

Charged Current DIS feasibility at EIC : Existing Pythia 8 samples and Beam-Energy dependence

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Outline

- DJANGO 5000 events and 9x275 beam energy setting
- Hadronic final state reconstruction
- Reconstruction efficiencies
- Different beam energy settings and uncertainties

Calculations involved

$$A_{\text{raw}}(x, Q^2) = \frac{\sigma^+(x, Q^2) - \sigma^-(x, Q^2)}{\sigma^+(x, Q^2) + \sigma^-(x, Q^2)}$$

$$\sigma_{\text{gen}}^+ = 33.021 \text{ pb}, \quad \sigma_{\text{gen}}^- = 12.906 \text{ pb} \quad [9 \times 275]$$

$$N_{\text{gen}}^+ = N_{\text{gen}}^- = 5000$$

$$\sigma_{\text{bin}}^\pm = N_{\text{bin}}^\pm \frac{\sigma_{\text{gen}}^\pm}{N_{\text{gen}}^\pm}$$

$$N_{\text{exp}} = (\sigma_{\text{bin}}^+ + \sigma_{\text{bin}}^-) \mathcal{L}_{\text{int}}$$

$$\delta A_{\text{raw}} = \frac{1}{P_e P_p \sqrt{N_{\text{exp}}}}$$

$$A_{\text{raw}}(x, Q^2) = \frac{N_{\text{bin}}^+ \frac{33.021}{5000} - N_{\text{bin}}^- \frac{12.906}{5000}}{N_{\text{bin}}^+ \frac{33.021}{5000} + N_{\text{bin}}^- \frac{12.906}{5000}}$$

$$18 \times 275 \text{ (1000)}$$

Integrated Luminosities

$$10 \text{ fb}^{-1} = 10^4 \text{ pb}^{-1}, \quad 100 \text{ fb}^{-1} = 10^5 \text{ pb}^{-1}$$

$$x_{JB} = \frac{Q_{JB}^2}{s y_{JB}}$$

$$Q_{JB}^2 = \frac{p_{T,h}^2}{1 - y_{JB}} \quad y_{JB} = \frac{\sum_h (E_h - p_{z,h})}{2E_e}$$

$$s = 4(9)(275) = 9900 \text{ GeV}^2$$

$$\delta A_{\text{raw}}(x, Q^2) = \frac{1}{0.49 \sqrt{[\sigma_{\text{bin}}^+(x, Q^2) + \sigma_{\text{bin}}^-(x, Q^2)] \mathcal{L}_{\text{int}}}}$$

$$\text{pPlus} = 58.6 \text{ pb}$$

$$\text{pMinus} = 25.1 \text{ pb}$$

Transverse Missing Momentum distributions



