Uncertainty in Double Spin Asymmetry in ep DIS

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Uncertainty in A_1 in ep DIS

$$A_1(x,Q^2) = \frac{\sigma_{1/2} - \sigma_{3/2}}{\sigma_{1/2} + \sigma_{3/2}} = \frac{A_{||}}{D(1+\eta\xi)} - \frac{\eta A_{\perp}}{d(1+\eta\xi)}$$

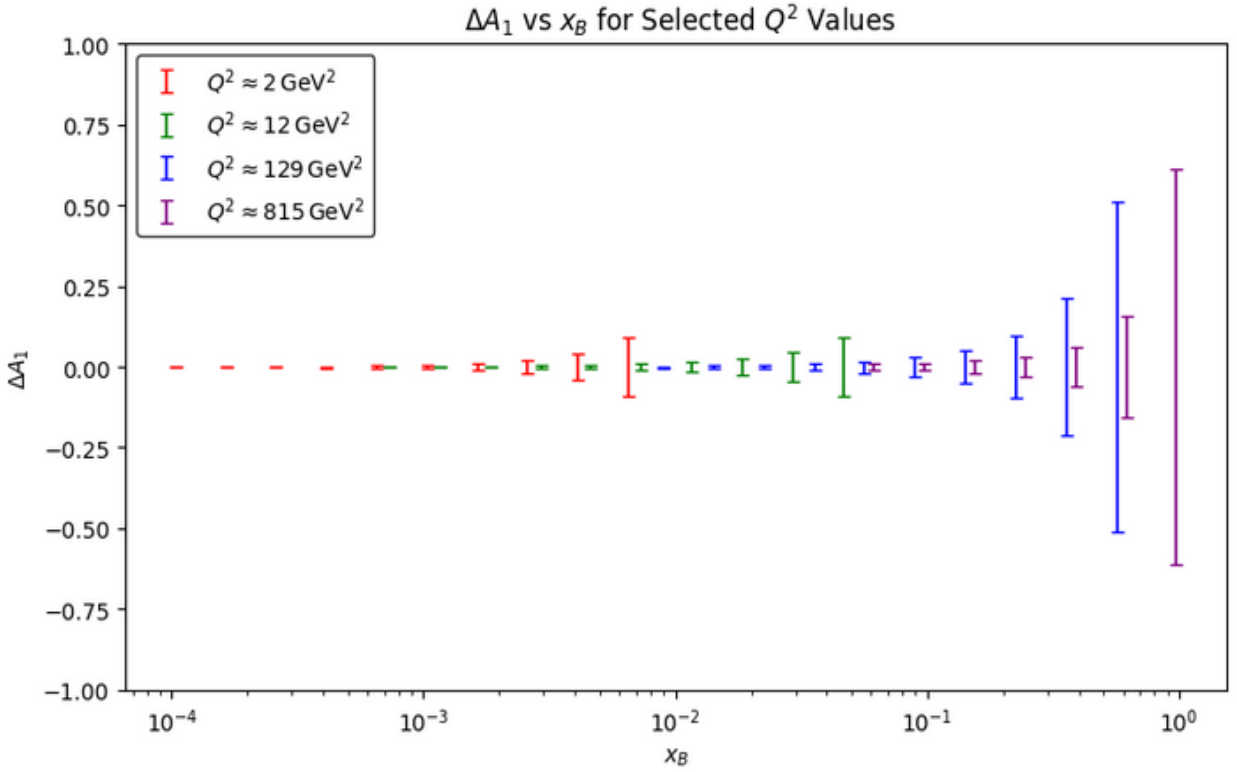
$$\Delta A_1(x,Q^2) = \sqrt{\left(\frac{\delta A_{||}}{D(1+\eta\xi)}\right)^2 + \left(\frac{\eta\delta A_{\perp}}{d(1+\eta\xi)}\right)^2}$$

Where,

$$\delta A_{||,\perp} \approx \frac{\delta N}{N P_e P_N}$$

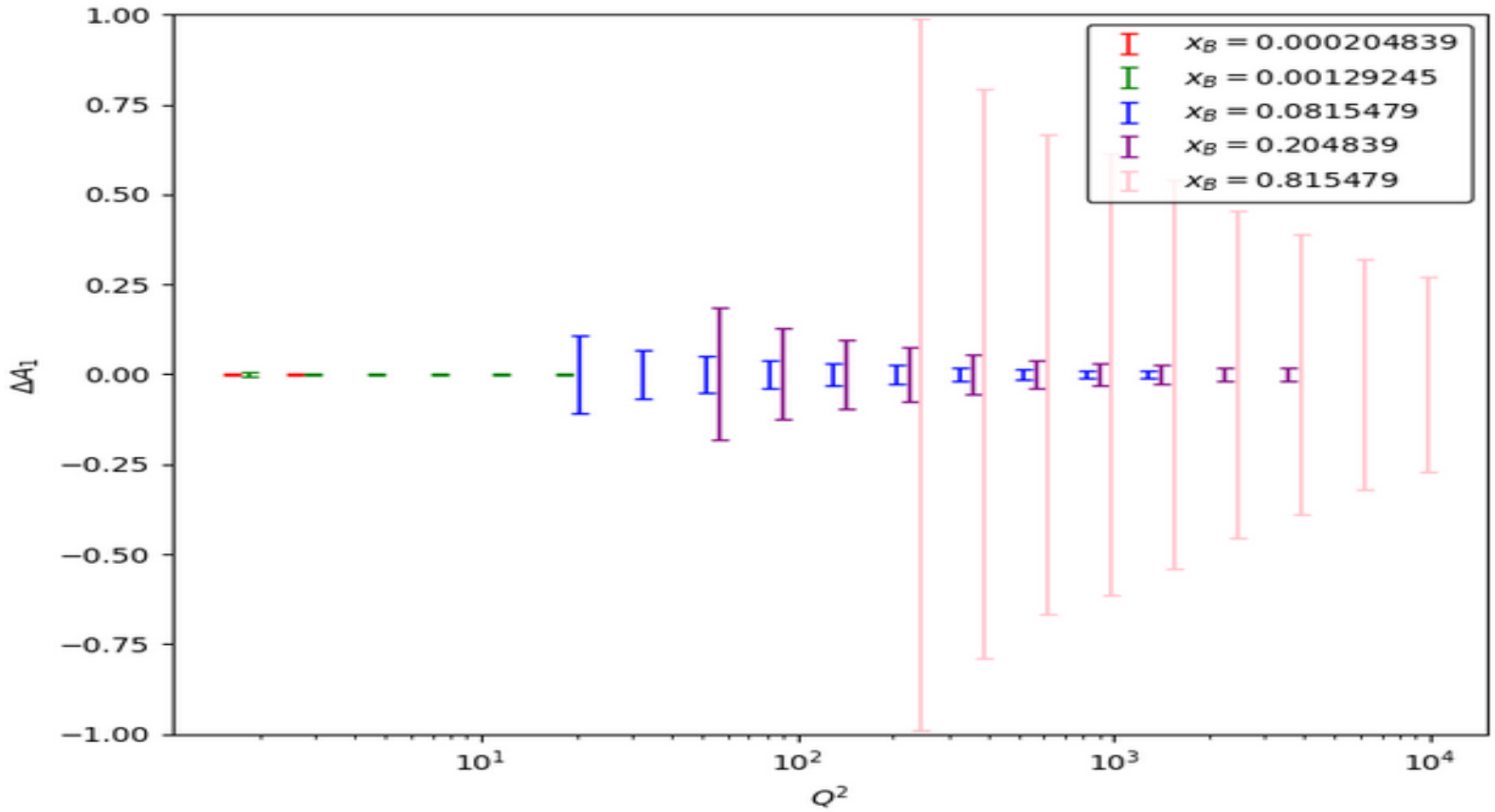
$$L = 10\ fb^{-1}, P_e = P_N = 70\ \%$$

- Here data are divided evenly between $\Delta A_{||}$ and $\Delta A_{\perp}$
- Statistical uncertainty only
- We don't include uncertainty in R

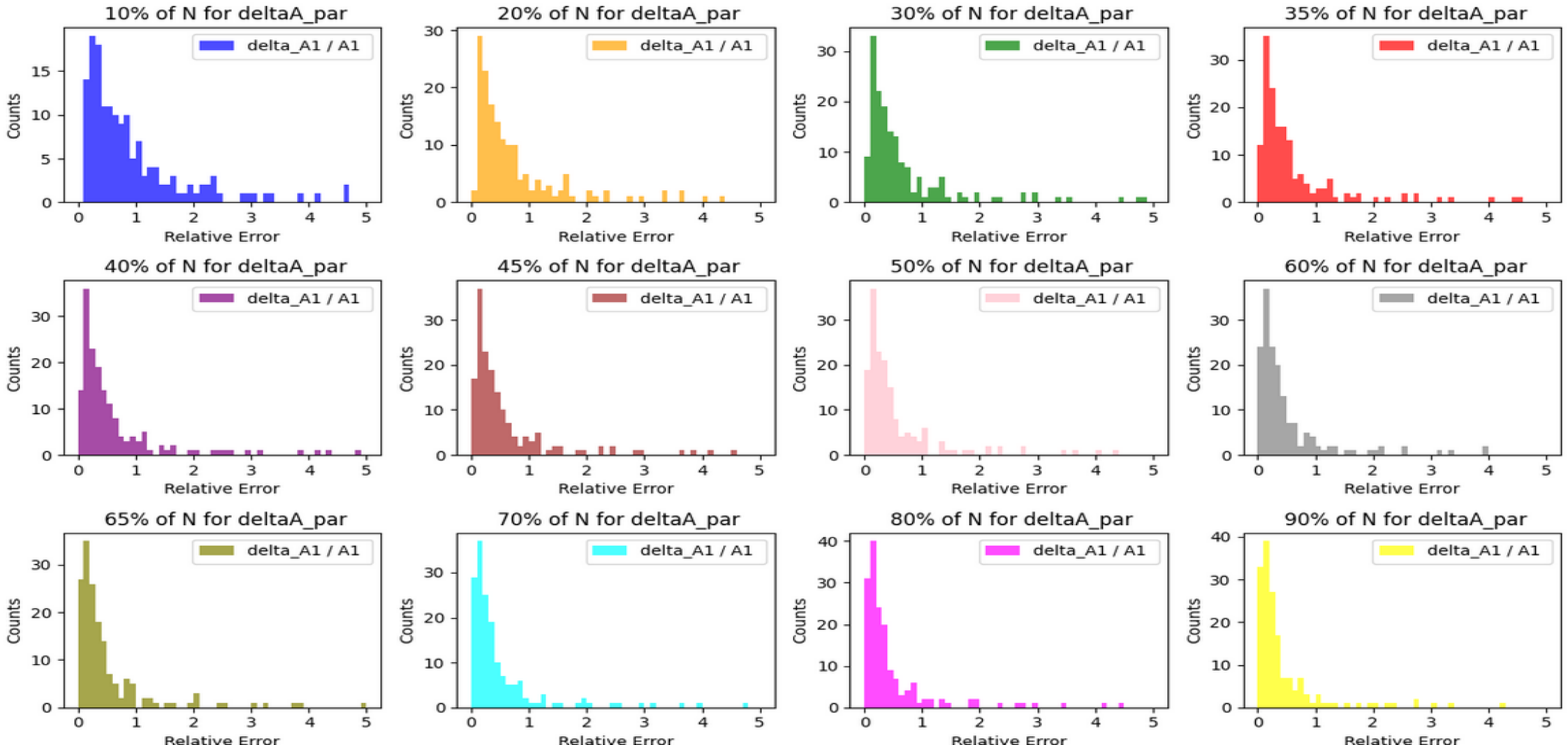


Only statistical uncertainty is considered, using the EPIC 24.06.0 Simulation campaign EPIC

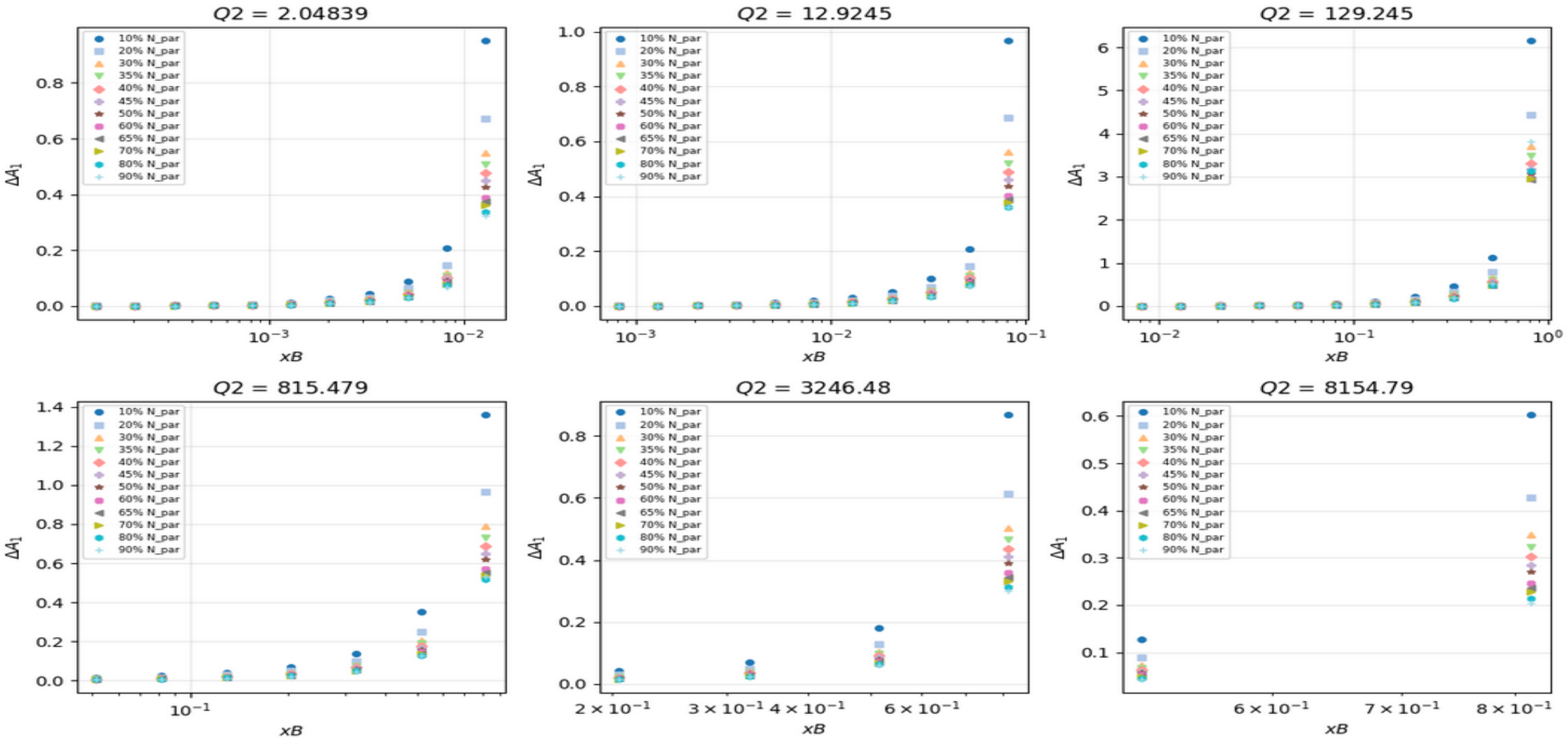
ΔA_1 *vs* Q^2 *for selected* xB



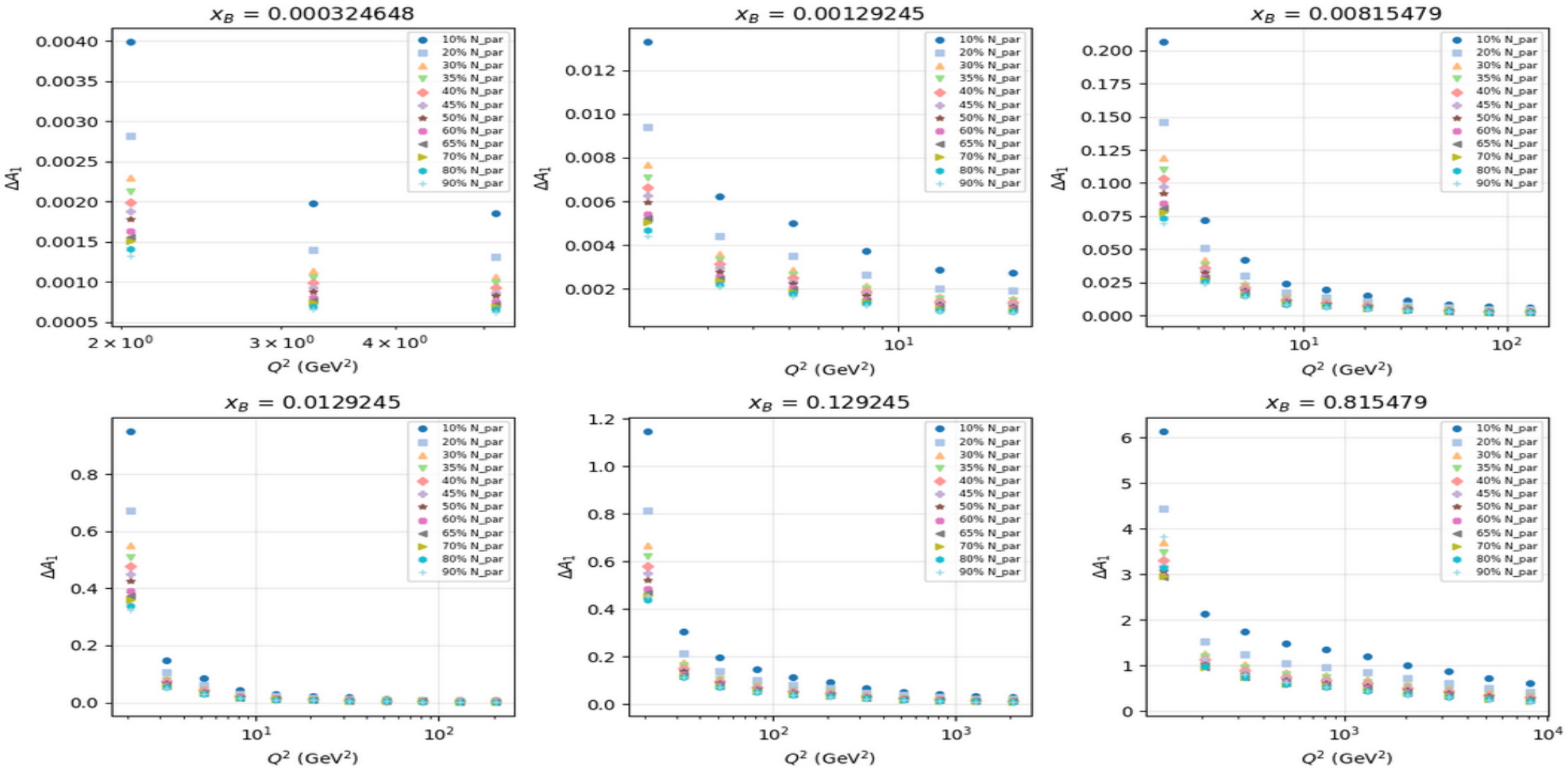
Relative error by taking different ratios of N for $\Delta A_{||}$ *and* $\Delta A_{\perp}$



ΔA_1 as a function of xB for different Q^2 values



ΔA_1 as a function of Q^2 for different xB values



Future work

- Current results show **excellent statistical precision** at low-x due to high luminosity.
- Next step: **include systematic uncertainties** to have full understanding of how well we will do this measurement.