

# DYqT pT W spectra at the Tevatron

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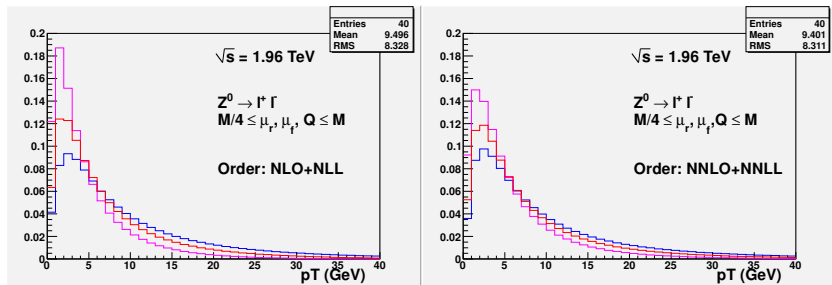


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- The DYqT calculation combines the fixed-order result at high values of  $p_T$  up to  $\mathcal{O}(\alpha_S^2)$  with the resummation of the logarithmically enhanced contributions at small values of  $p_T$  up to NNLL.
- The program can be used at NLL+LO and NNLL+NLO.
- At NLL+LO accuracy the resummed part is evaluated at NLL accuracy, and the fixed-order part is evaluated at LO.

- At NNLL+NLO accuracy the resummed part is evaluated at NNLL accuracy, and the fixed-order part is evaluated up to NLO
- At NNLL+NLO accuracy the DYqT calculation exactly recovers the total cross section at NNLO.
- It is not a Monte-Carlo algorithm  $\rightarrow$  no `cuts-file`, no bar-errors. Finite width effects available.

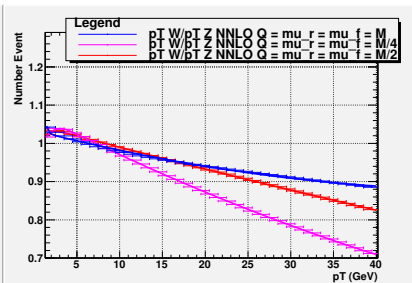
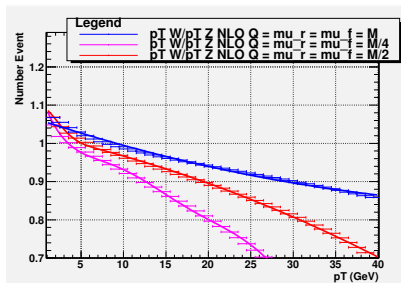
- pT Z distributions, variation of theoretical scales  
 $\mu_r, \mu_f, Q$



- Process:  $Z/\gamma^* \rightarrow l^+ l^-$ ,  $\sqrt{s} = 1.96 \text{ TeV}$ . ■  
 un-scaled  $\mu_r, \mu_f$  and  $Q (= M_b)$ , ■ for  
 $Q, \mu_r, \mu_f = M_b/4$  and ■ for  $Q, \mu_r, \mu_f = M_b/2$ .

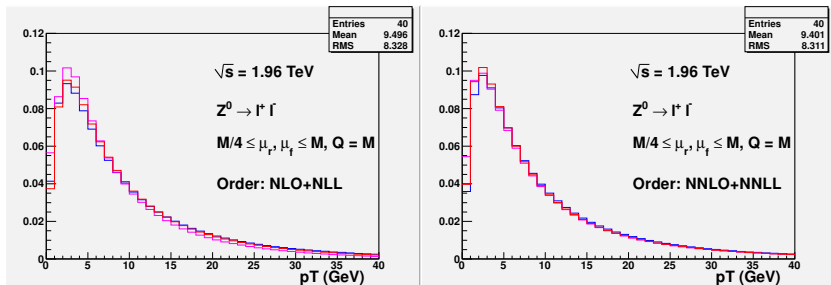


- $p_T W/p_T Z$ : NLO and NNLO



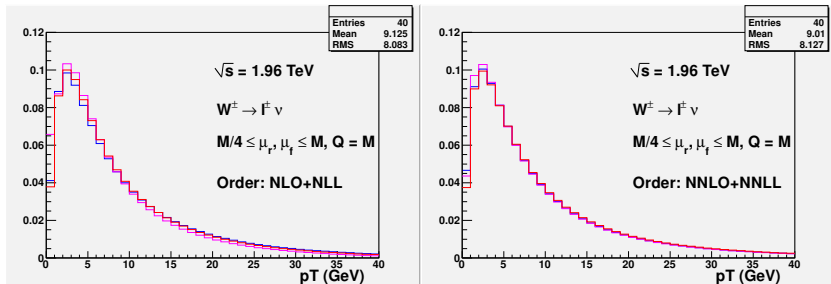
- Dependence from scaling process. Spread increases as  $p_T$  increases.

- pT Z distributions, variation of theoretical scales  
 $\mu_R, \mu_f$ : NLO and NNLO



- $Q = M_{\text{boson}}$  for each scaling. No cuts applied. ■  
 unscaled  $\mu_R$  and  $\mu_F$ , ■ for  $\mu_R, \mu_F = M_b/4$  and  
■ for  $\mu_R, \mu_F = M_b/2$ .

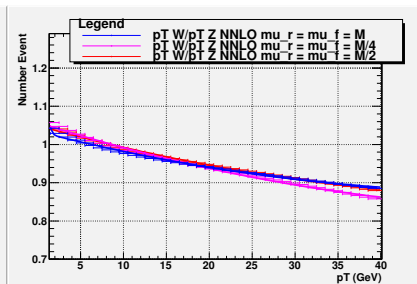
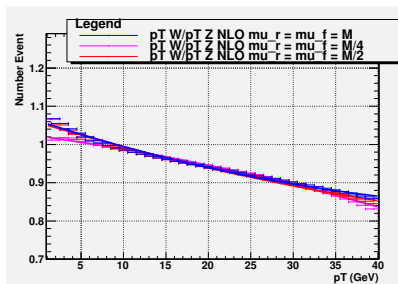
- pT W distributions, variation of theoretical scales  
 $\mu_r, \mu_f$



- *Process:*  $W \rightarrow l\nu$ ,  $\sqrt{s} = 1.96$  TeV. No cuts applied. ■ un-scaled  $\mu_R$  and  $\mu_F$ , ■ for  $\mu_R, \mu_F = M_b/4$  and ■ for  $\mu_R, \mu_F = M_b/2$ .

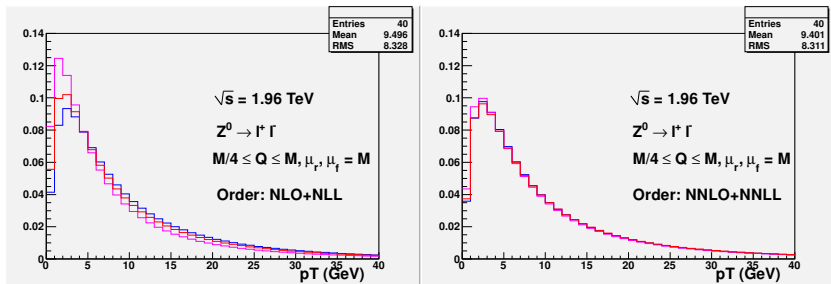


- $p_T W/p_T Z$  at NLO



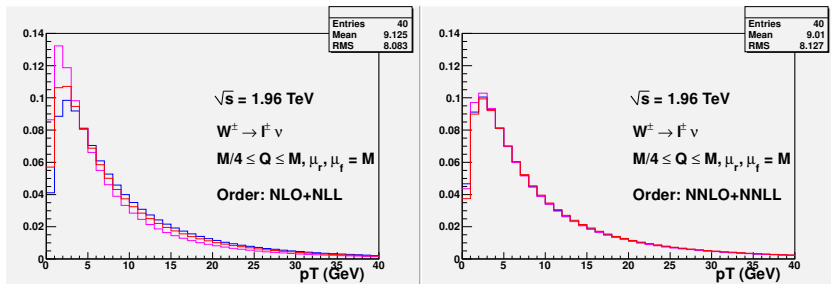
- Slight dependence from scaling for the pink ratio.

- $p_T$  Z distributions, variation of theoretical scales  
 $Q$ : NLO and NNLO



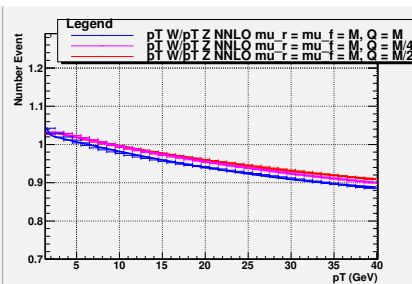
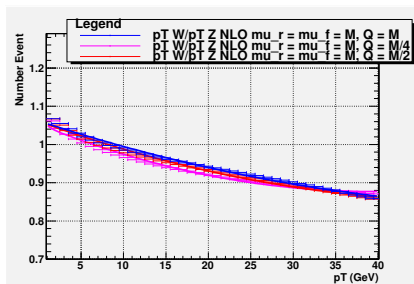
- $\mu_R, \mu_F = M_{\text{boson}}$  for each scaling. No cuts applied. ■ un-scaled  $Q$  ( $= M_b$ ), ■ for  $Q = M_b/4$  and ■ for  $Q = M_b/2$ .

- pT W distributions, variation of theoretical scales  
 $Q$ : NLO and NNLO



- $\mu_R, \mu_F = M_{\text{boson}}$  for each scaling. No cuts applied. ■ un-scaled  $Q$  ( $= M_b$ ), ■ for  $Q = M_b/4$  and ■ for  $Q = M_b/2$ .

- $p_T W/p_T Z$  at NLO



- Slight dependence from scaling.

- DYqT **Conclusion**
- NLO  $\longrightarrow$  both for W and Z more affected by scales variations (according to previous DYRes talks);
- NNLO  $\longrightarrow$  both W and Z less affected by scales variations (according to previous DYRes talks);
- Ratio NLO & NNLO  $\longrightarrow$  more affection to scaling  $\mu_R, \mu_F, Q$ ;
- Single scaling of  $Q$ , or  $\mu_R, \mu_F$  does not affect ratios.