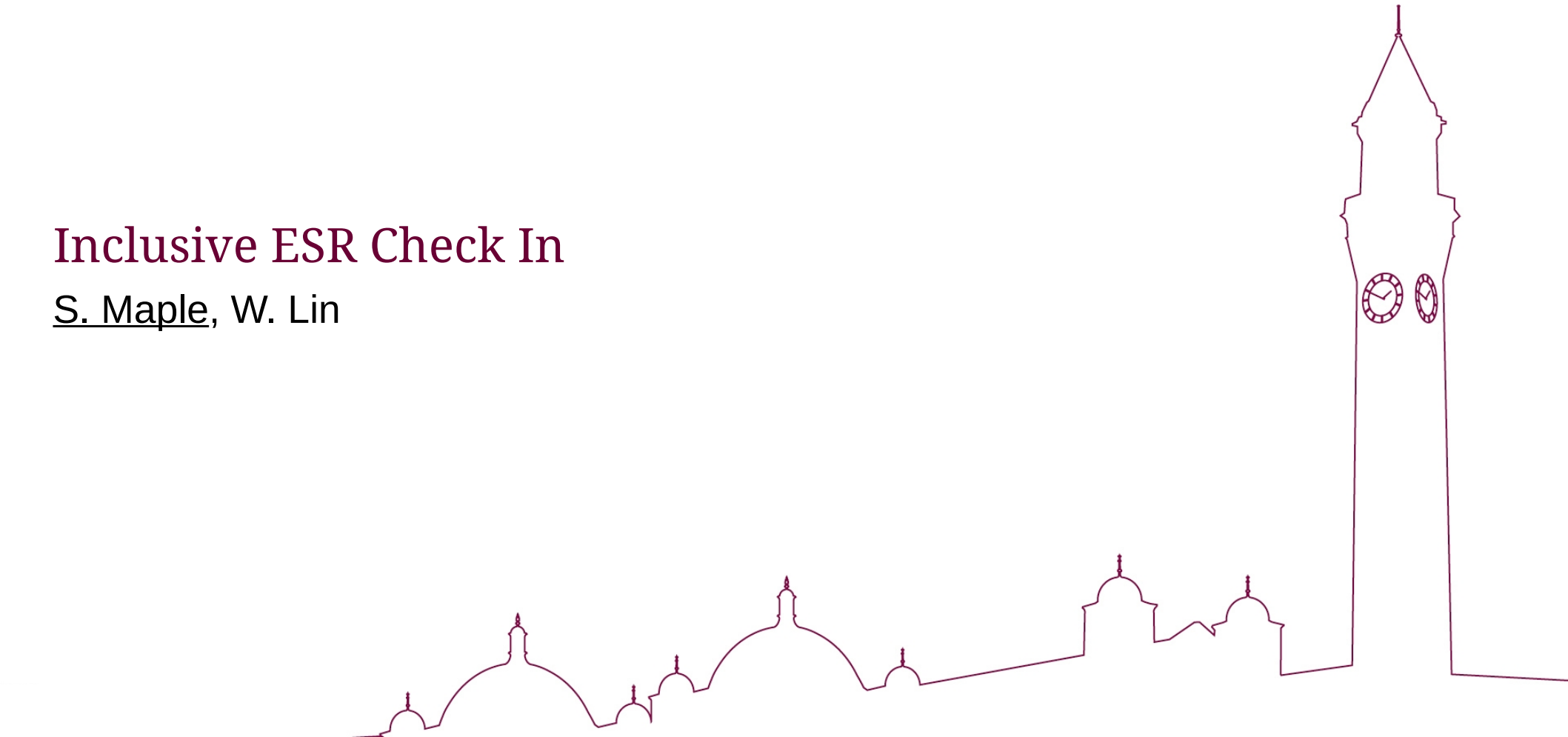
UNIVERSITY OF BIRMINGHAM | SCHOOL OF PHYSICS AND ASTRONOMY

Inclusive ESR Check In

S. Maple, W. Lin



Overview

- Appendix A.1: DIS electron selection
  - Short section to refer to where required → Done?

- Appendix A.2 NC ep reduced cross sections
  - Text written, just needs cleaning up. Replace fig. 9 with March campaign, update uncertainties in fig. 10

- Appendix A.3-4 Proton F_2 and F_L structure functions and PDFs
  - Text written, needs cleaning up + references re-adding

- Appendix A.5 F_2 ratio in e+Au
  - Text written, needs cleaning up, maybe some extra info, and references.

- Appendix A.6 Double spin asymmetry and spin dependent structure functions
  - Text written, figures need updating to March campaign and some style changes

A.2

- Update figures to March campaign
- Minor text updates

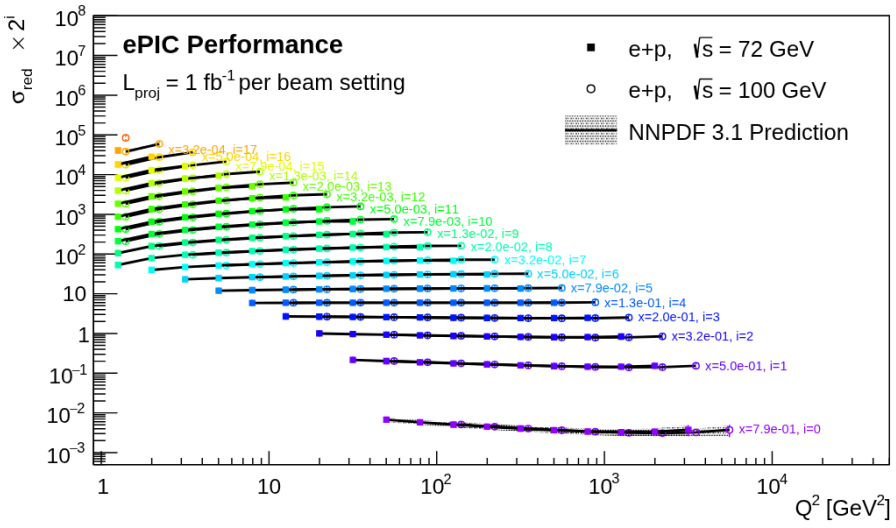


Figure 10: Cross sections and uncertainties for the 10x130 and 10x250 GeV^2 ep beam configuration as a function of Q^2 with no purity/stability requirement. Points are offset in Q^2 for visibility. The uncertainties are taken as the sum in quadrature of the statistical uncertainty and a 3.9 % total systematic uncertainty.SM update figure - smaller errors needed.

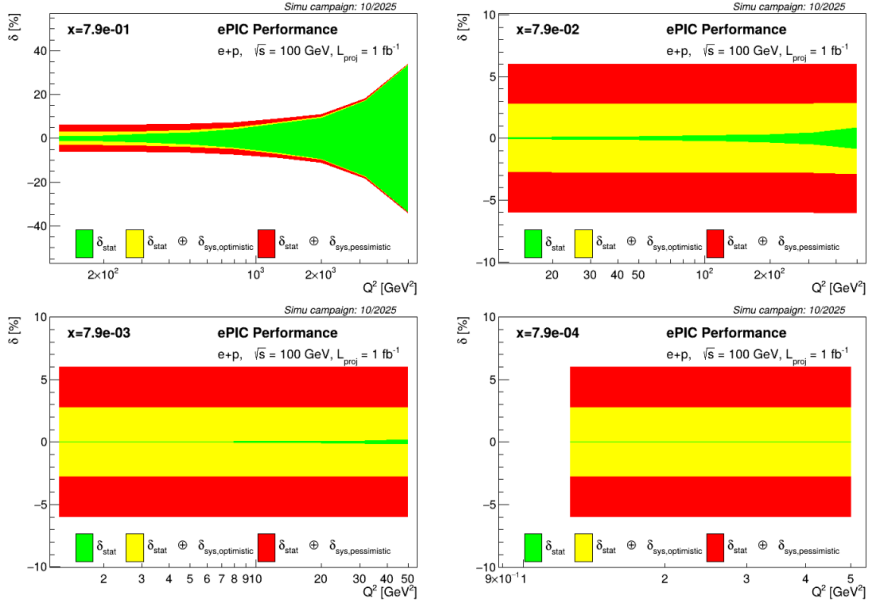
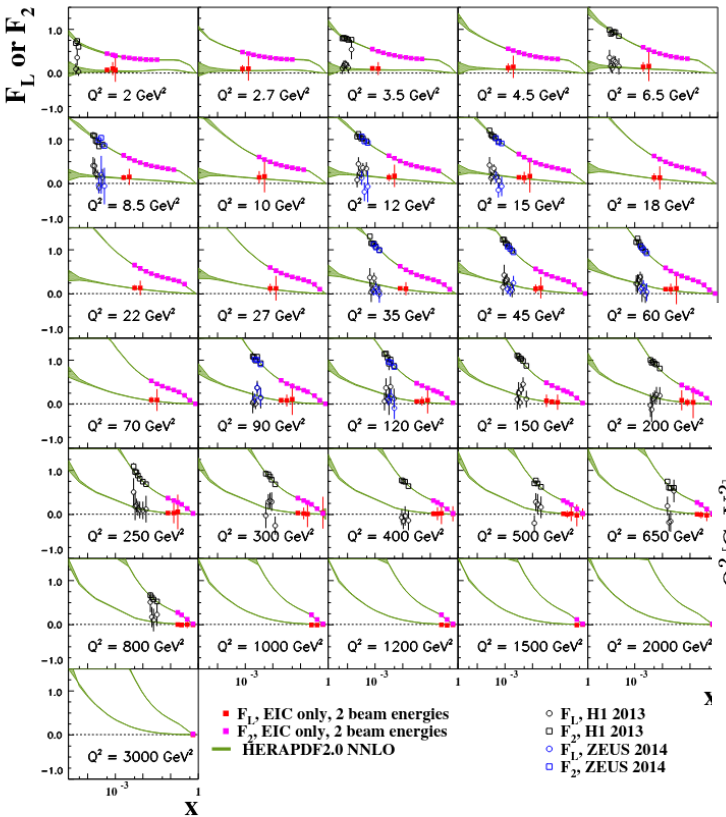


Figure 9: Cross section uncertainties for the 10x250 GeV^2 ep beam configuration as a function of Q^2 at four values of x SM update figure.

A.3

- Mainly text updates



igure 11: Simulated extractions of F_2 and F_L for fits with the two standard EIC early science beam energy onfigurations of $\sqrt{s} = 100$ and 72 GeV. The error bars on the points represent the total experimental ncertainties. For the F_L measurements, points with absolute uncertainties larger than 0.5 are removed or visual clarity but all points for the corresponding F_2 measurements are shown.

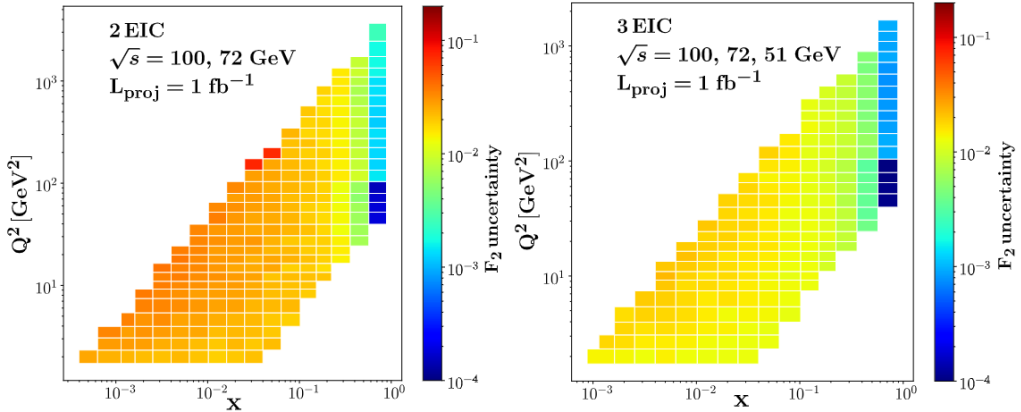


Figure 14: Absolute uncertainties on the simulated early science F_2 measurements, corresponding to the two (left) and three (right) beam energy configurations, with the colors indicating the absolute uncertainties.

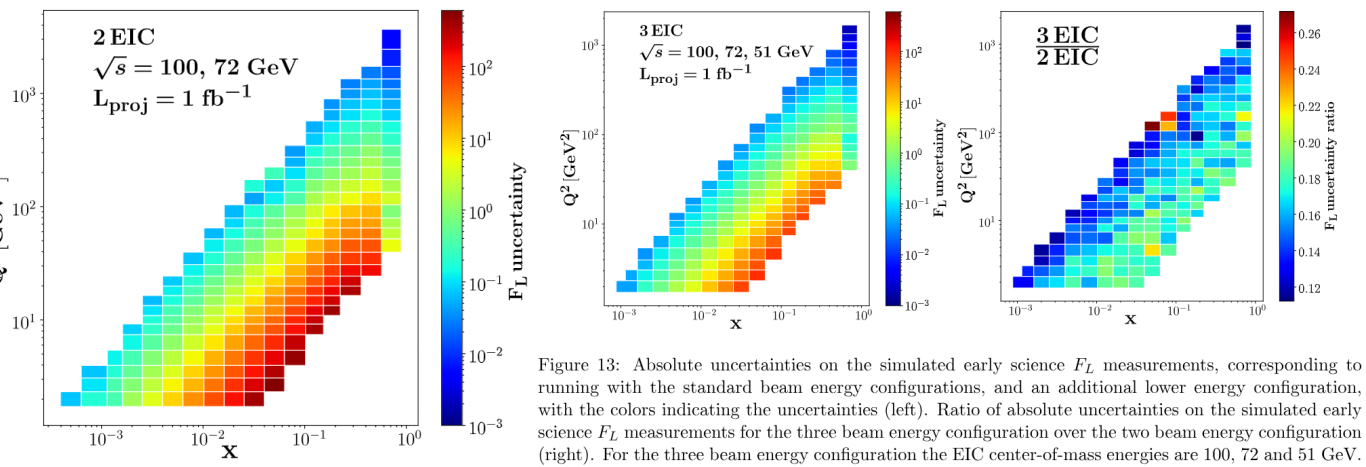


Figure 13: Absolute uncertainties on the simulated early science F_L measurements, corresponding to running with the standard beam energy configurations, and an additional lower energy configuration, with the colors indicating the uncertainties (left). Ratio of absolute uncertainties on the simulated early science F_L measurements for the three beam energy configuration over the two beam energy configuration (right). For the three beam energy configuration the EIC center-of-mass energies are 100, 72 and 51 GeV. For the two beam energy configuration the EIC center-of-mass energies are 100 and 72 GeV. Note that different methods are applied in the two cases, with all three beam energies required to be available in the Rosenbluth fits for the '3 EIC' extraction and just two required for the '2 EIC' case.

A.4

- Mainly text updates

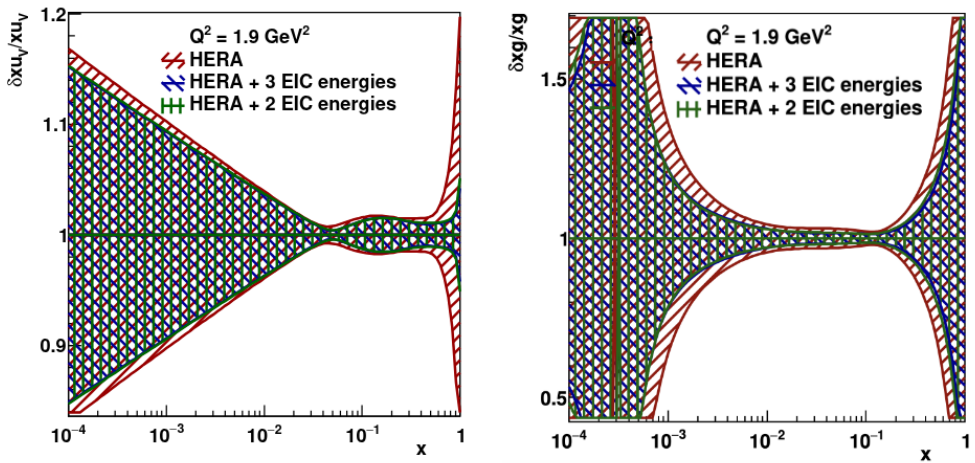


Figure 15: Impact of simulated EIC data on the NNLO collinear parton distributions of the proton, shown on a logarithmic x scale. The bands show relative experimental uncertainties for the up-valence and gluon distributions for $Q^2 = 1.9\,\mathrm{GeV}^2$. The HERAPDF2.0NNLO total uncertainties are compared with results in which simulated EIC data for different beam energy scenarios are also included in the HERAPDF2.0NNLO fitting framework. Beam settings are $\sqrt{s} = 100$ and 72 GeV for the two-beam case, with $\sqrt{s} = 51$ GeV added for the three-beam case.

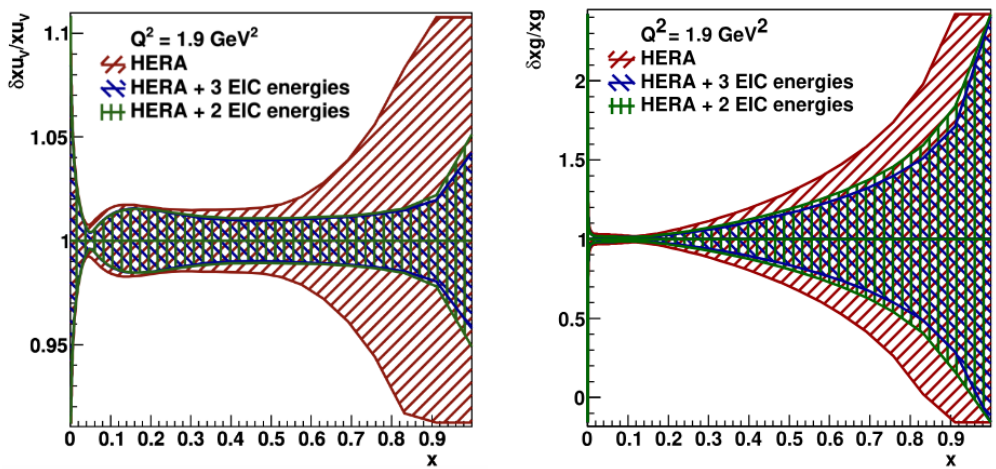


Figure 16: Impact of simulated EIC data on the NNLO collinear parton distributions of the proton, shown on a linear x scale. The bands show relative experimental uncertainties for the up-valence and gluon distributions for $Q^2 = 1.9\,\mathrm{GeV}^2$. The HERAPDF2.0NNLO total uncertainties are compared with results in which simulated EIC data for different beam energy scenarios are also included in the HERAPDF2.0NNLO fitting framework. Beam settings are $\sqrt{s} = 100$ and 72 GeV for the two-beam case, with $\sqrt{s} = 51$ GeV added for the three-beam case.

A.5

- Cleaning up text, minor additions, add references

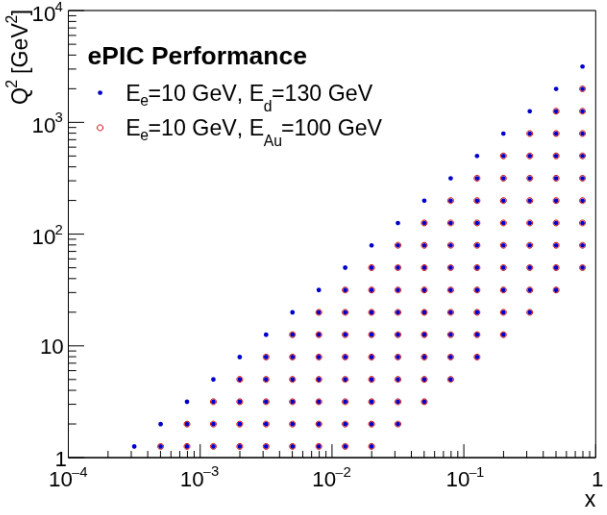


Figure 17: Kinematic coverage of inclusive cross section measurements for the EIC early science 10×130 GeV^2 $e+d$ and 10×100 GeV^2 $e+$Au beam energy configurations, for five bins per decade in x and Q^2, with $Q^2 > 1$ GeV^2 and $0.01 < y < 0.95$.

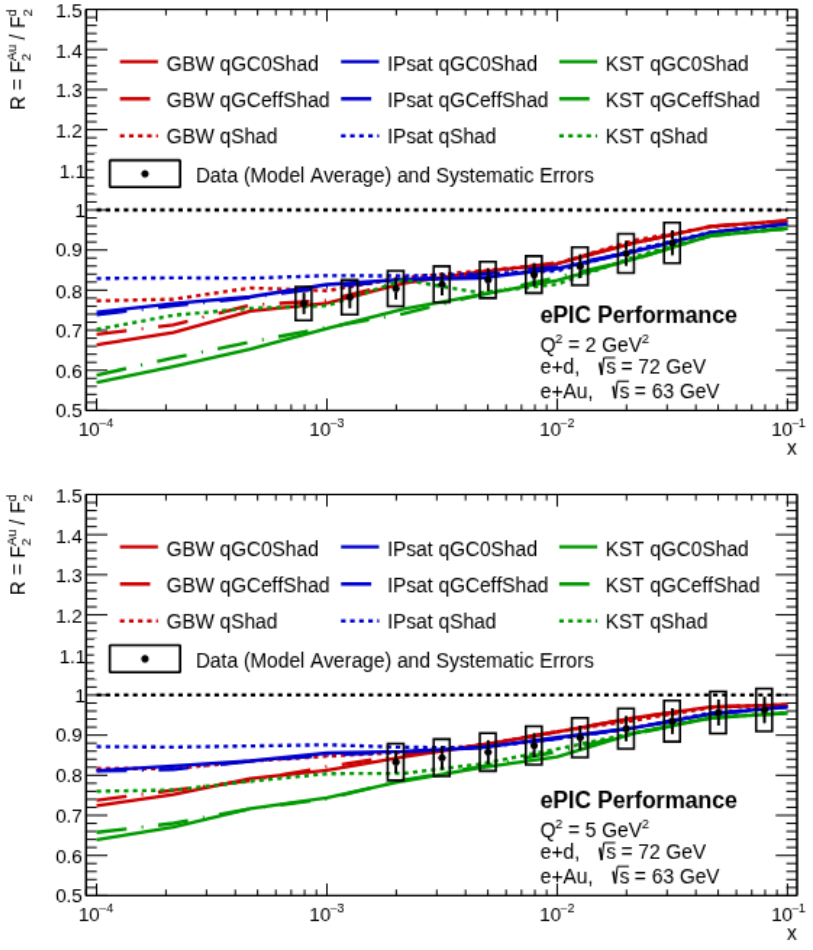


Figure 18: Projected measurements of the per-nucleon F_2 structure function ratio for ^{197}Au to the deuteron as a function of x, at $Q^2 = 2$ GeV^2 (top) and $Q^2 = 5$ GeV^2 (bottom). The error bars indicate an optimistic 3.4 % estimate for the total measurement uncertainty, and the boxes a pessimistic 5.5 % estimate. The points are overlaid on predictions from different phenomenological models of the dipole cross section (GBW, IPsat, KST), for calculations using only the lowest $|q\bar{q}\rangle$ component of the photon (qShad) and for two calculations using the higher Fock component of the photon containing gluons (qGC0Shad, qGCeffShad) [15]. The points are positioned at the average R value of the nine model predictions.

A.6

- Figures to be updated w/ recent campaign and more readable text

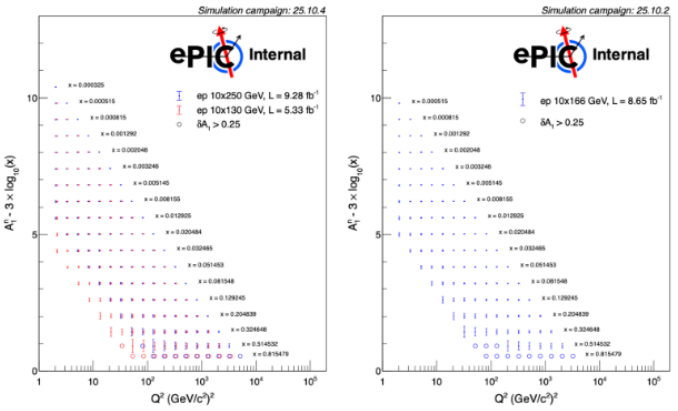


Figure 19: Projected measurements of A_1^p (left) and A_1^n (right) with estimated statistical uncertainty.

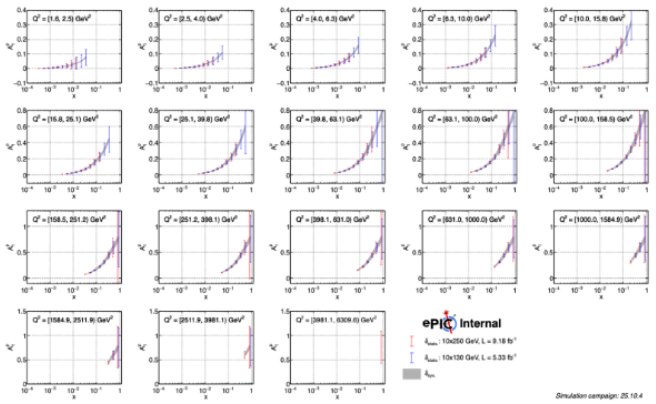


Figure 20: Projected measurements of A_1^p with estimated statistical and systematic uncertainties for each Q^2 bin. (Will make figure text bigger)

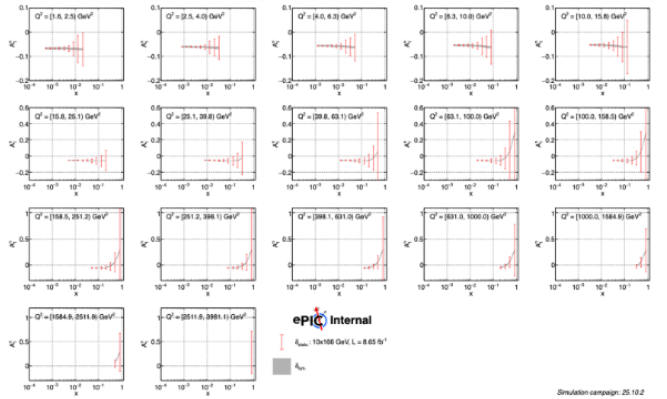


Figure 21: Projected measurements of A_1^n with estimated statistical and systematic uncertainties for eac Q^2 bin. (Will make figure text bigger)

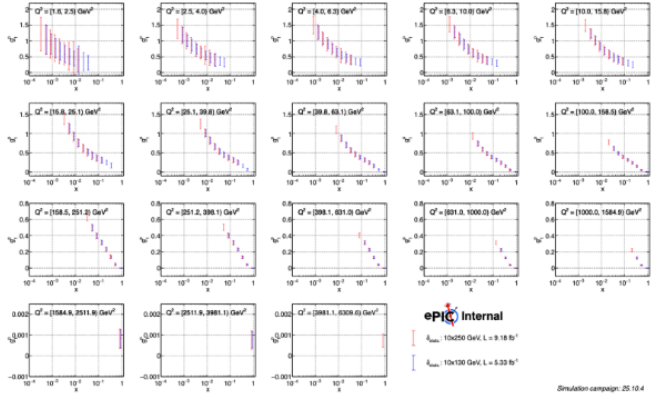


Figure 22: Projected measurements of g_1^p with estimated statistical uncertainties for each Q^2 bin. (Will make figure text bigger)

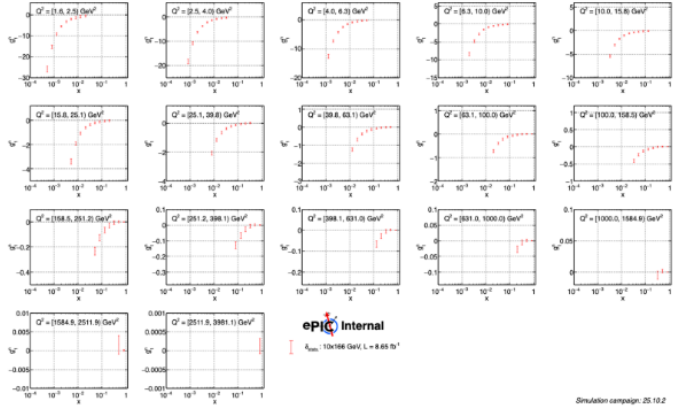


Figure 23: Projected measurements of g_1^n with estimated statistical uncertainties for each Q^2 bin. (Wil make figure text bigger)