

# LVL2 Tracking with IDScan

- z-Finder
- Studies with 20% prod. files
- Next steps

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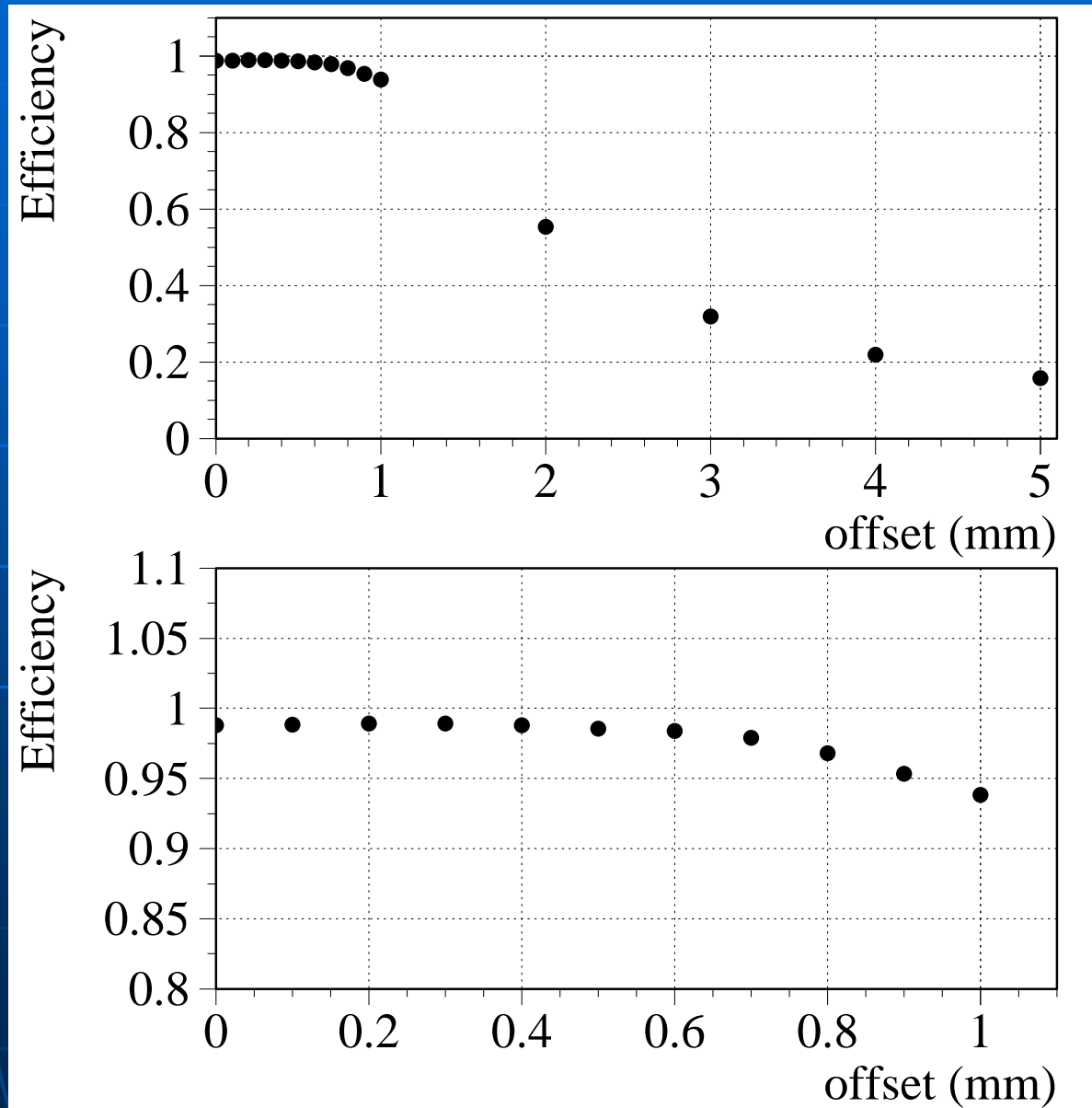
# Why use the kine z

- It allows us to study independently the performance of the various steps in pattern recognition
  - Easier to localise problems
  - Easier to find where there is space for improvements
- We can still estimate correctly the overall performance
  - Z-resolution has negligible impact on subsequent track reconstruction for IDScan



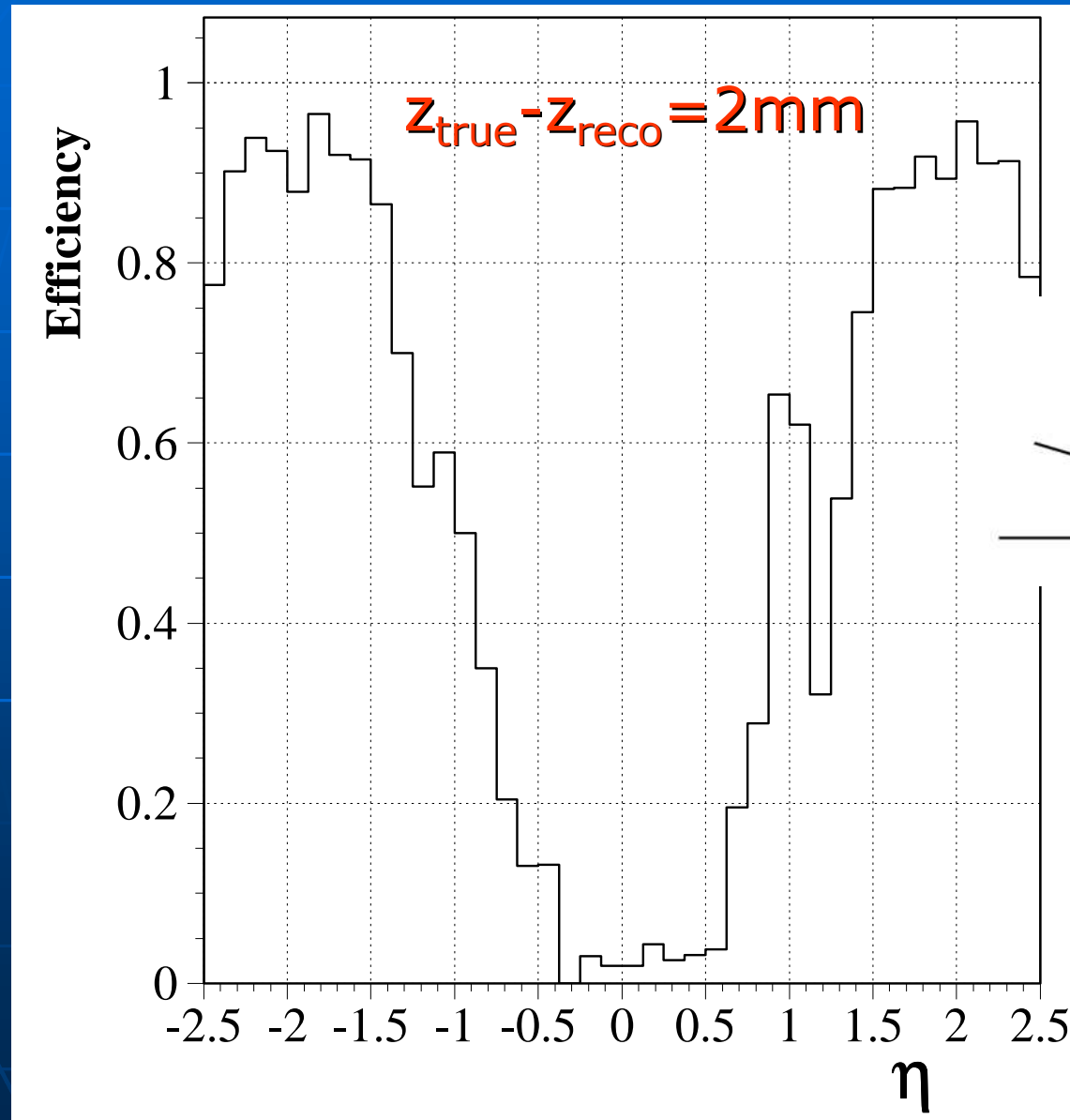
# Impact of offset in z (I)

- Study done with single muons with  $p_T=5\text{GeV}$
- No effect if  $|z_{\text{true}}-z_{\text{reco}}| < .6\text{mm}$
- Only  $\sim 5\%$  loss at  $|z_{\text{true}}-z_{\text{reco}}| = 1\text{mm}$

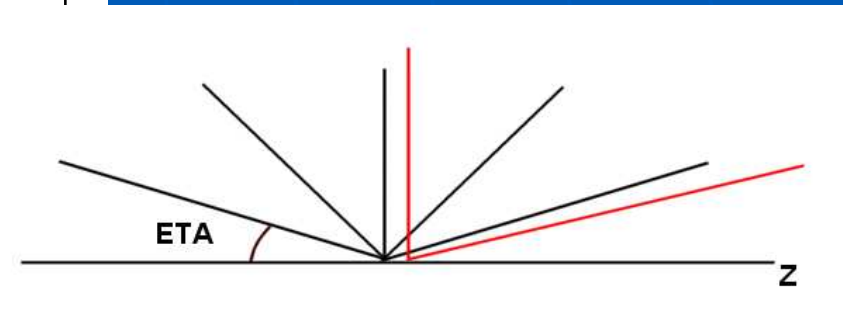




# Impact of offset in $z$ (II)



High  $\eta$  tracks less sensitive than low  $\eta$  ones



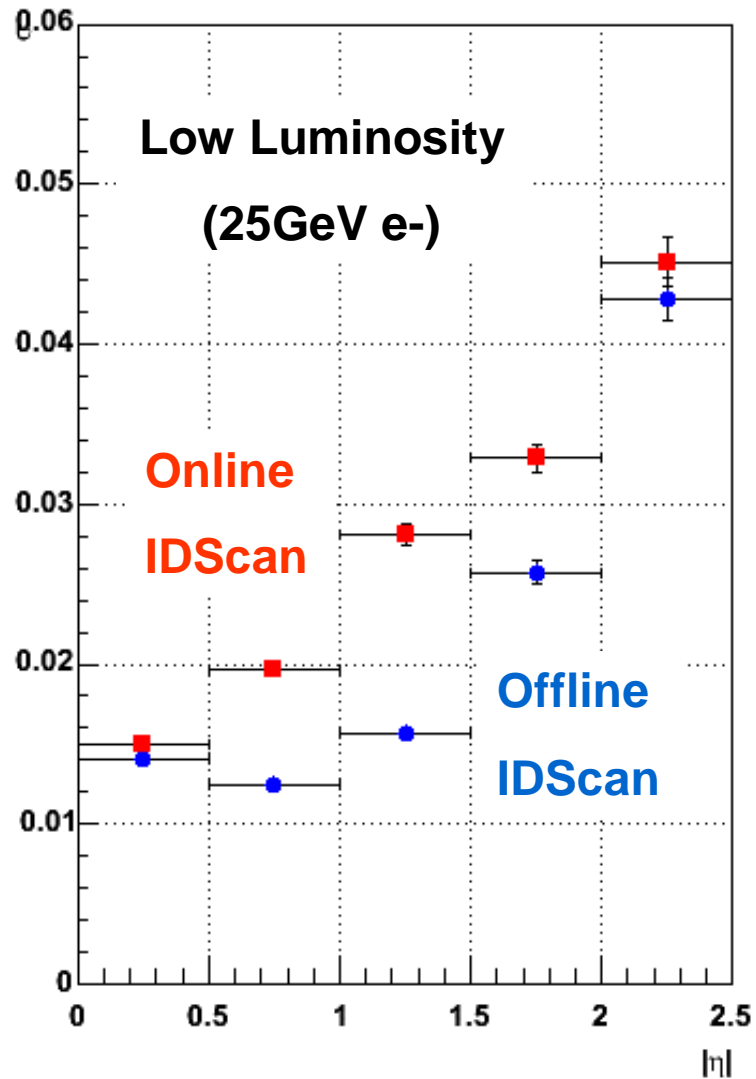
Just as well!  $z$ -resolution is worse at high  $\eta$

In IDScan, the bin size of the  $z$ -histogram is a function of  $\eta$

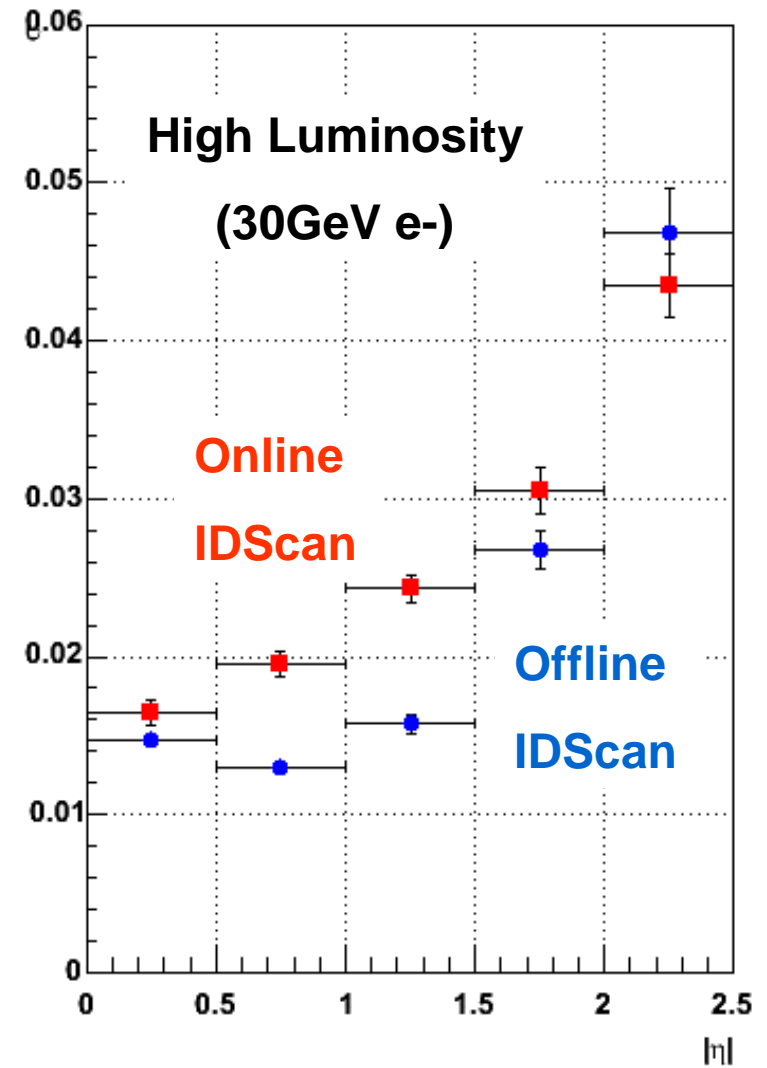


# Z finder : 20% prod files

Gaussian  $\sigma$  as a function of  $\eta$

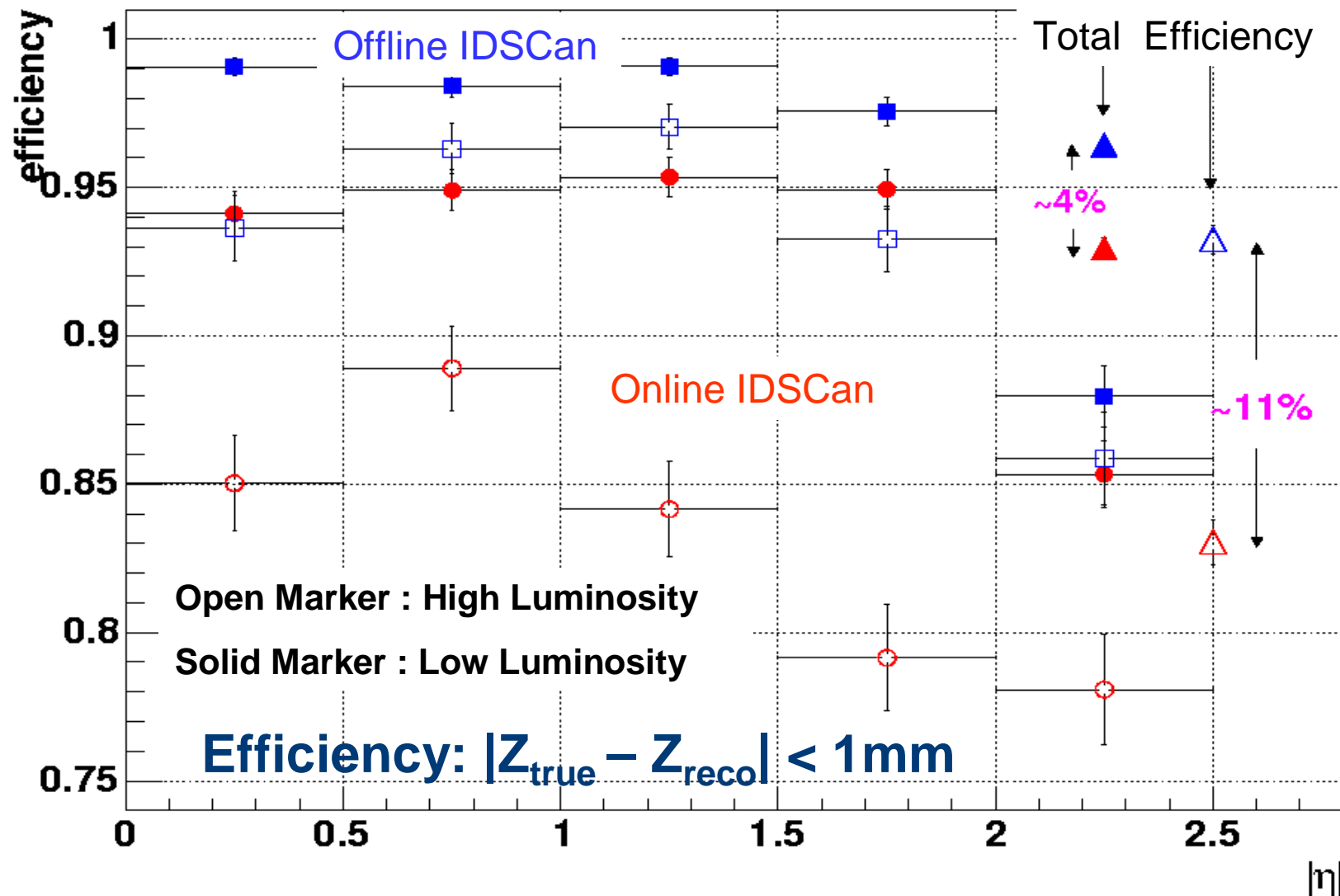


Gaussian  $\sigma$  as a function of  $\eta$



# Z finder : 20% prod files

Efficiencies for each  $\eta$  region



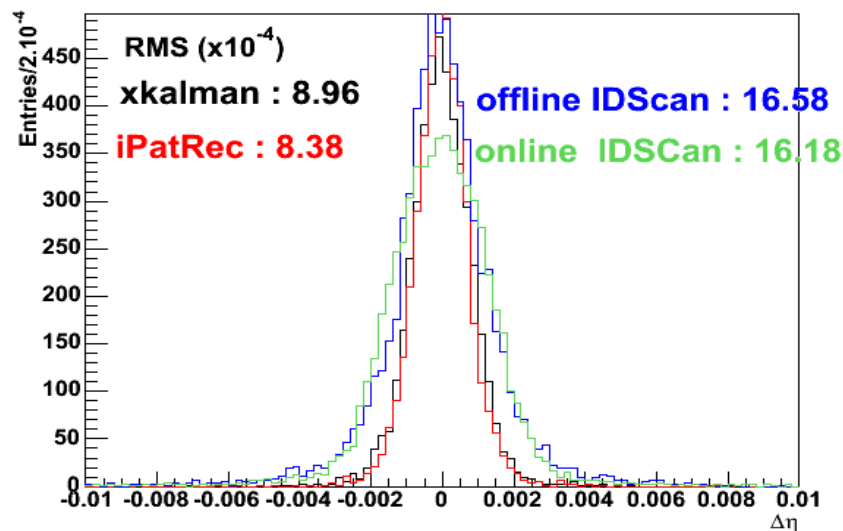
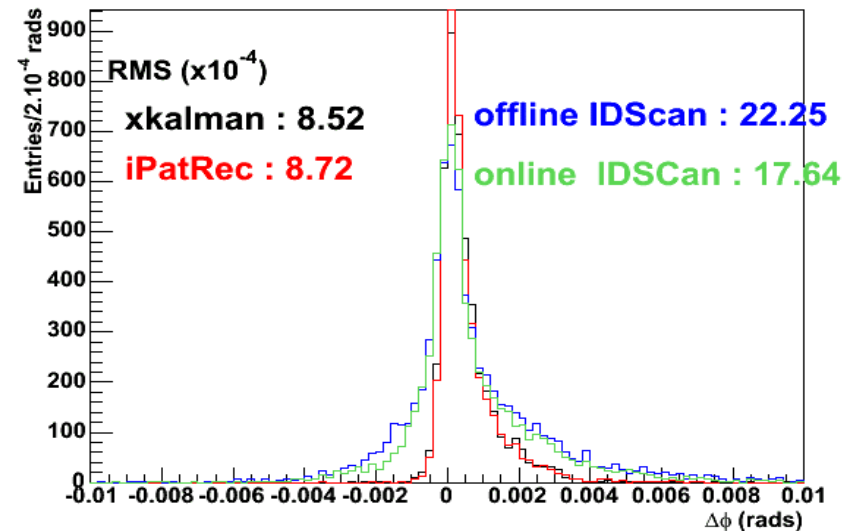
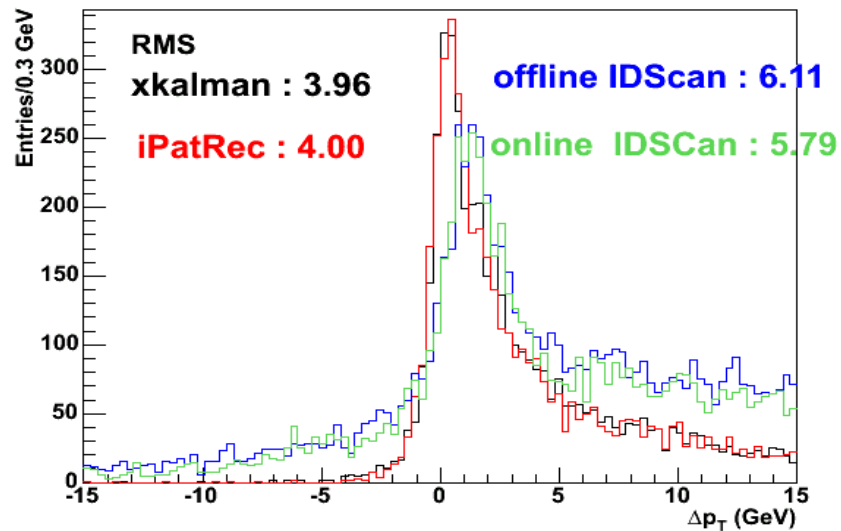


# Efficiency on Tracks (I)

- 20% production
- kineZ ntuples  $\Rightarrow$  Correct Z for reconstruction
- Conditions: (i)  $|P_{\uparrow}^{\text{gen}} - P_{\uparrow}^{\text{reco}}| < 15 \text{ GeV}$   
(ii)  $|\varphi^{\text{gen}} - \varphi^{\text{reco}}| < 0.01 \text{ rads}$   
(iii)  $|\eta^{\text{gen}} - \eta^{\text{reco}}| < 0.01$

<b>Efficiency (5,000 events)</b>	<b><i>Low Luminosity 25 GeV e<sup>-</sup></i></b>	<b><i>High Luminosity 30 GeV e<sup>-</sup></i></b>
<i>xkalman</i>	<b><i>(88.9<math>\pm</math>0.4)%</i></b>	<b><i>(84.0<math>\pm</math>0.5)%</i></b>
<i>iPatRec</i>	<b><i>(87.2<math>\pm</math>0.4)%</i></b>	<b><i>(82.2<math>\pm</math>0.5)%</i></b>
<i>IDScan Offline</i>	<b><i>(91.6<math>\pm</math>0.4)%</i></b>	<b><i>(87.5<math>\pm</math>0.5)%</i></b>
<i>IDScan Online</i>	<b><i>(89.0<math>\pm</math>0.4)%</i></b>	<b><i>(82.9<math>\pm</math>0.5)%</i></b>

# Efficiency on Tracks (II)



- 20 % production
- KineZ Ntuples
- Low Luminosity
- 5,000 events





# Conclusions (so far...)

- **Z-resolution has negligible effect on tracking**
  - Z-reconstruction can be decoupled from subsequent pattern recognition
- **20% production electron files**
  - Z-finder resolution worse in online IDScan
  - Z-finder efficiency worse in online IDScan
  - Using kine z, track reconstruction efficiency of online/offline IDScan comparable to xkalman/iPatRec
- **$\eta$  and  $\phi$  of reco track, within 0.01 of true track**
  - Tracking not responsible for 0.2x0.2 RoI size



# Next steps

- Understand better numbers and discrepancies
- Run the full e/gamma selection
- Understand contributions to the EM RoI size
- Run IDScan in AthenaMT