



ResBos-A upgrade

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1. What is new?

γ -Z interference effect
Y-piece (perturbative piece)

2. W physics

Comparison with WGRAD

3. Z physics

Kinematical distributions

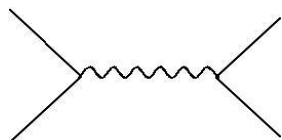
4. Next ...



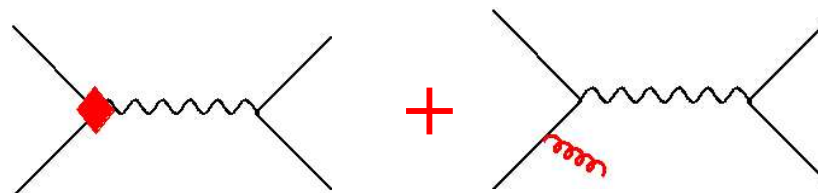
ResBos-A

- The improved **ResBos** including final state NLO QED corrections to **W** and **Z** production

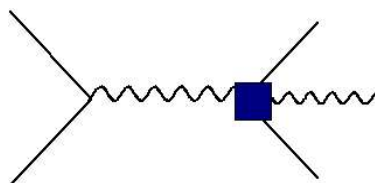
Born



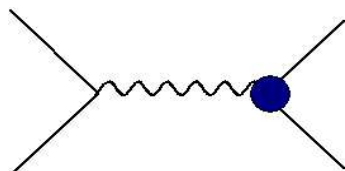
Resum+Born



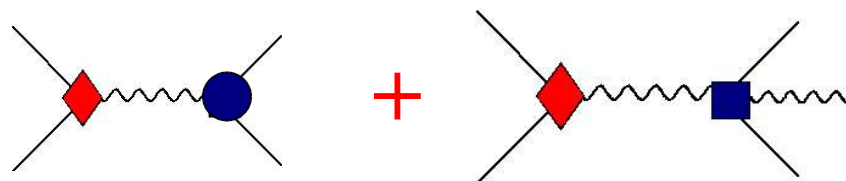
NLO



+

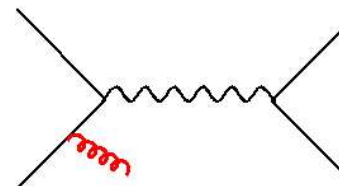


Resum+NLO



+

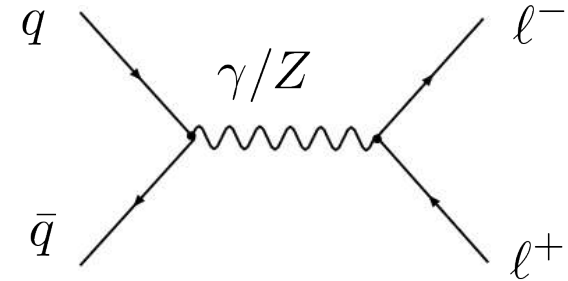
+





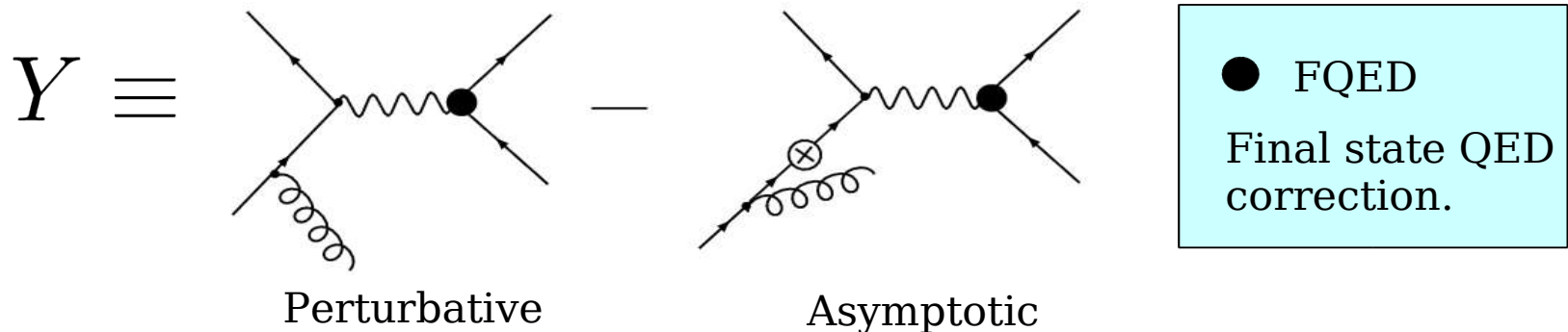
What is new?

1. Photon and Z interference effect has been implemented.
2. Effective Born Approximation is adopted in order to include the dominant higher order EW corrections around the Z-pole.



$$\alpha \rightarrow \alpha(\hat{s}) \quad , \quad v_f \rightarrow v_f^{\text{eff}} = \frac{1}{2s_w} \frac{M_Z}{M_W} (I_3^f - 2Q_f \sin^2 \theta_{\text{eff}}^f)$$

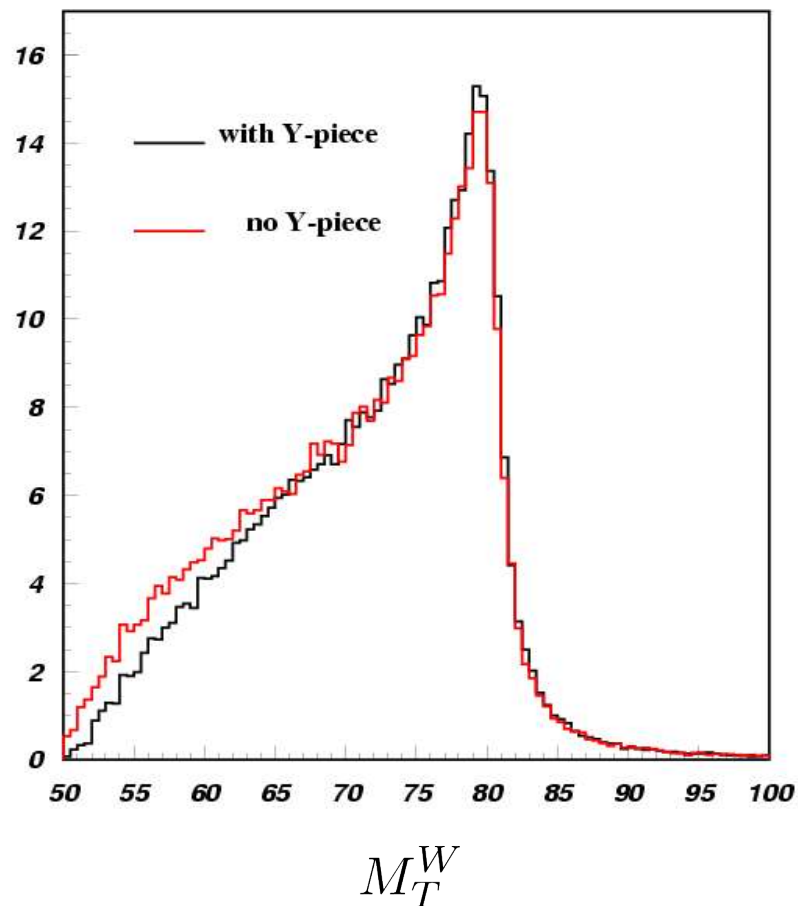
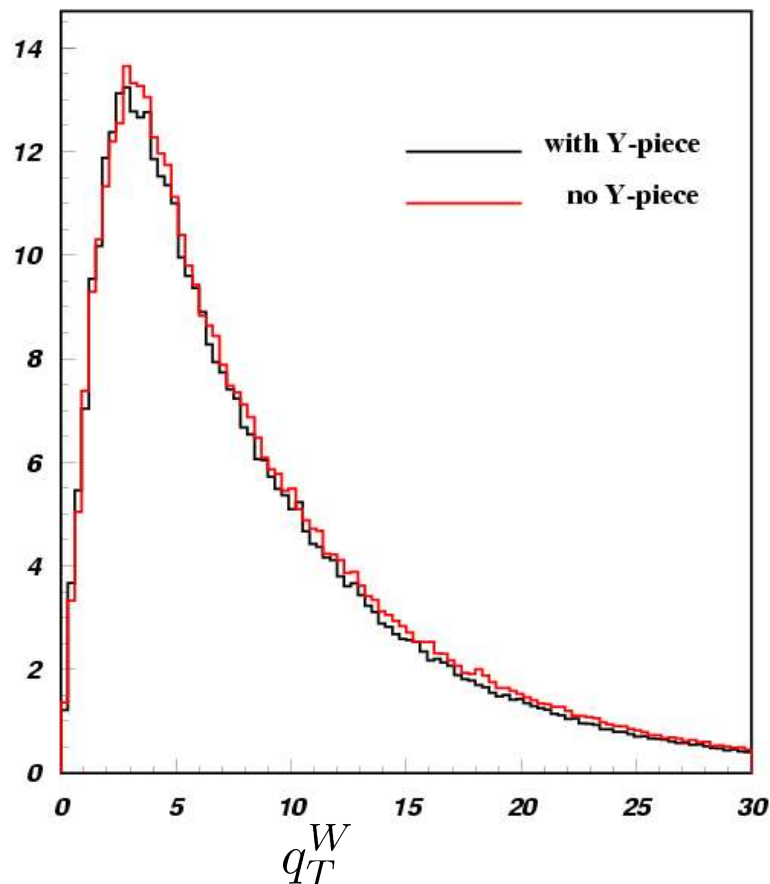
3. Y-piece (perturbative piece) has been implemented.



Y-piece (with FQED) contribution in W physics



$$W^+ \rightarrow e^+ \nu \quad (\text{no recombination})$$

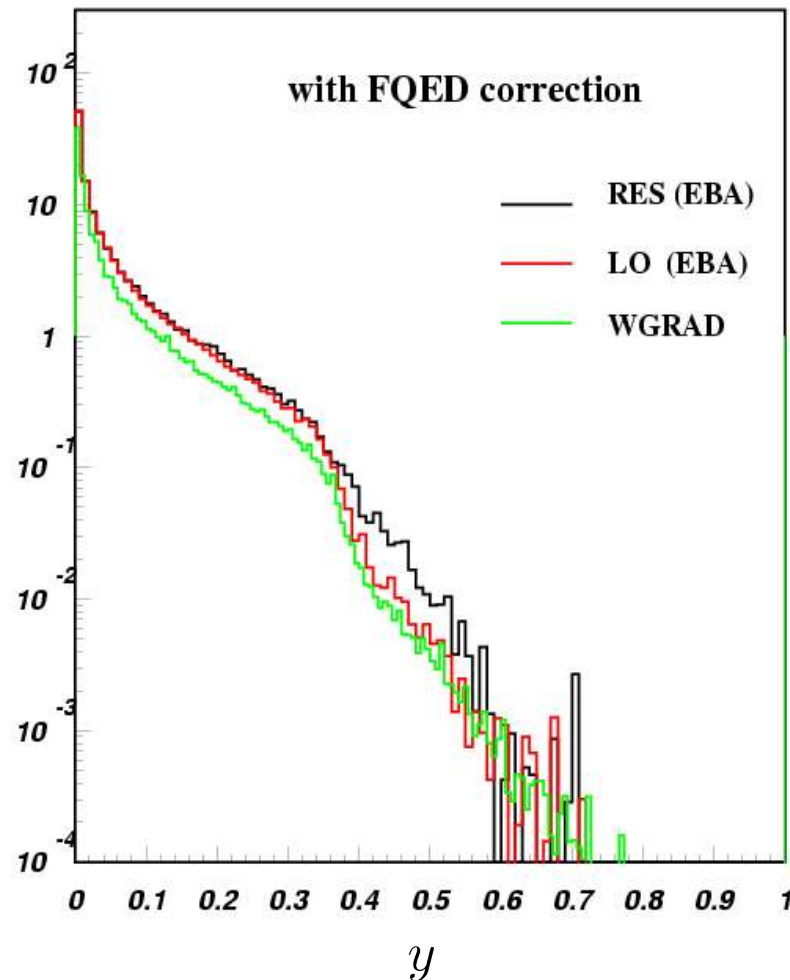


Cuts: $p_T^{e^+} > 25 \text{ GeV}$ $\cancel{E}_T > 25 \text{ GeV}$ $|\eta^{e^+}| < 1.2$



Electron

(no recombination)



Cuts:

$$p_T^{e^+} > 25 \text{ GeV}$$

$$\cancel{E}_T > 25 \text{ GeV}$$

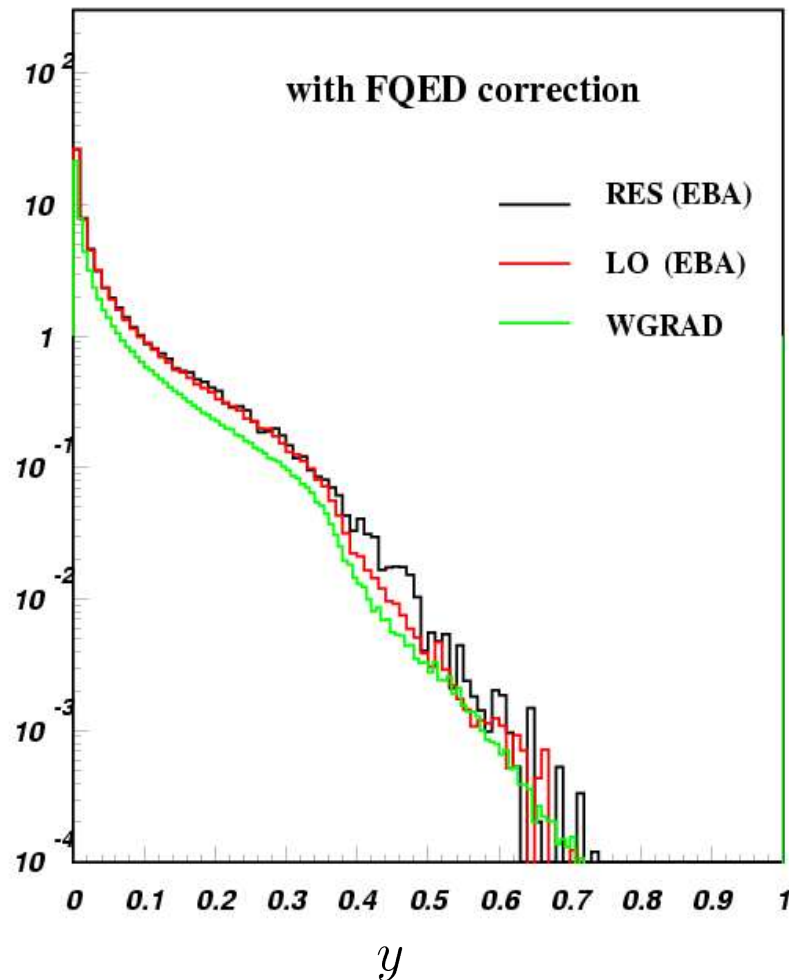
$$|\eta^{e^+}| < 1.2$$

$$y \equiv \frac{E_\gamma}{E_\gamma + E_{e^+}}$$



Muon

(no ΔR cut)



Cuts:

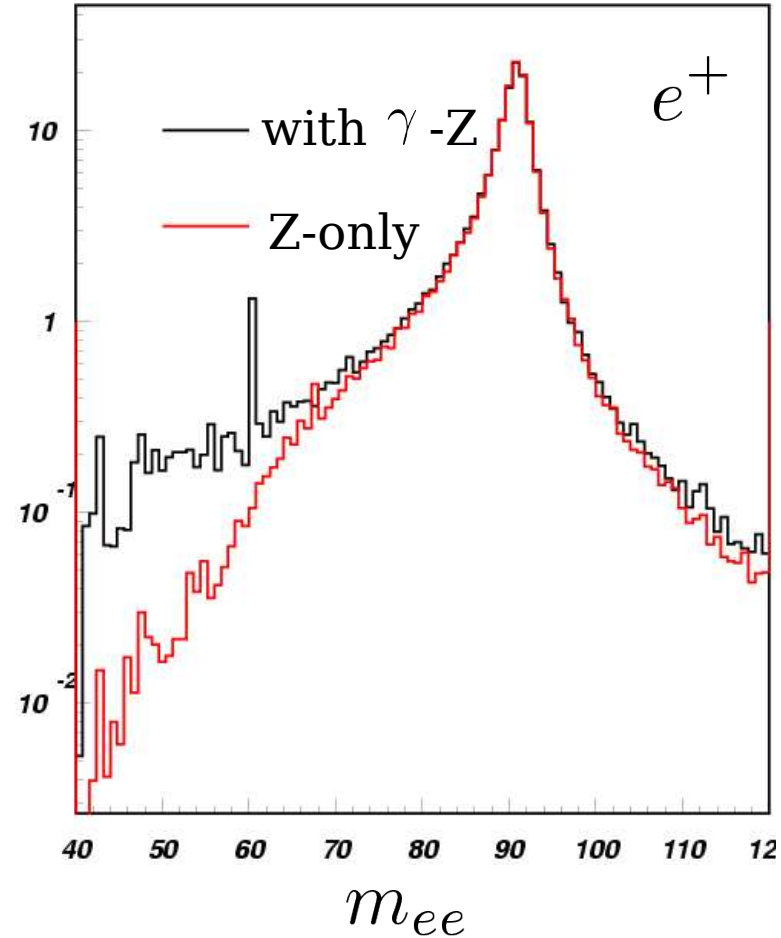
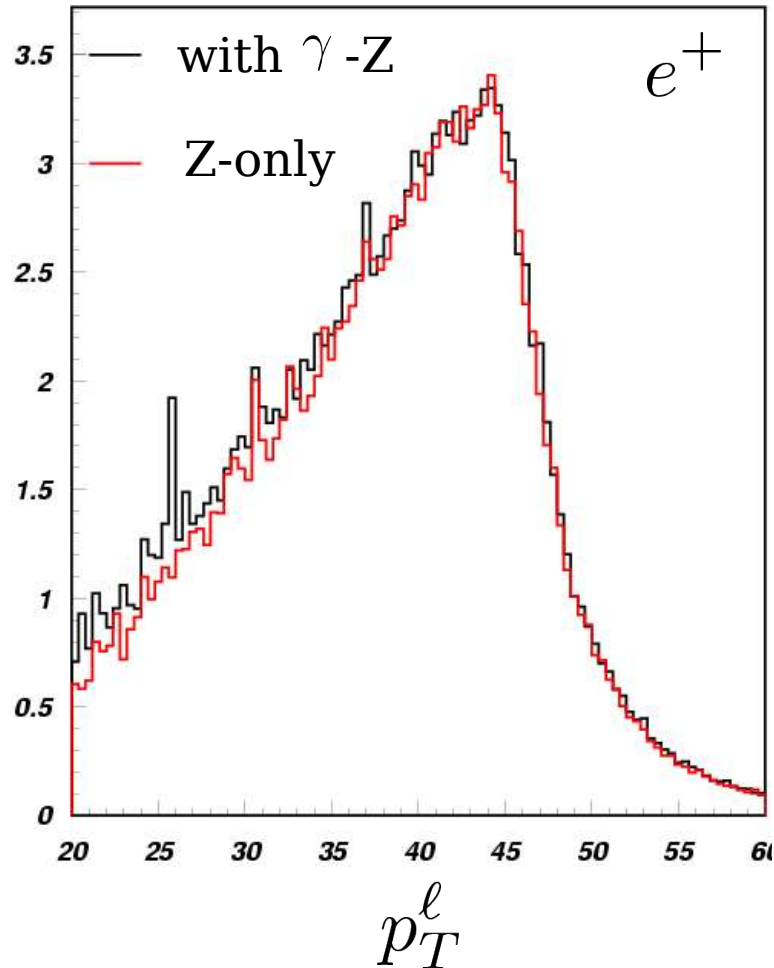
$$p_T^{\mu^+} > 25 \text{ GeV}$$

$$\cancel{E}_T > 25 \text{ GeV}$$

$$|\eta^{\mu^+}| < 1.2$$

$$y \equiv \frac{E_\gamma}{E_\gamma + E_{\mu^+}}$$

Z boson physics: γ - Z interference effects (with FQED)

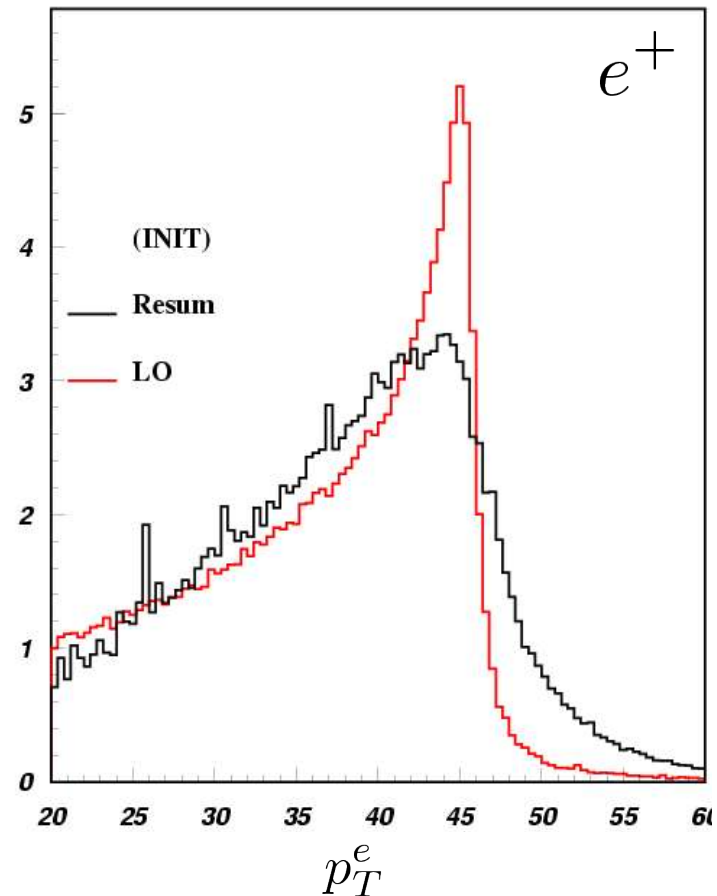


Cuts: $p_T^l > 20$ GeV , $|\eta^{\ell^+}| < 2.4$, 40 GeV $< m_{\ell\ell} < 200$ GeV

Z boson physics: kinematical distributions (with FQED)



p_T^ℓ is sensitive to $|\vec{p}_T^Z|$.



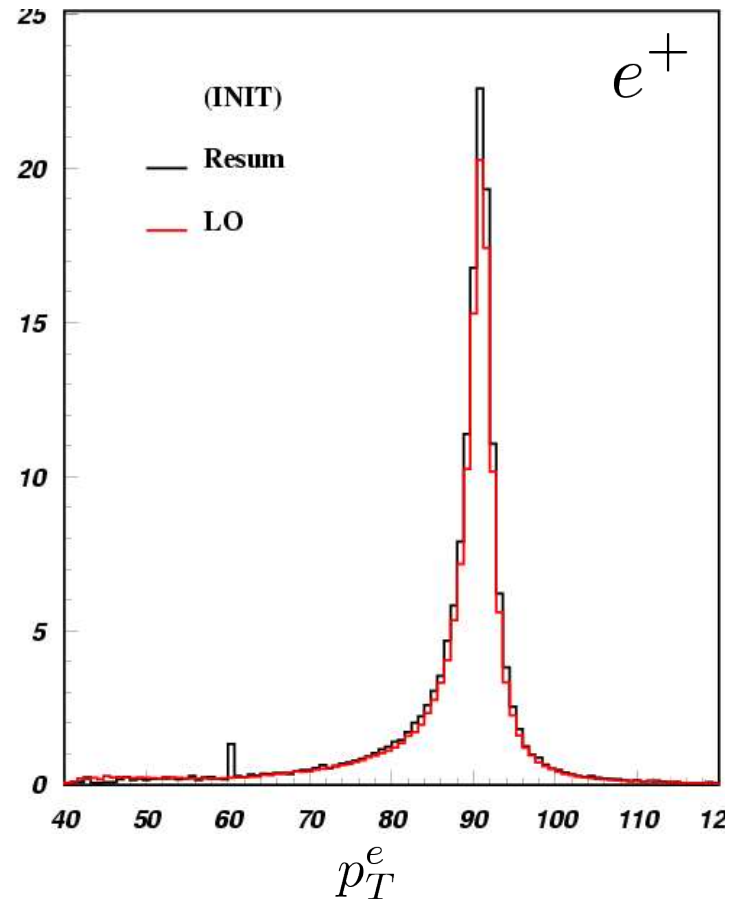
no recombination
no ΔR

Cuts: $p_T^\ell > 20 \text{ GeV}$, $|\eta^{\ell^+}| < 2.4$, $40 \text{ GeV} < m_{\ell\ell} < 200 \text{ GeV}$

Z boson physics: kinematical distributions (with FQED)



$m_{\ell^+\ell^-}$ is not sensitive to $|\vec{p}_T^Z|$.



no recombination
no ΔR

Cuts: $p_T^\ell > 20 \text{ GeV}$, $|\eta^{\ell^+}| < 2.4$, $40 \text{ GeV} < m_{\ell\ell} < 200 \text{ GeV}$

Next ...



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1. Final state multiple soft photon resummation will be implemented soon.
 2. What else do you want from us?