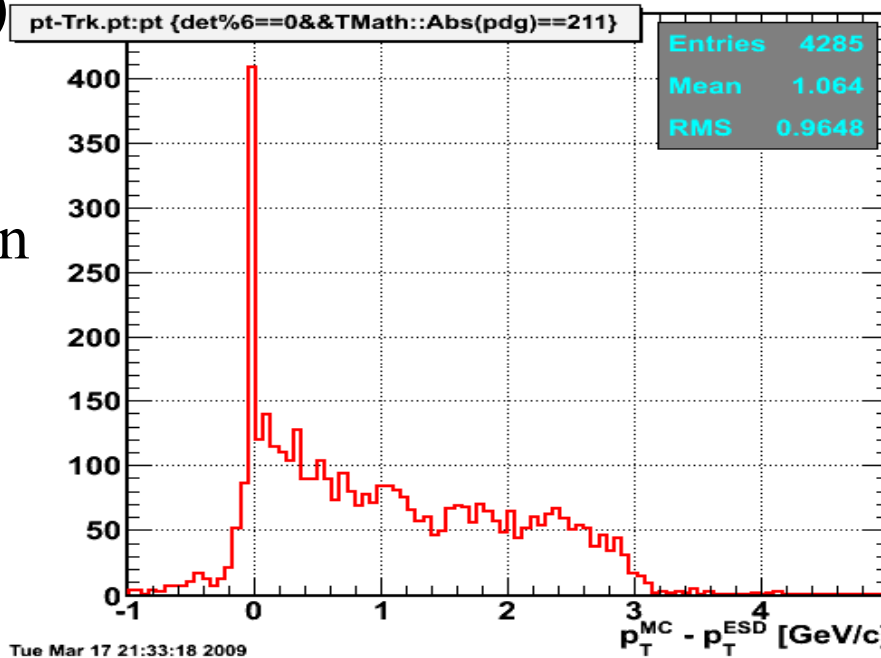
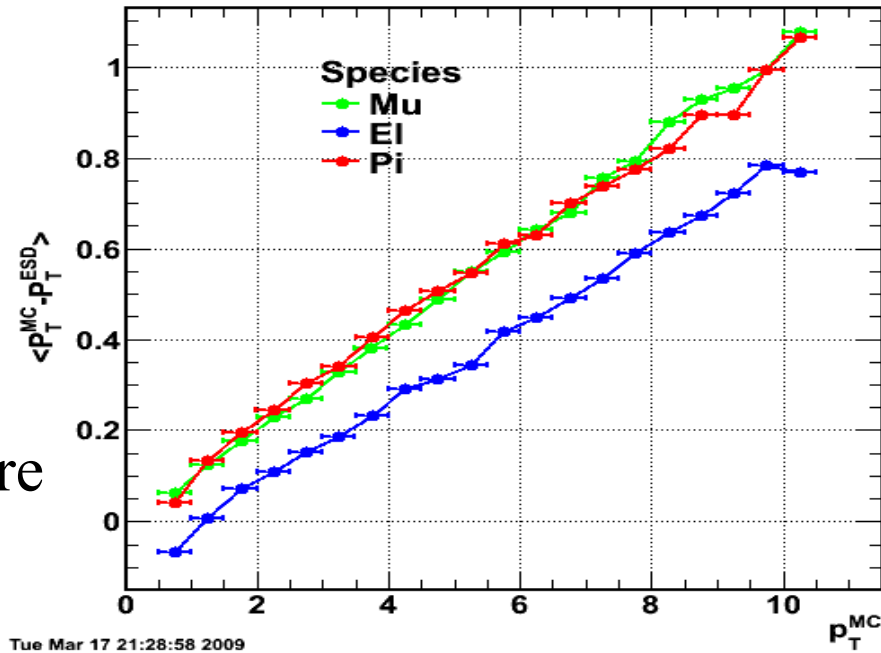


- using geo manager to retrieve anode wire position (x_d)
- caching local calibration
(*AliTRDseedV1::Calibrate()*)
- bootstrapping cluster position during tracking
(*AliTRDcluster::GetXloc(...)*, *GetYloc(...)*)

Open issues

- Calibration / QA on tracks
 - now we (TRD TPC etc.) are using friends
 - should move(able) to AliTracker::PostProcess() (!?)

- **REQUEST**
Momentum @ PID estimation position (not only TRD !!)



Also in SVN ...

- using/monitoring [shared] clusters : *GetN()*, *GetNUsed()*, *GetNShared()*
- kink awareness *IsKink()*

BACKUP

Radial cluster position “adjustment”

$$\Delta y = y_t(x_c) - w$$

$$w = y_c + h[z_t(x_c) - z_c]$$

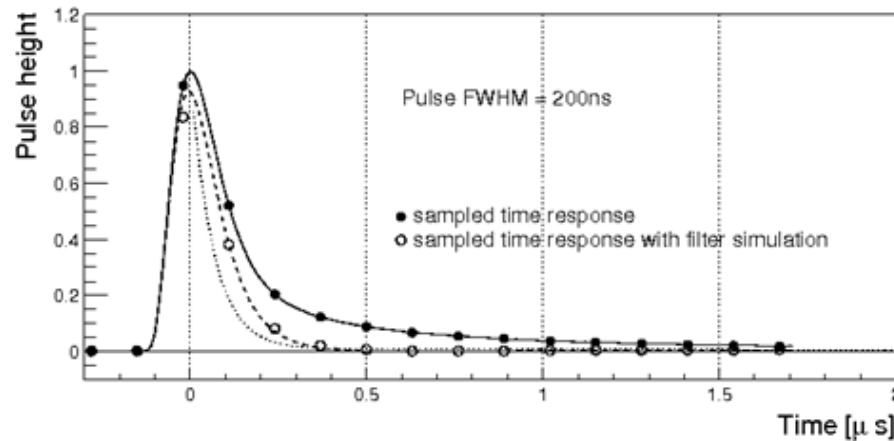
$$\Delta y = y_t^* - y_c^* - \delta x_c \left(\frac{dy}{dx} - h \frac{dz}{dx} \right)$$

$$y_c = y_0 - \alpha_L(v_d) t_d v_d$$

$$t_d = t_{tb} - t_0 + \tau$$

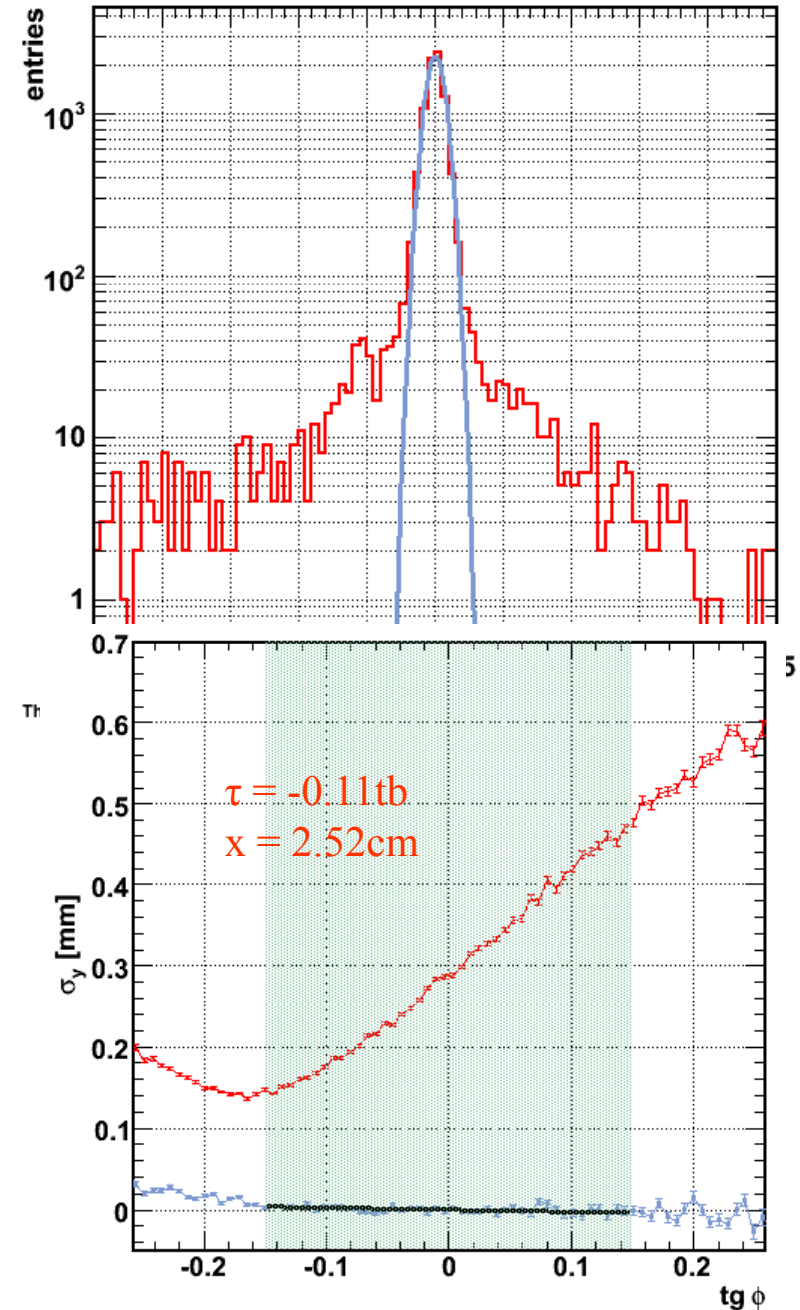
$$\Delta y \approx y_t^* - y_c^* - \delta x_c^0 \frac{dy}{dx} + \alpha_L(v_d) \delta x_c^1$$

$$\delta x_c^1 = \tau v_d$$



19-Mar-09

TRD Resolution



Thu Nov 20 17:30:09 2008

TRF & Diffusion

$$TRF(t) = \int d\tau G(t - \tau) TRF_{id}(\tau)$$

$$TRF^{55Fe} : TRF(t) = \int d\vartheta v_d e^{-\lambda(x_0 - v_d(t - \vartheta))} \int d\tau G(\vartheta - \tau) TRF_{id}(\tau)$$

