

# Energy Flow and Charged Particle Spectra in DIS

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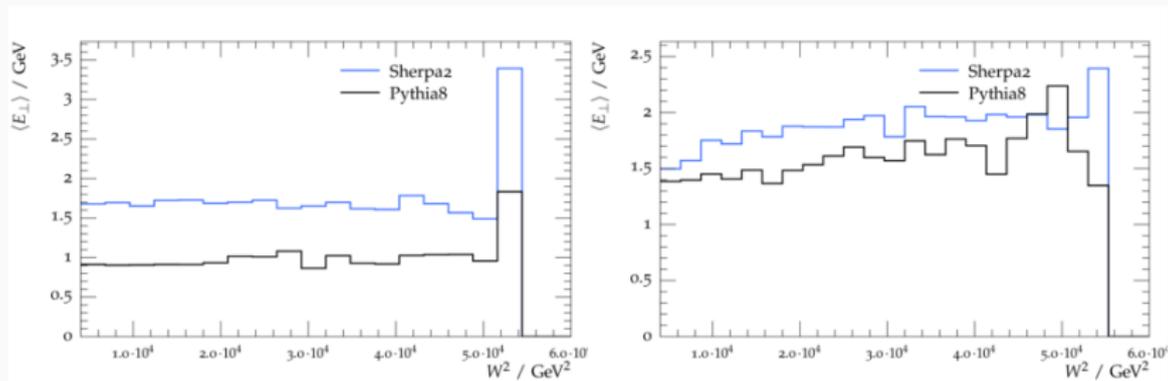
Study of the global properties of the hadronic final states in deep inelastic scattering events.

- Average Transverse Energy
- Transverse Energy Flow
- Transverse Energy-Energy Correlation
- Scaled Charged Particle Spectra
- Average  $p_T^2$  spectra

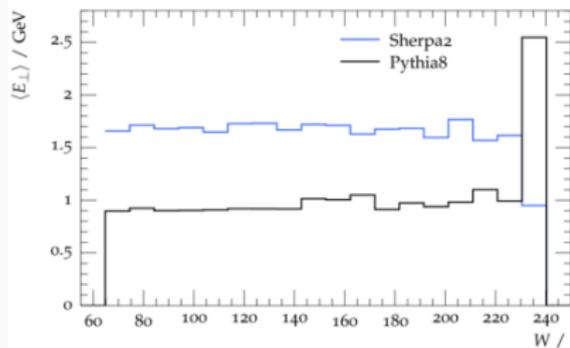
*Reference: HERA H1-1994-S2919893 and H1-2000-S4129130*

- Comparisons of Average  $E_T$  with respect to  $W$ ,  $W^2$ , rapidity and Bjorken  $x$ , from Pythia8 and Sherpa2 at the lowest order.

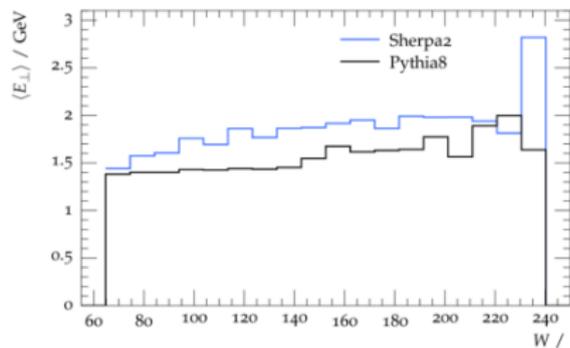
# Average $E_T$ as function of $W^2$



# Average $E_T$ as function of $W$



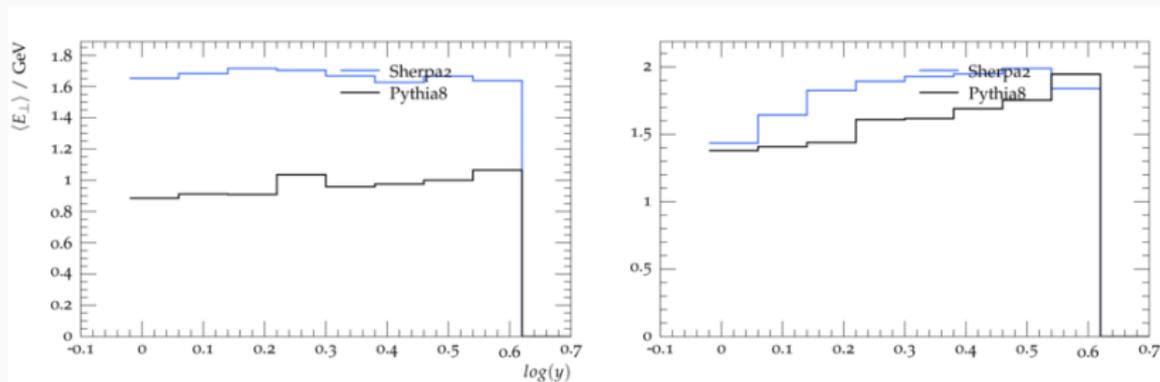
(3) Central Region



(4) Forward Region



# Average $E_T$ as function of Rapidity

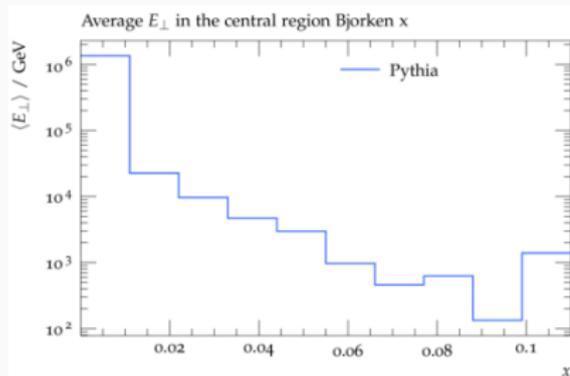


(5) Central Region

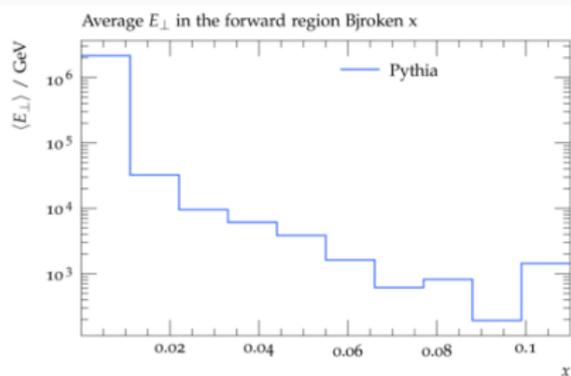
(6) Forward Region



# Average $E_T$ as function of Bjorken $x$



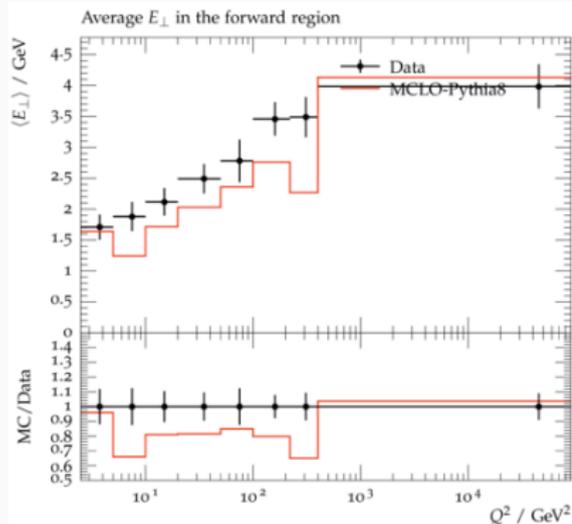
(7) Central Region



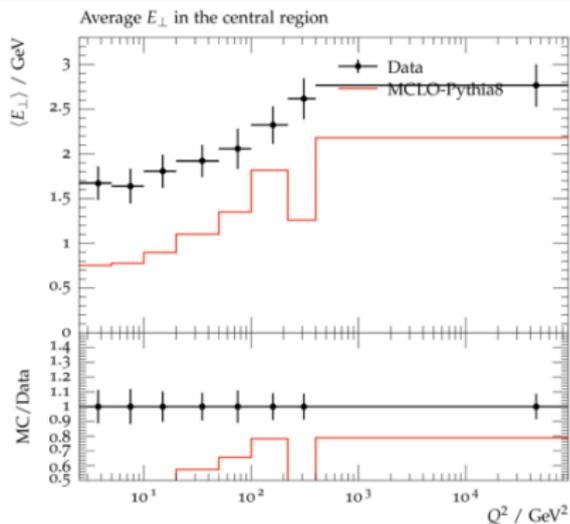
(8) Forward Region



# Average $E_T$ as function of $Q^2$ from Pythia8



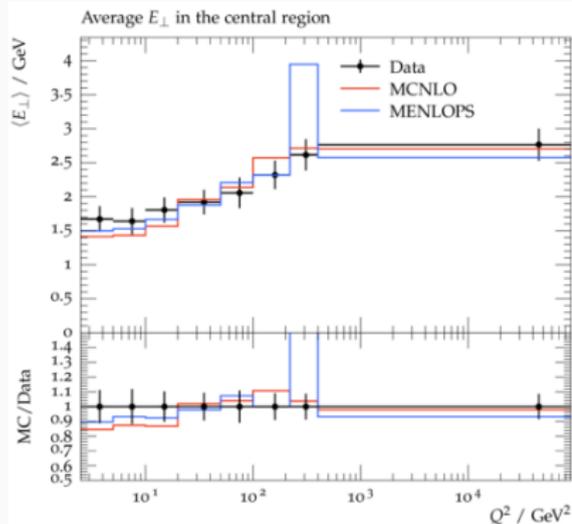
(9) Figure 9



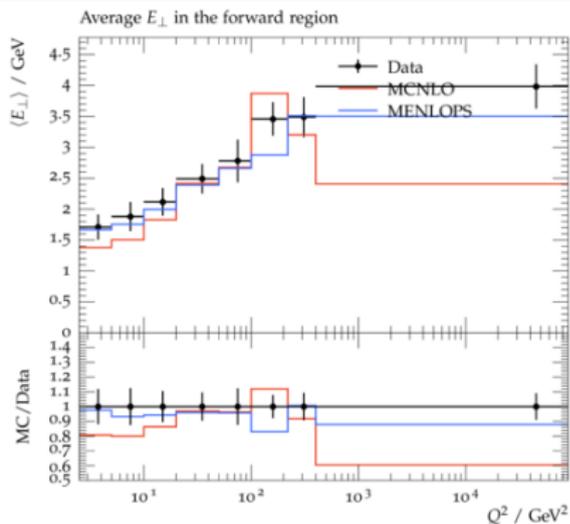
(10) Figure 10



# Average $E_T$ as function of $Q^2$ from Sherpa7



(11) Figure 13



(12) Figure 14

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# Event Kinematics

The event kinematics are determined using information from both the scattered electron(positron) and the final hadronic system.

- $Q^2 = 4E_e E_e' \cos^2(\theta_e/2)$
- $y = \sum \frac{E_h - p_{z,h}}{2E_e}$
- $x = \frac{Q^2}{ys}$
- $W^2 = m_p^2 + sy - Q^2$
- Scaled Longitudinal Momentum:  $x_L = \frac{p_z^*}{2W}$
- Energy-Energy Correlation:  
$$\Omega(\omega) = \frac{1}{N\Delta\omega} \sum_N \sum_{ij, i \neq j} \frac{E_{Ti} E_{Tj}}{(p_{Te})^2} \int_{\omega - \frac{\Delta\omega}{2}}^{\omega + \frac{\Delta\omega}{2}} \delta(\omega' - \omega_{ij}) d\omega'$$
- Omega:  $\omega_{ij} = (\eta_i - \eta_j)^2 + (\phi_i - \phi_j)^2$

THANK YOU