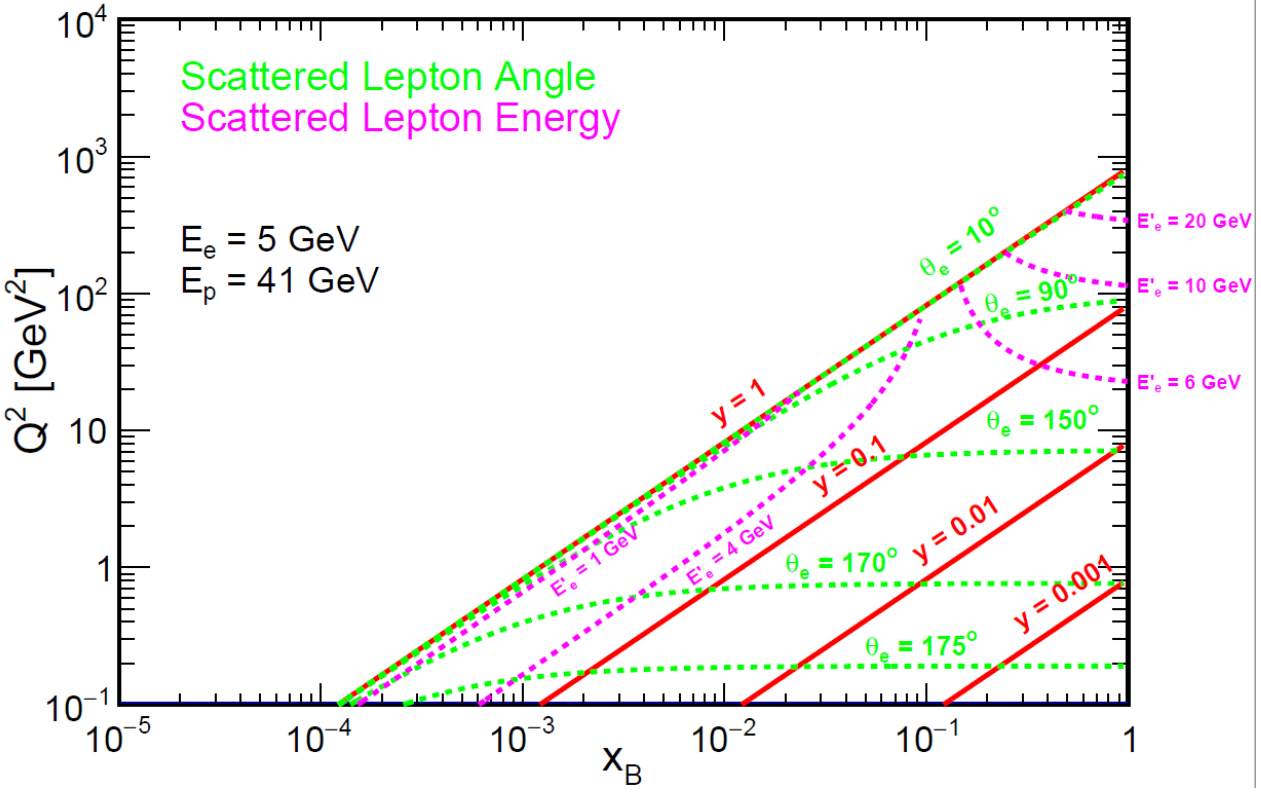
Electron Acceptance
&
Unpolarized e-p NC Cross Section

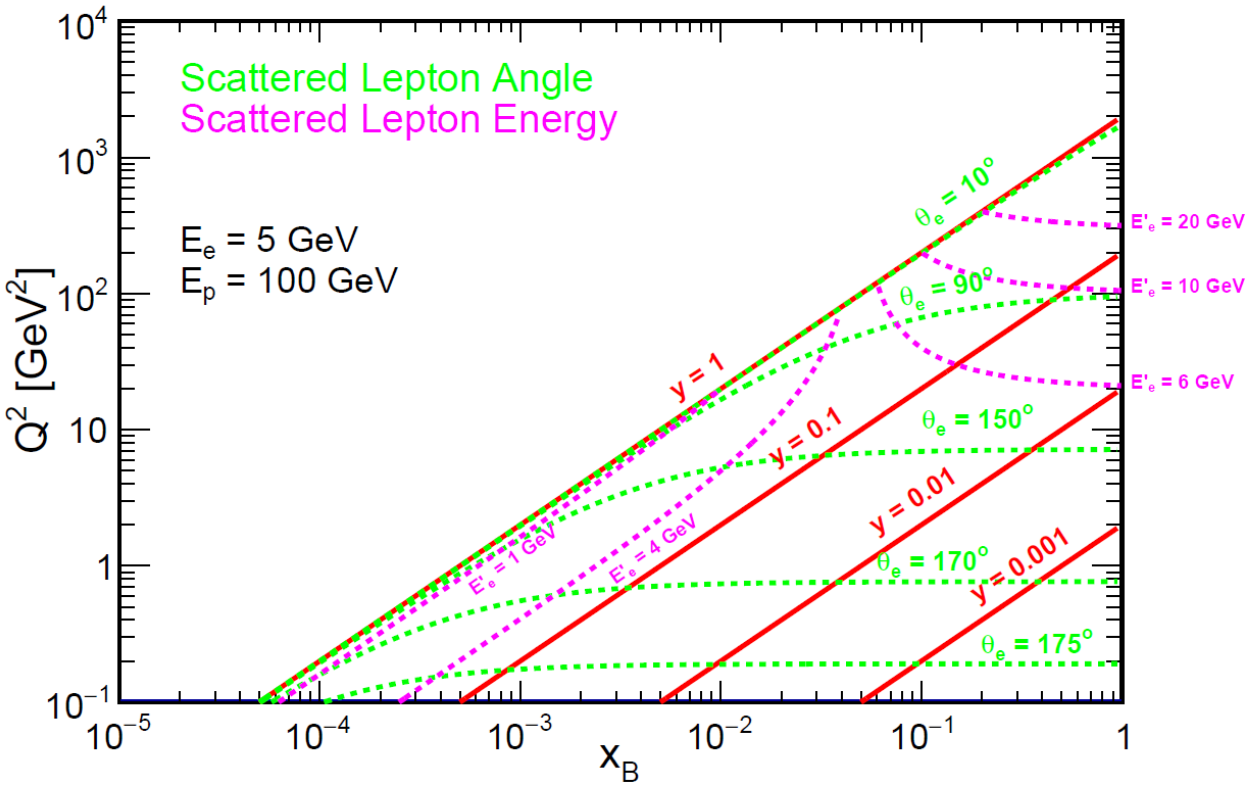
Barak Schmookler

Outline

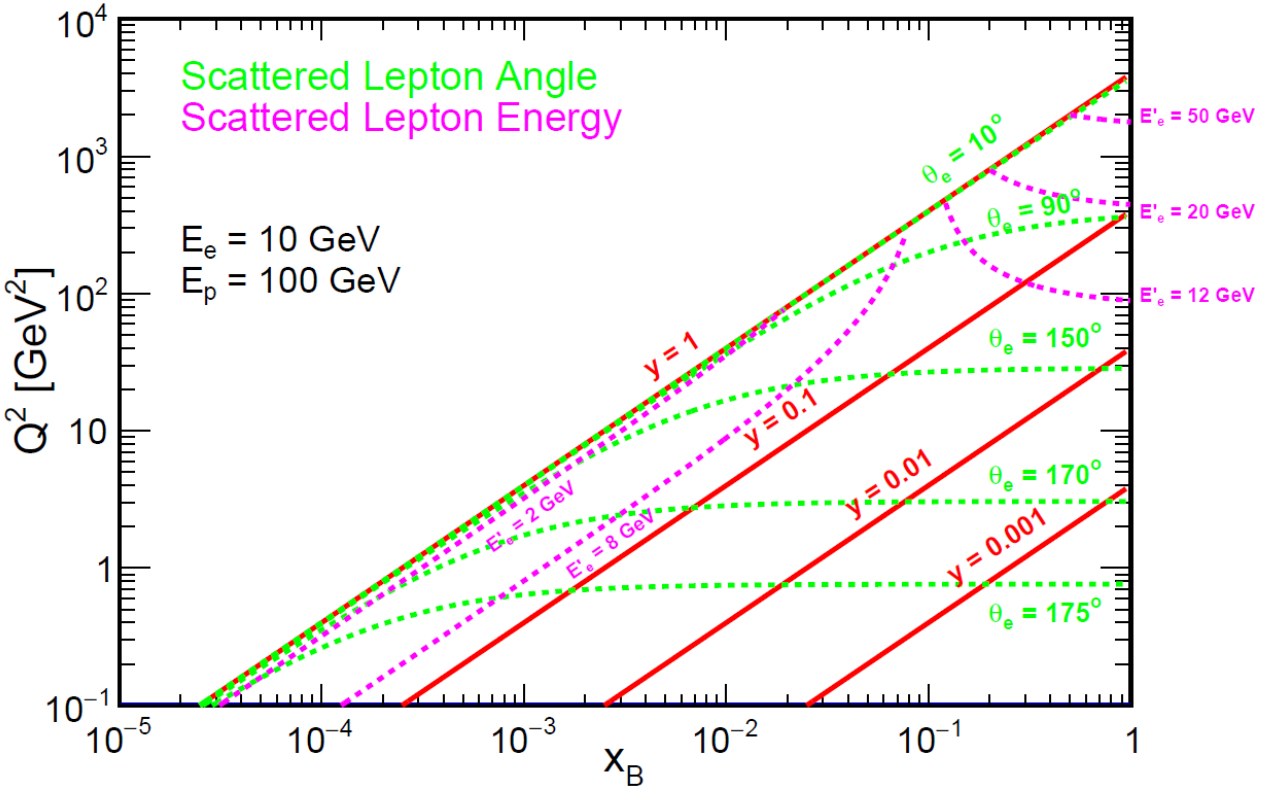
1. Review of kinematic maps provided to the detector group
2. Central arm electron acceptance
3. Unpolarized e-p NC cross section from *Pythia6* and *Djangoh* compared to theory

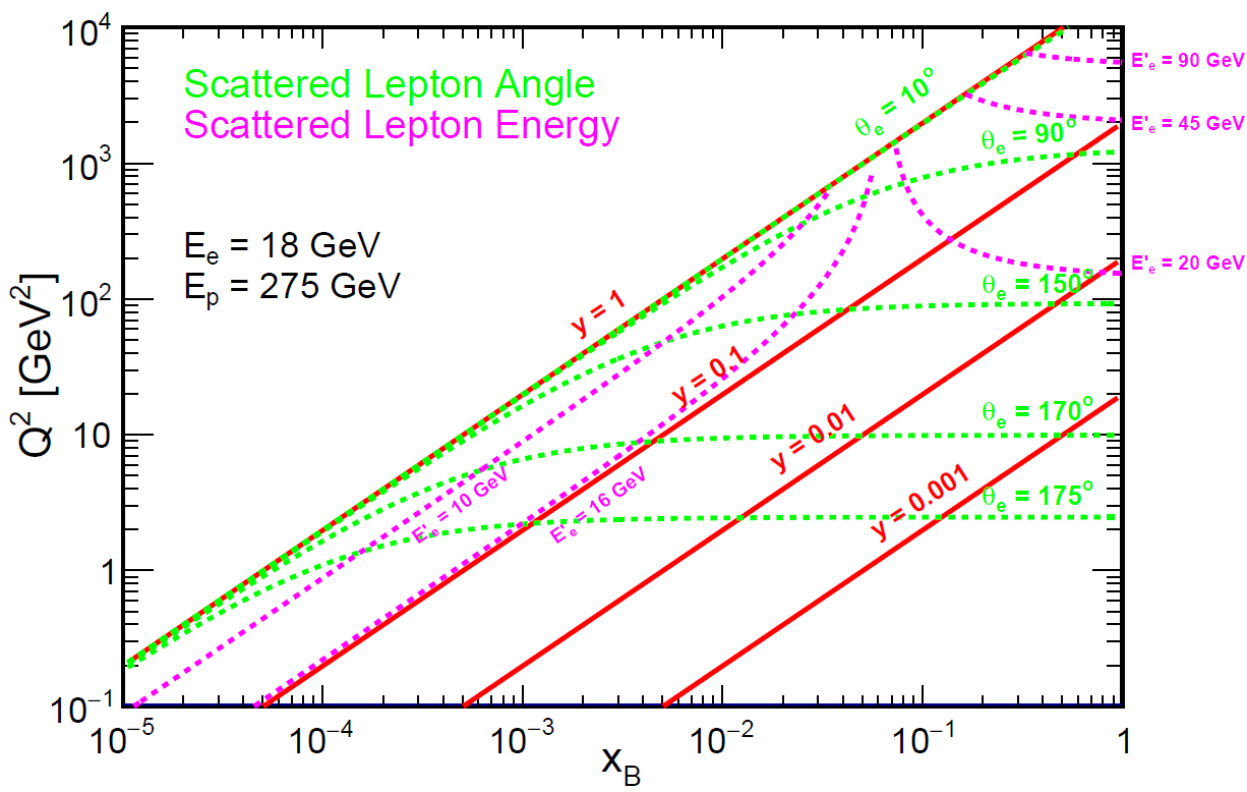
Input to the Detector Group: kinematic maps



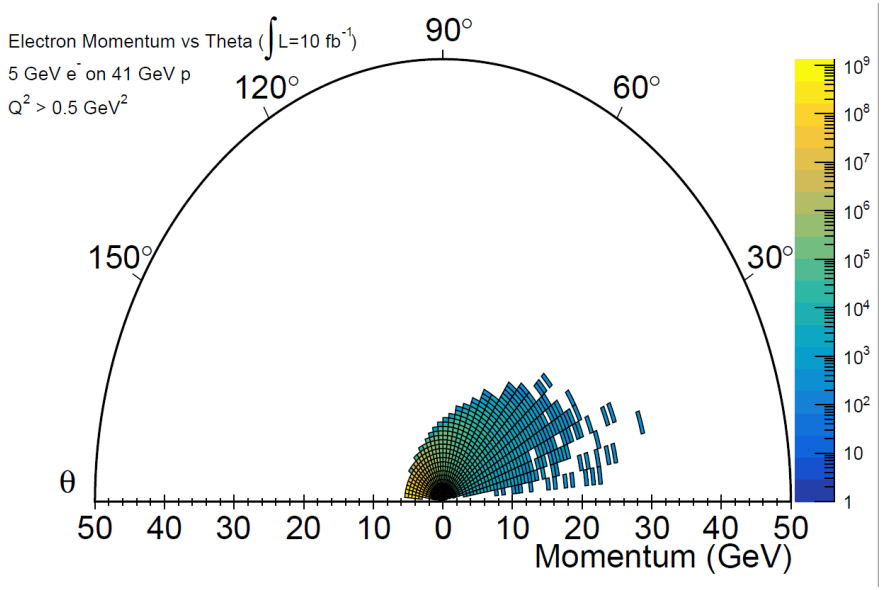


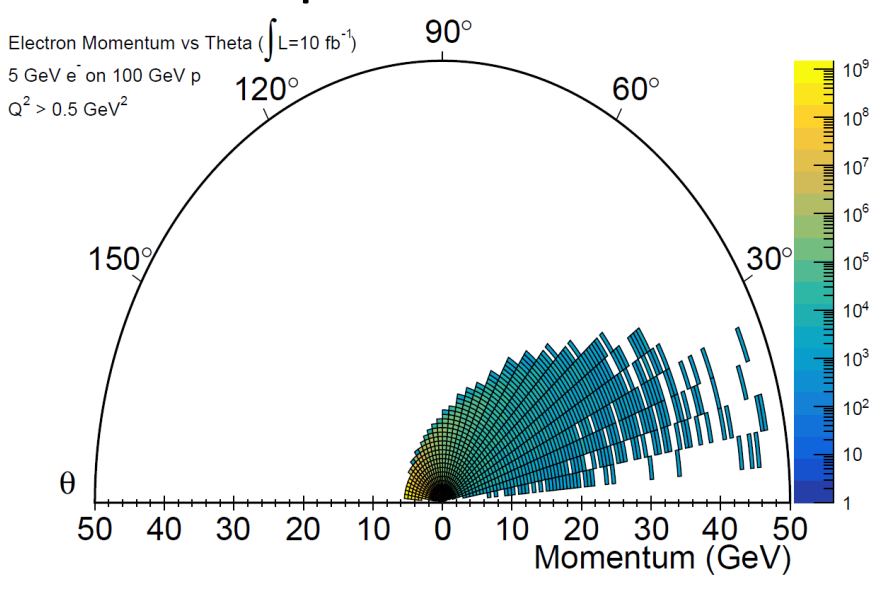
Input to the Detector Group: kinematic maps

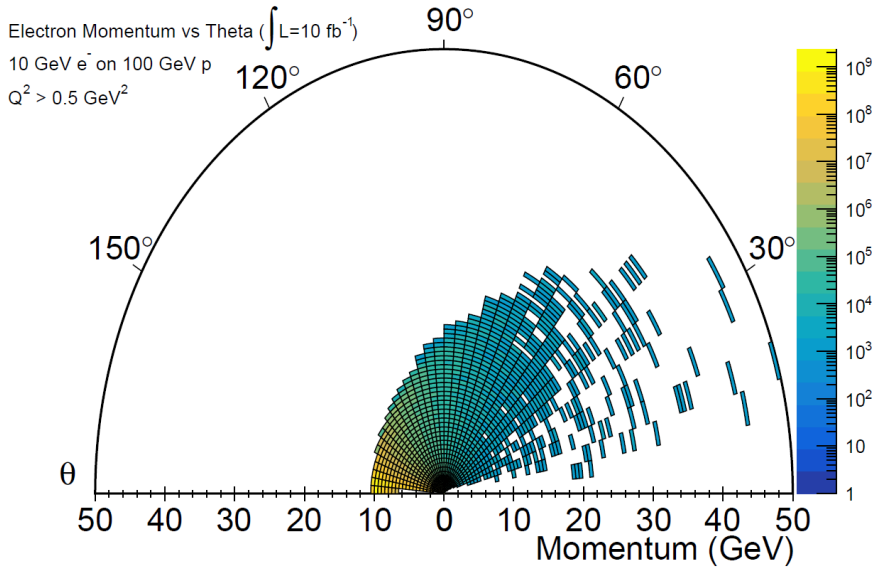


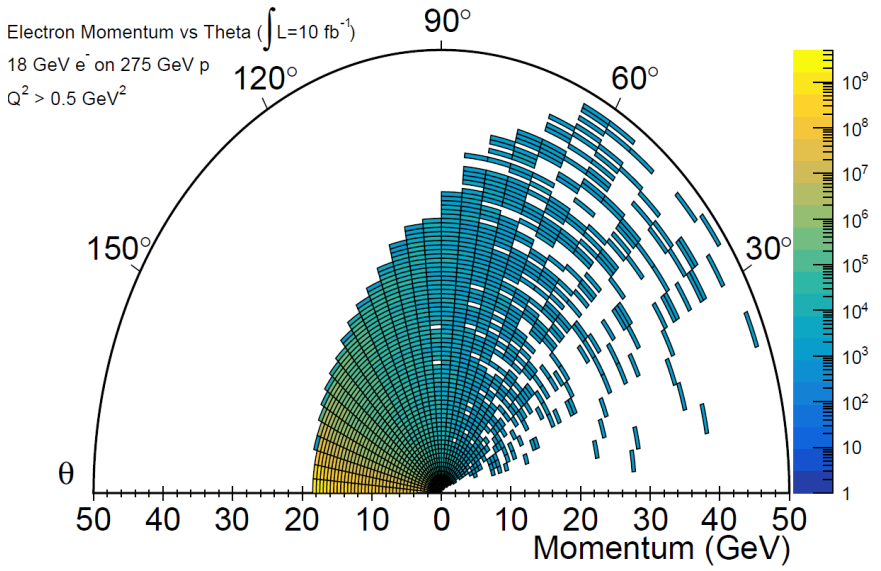


Scattered Electron kinematic maps





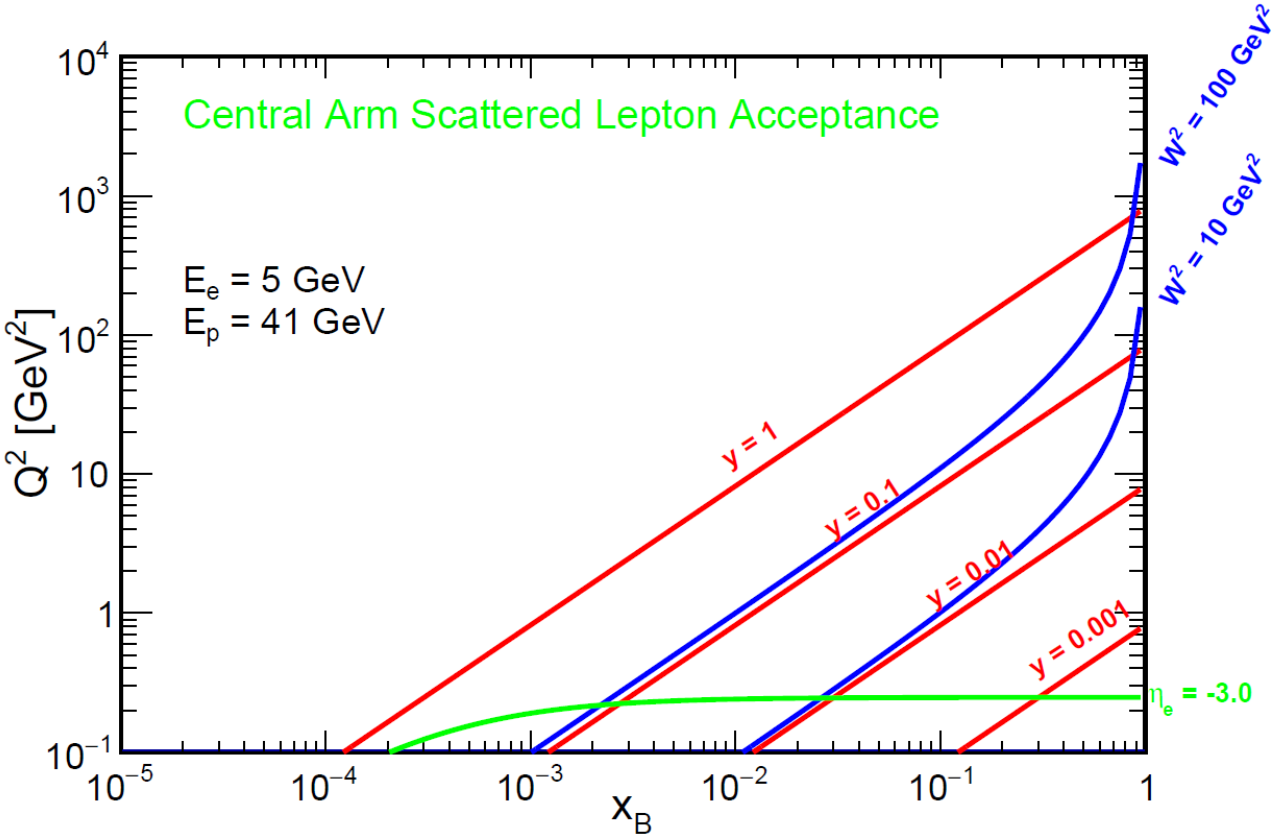


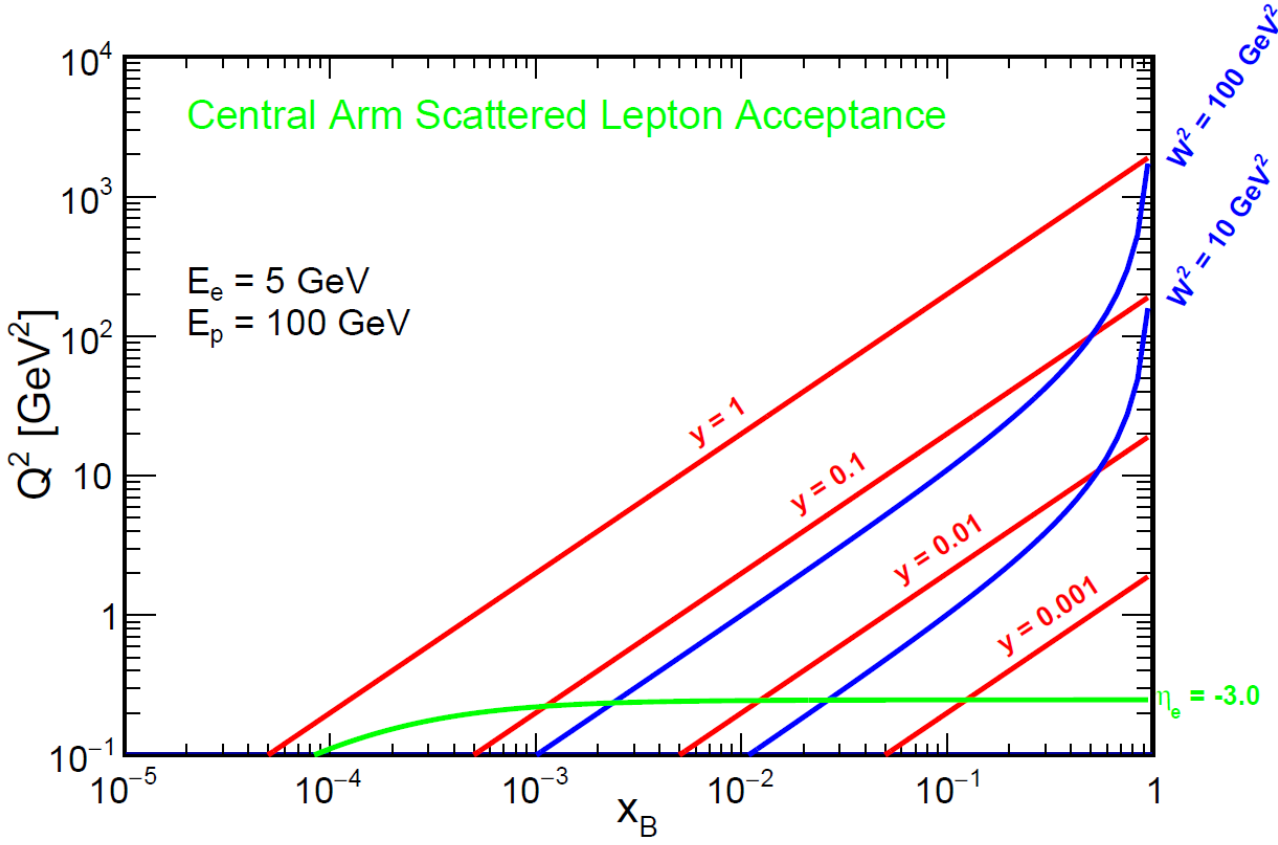


Summary of kinematic maps

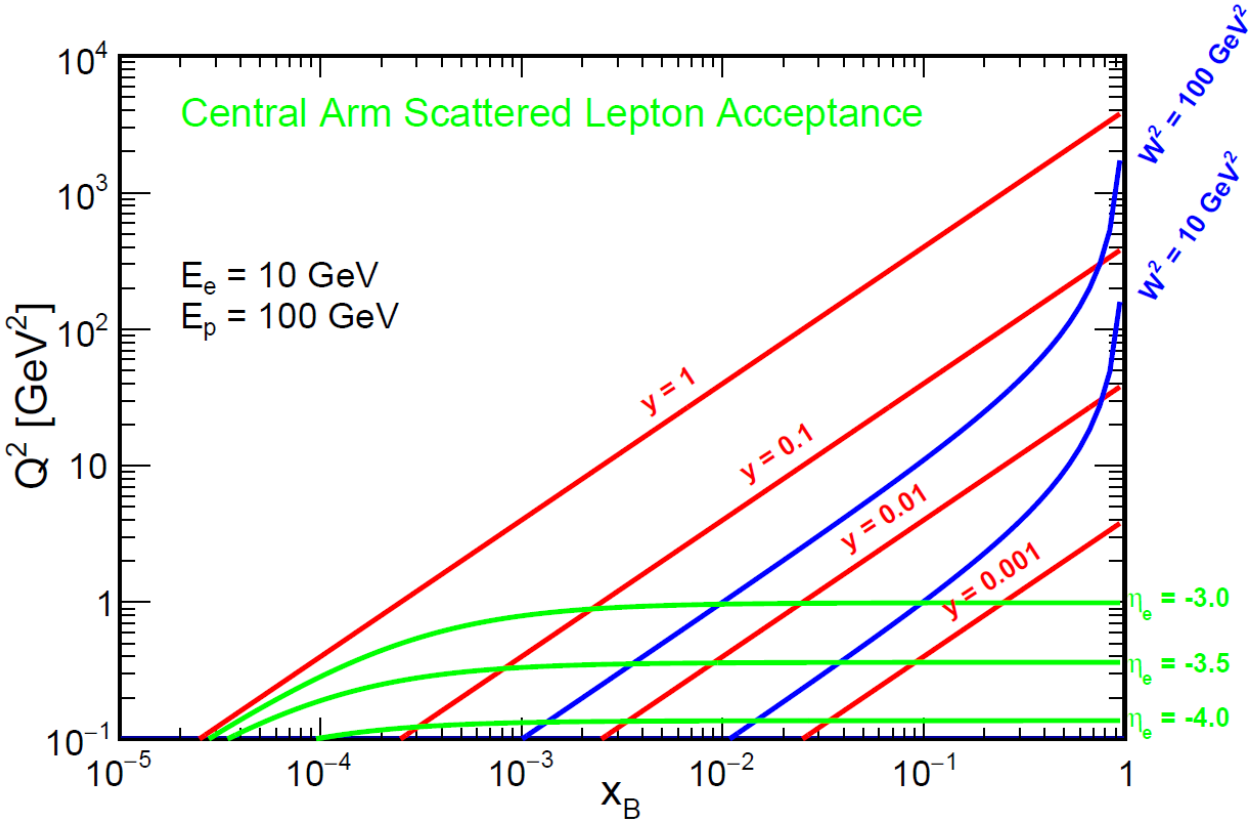
- We've created NC kinematic maps using the *PYTHIA6* and *DJANGOH* generators for electron-proton scattering for the 4 required yellow report beam energy combinations.
- The maps have been made for the scattered electron, all final-state electrons, protons, neutrons, photons, and all hadrons.
- We are now working to recreate these maps assuming a non-zero beam crossing angle (i.e. 25 mRad and 50 mRad).
- We also are using the *BeAGLE* event generator to create similar kinematic maps for eA scattering. This work will be completed this (or next) week.
- The work shown here is documented here: https://wiki.bnl.gov/eicug/index.php/Yellow_Report_Physics_Inclusive_Reactions

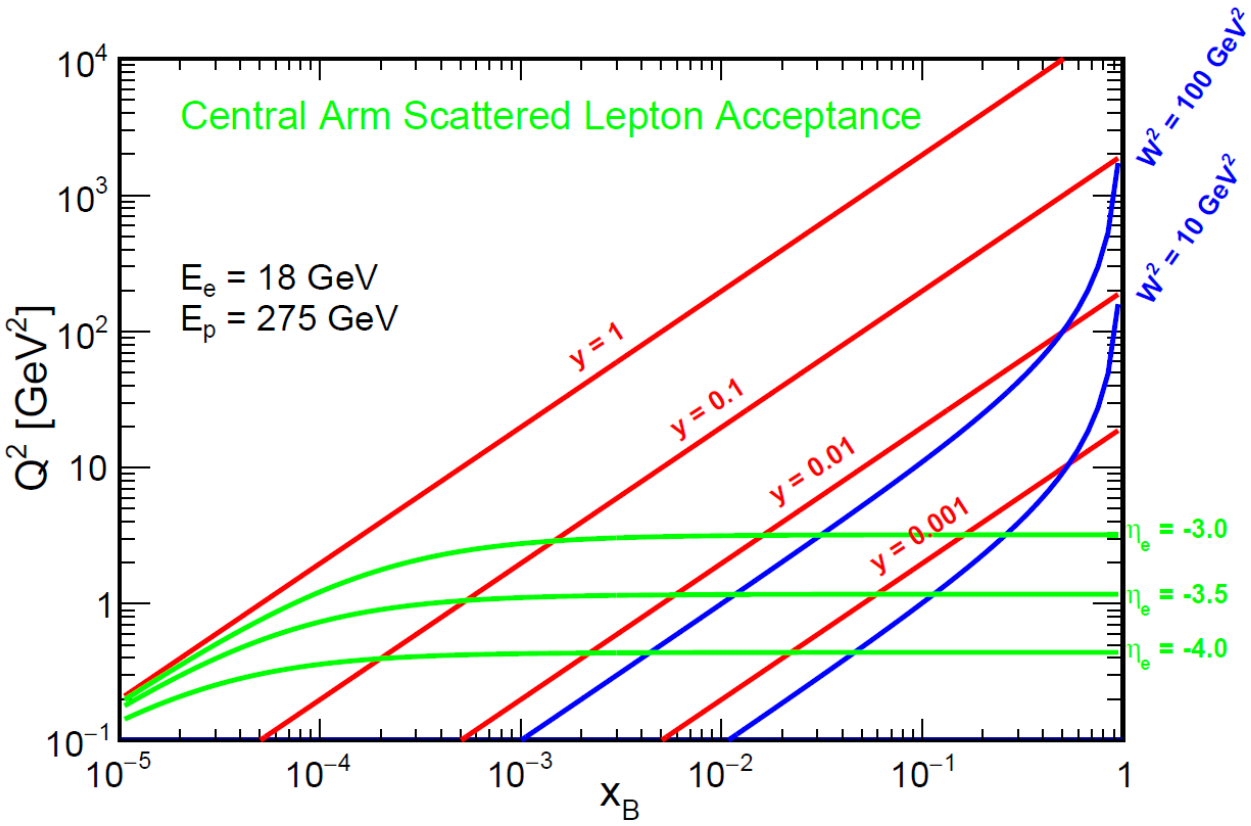
What electron acceptance do we need?



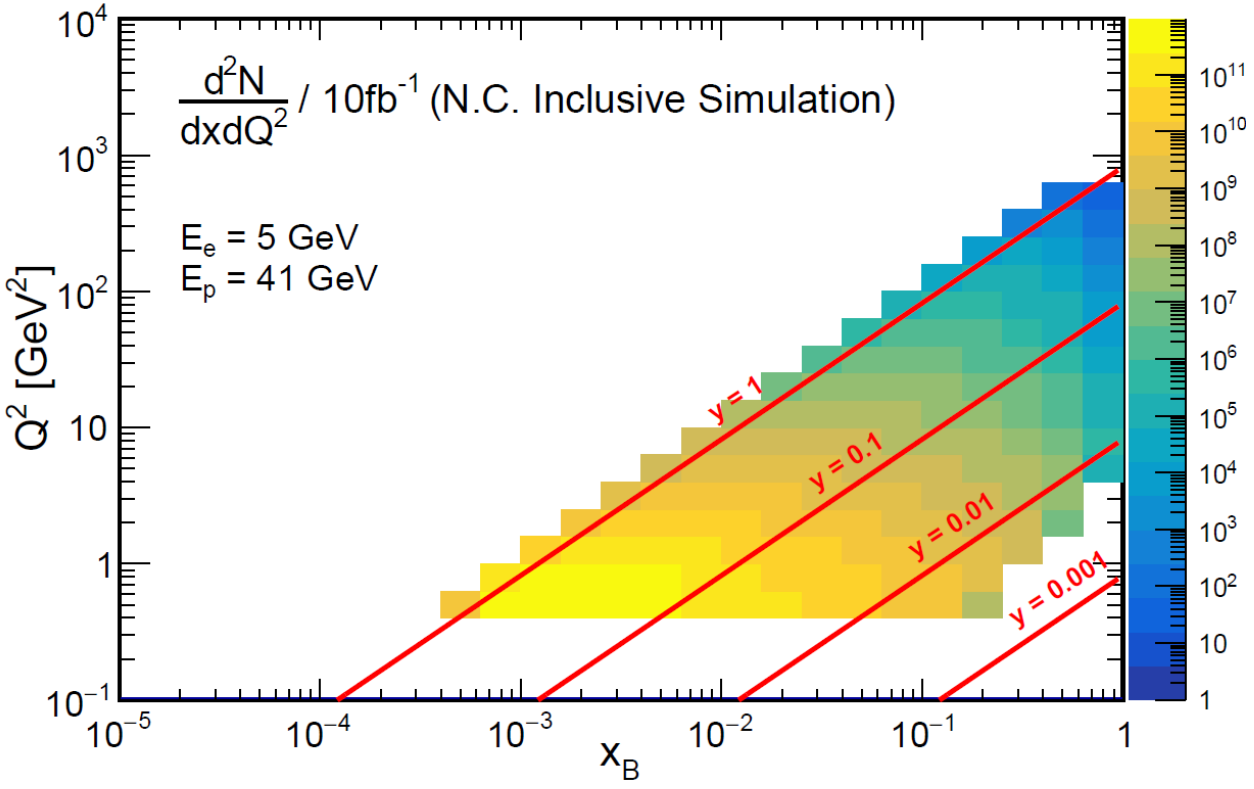


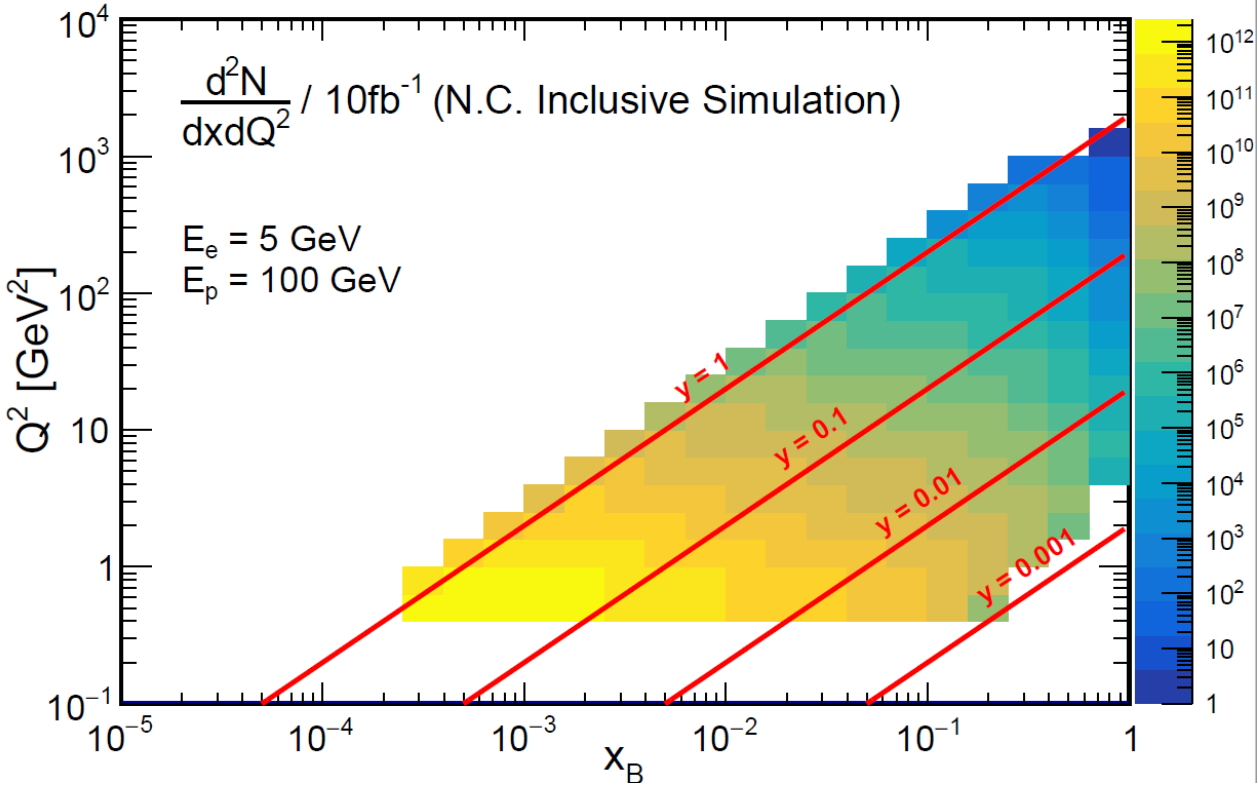
What electron acceptance do we need?



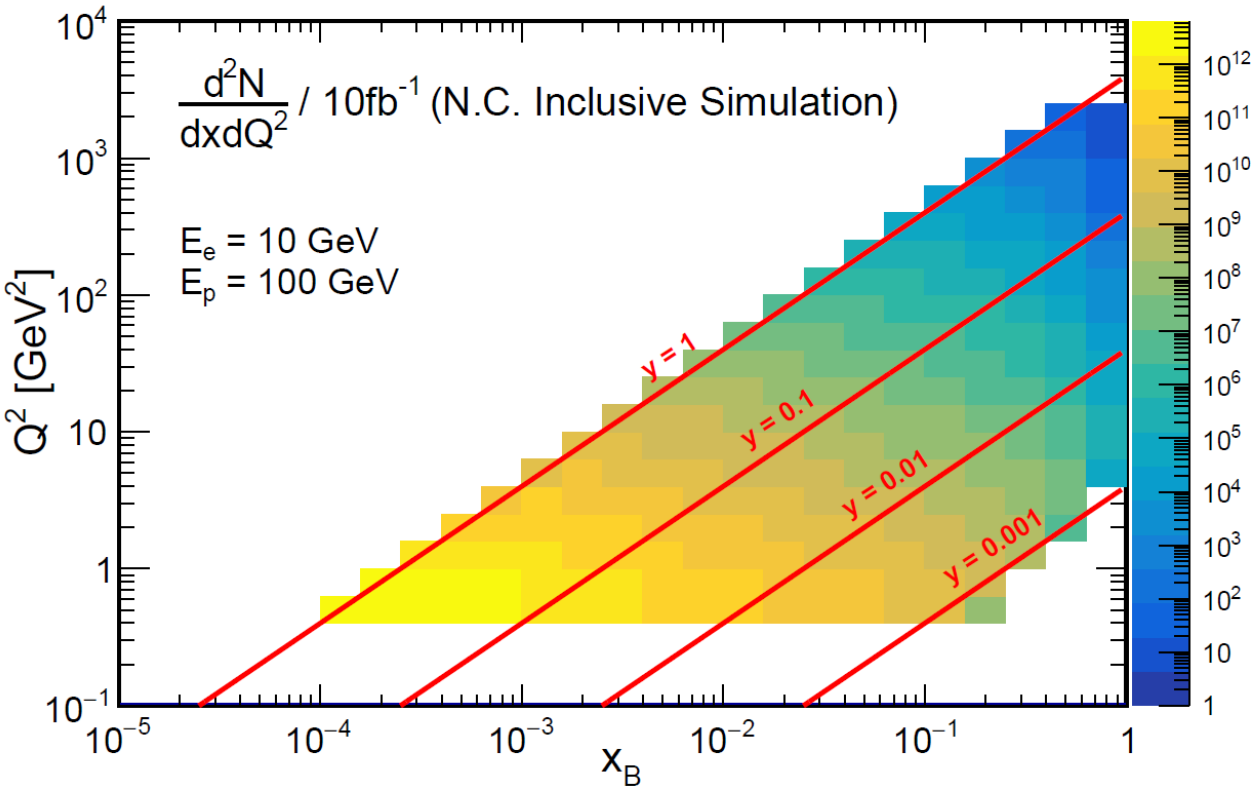


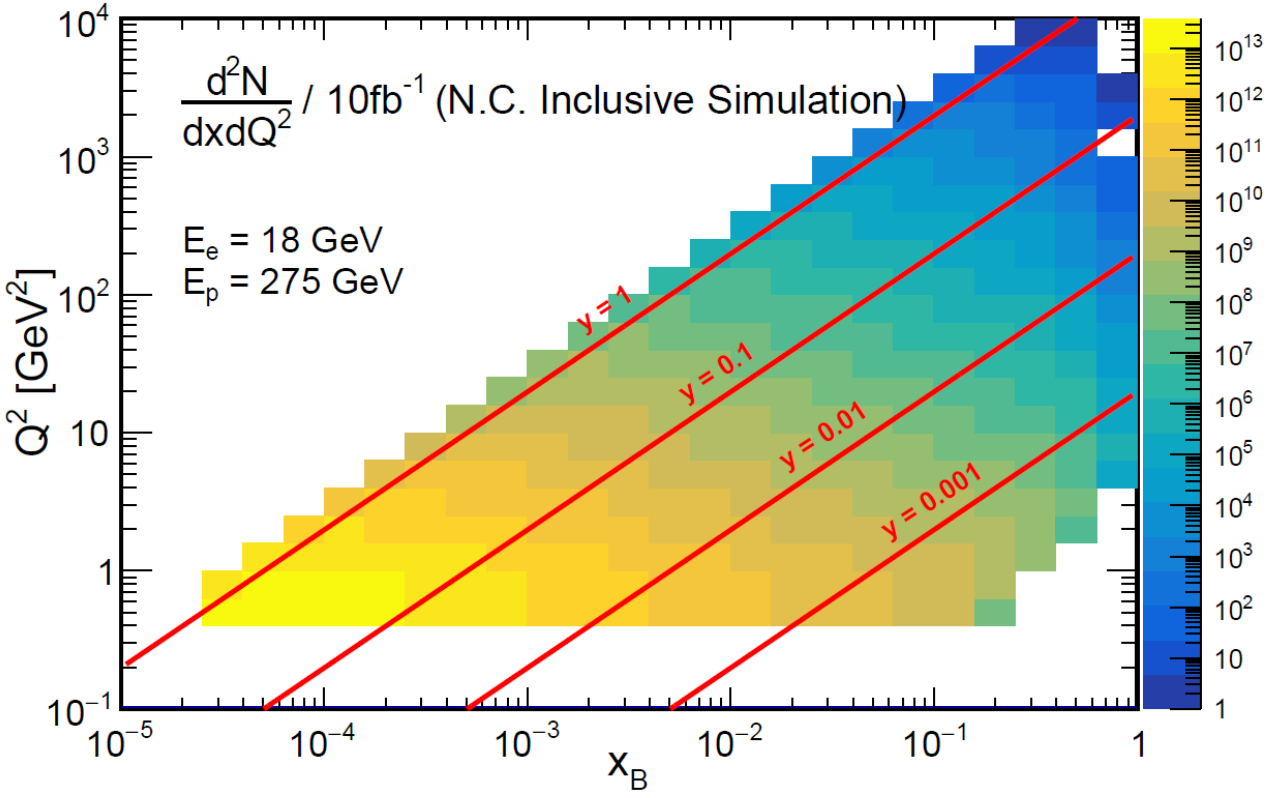
e-p Neutral-Current Cross Section



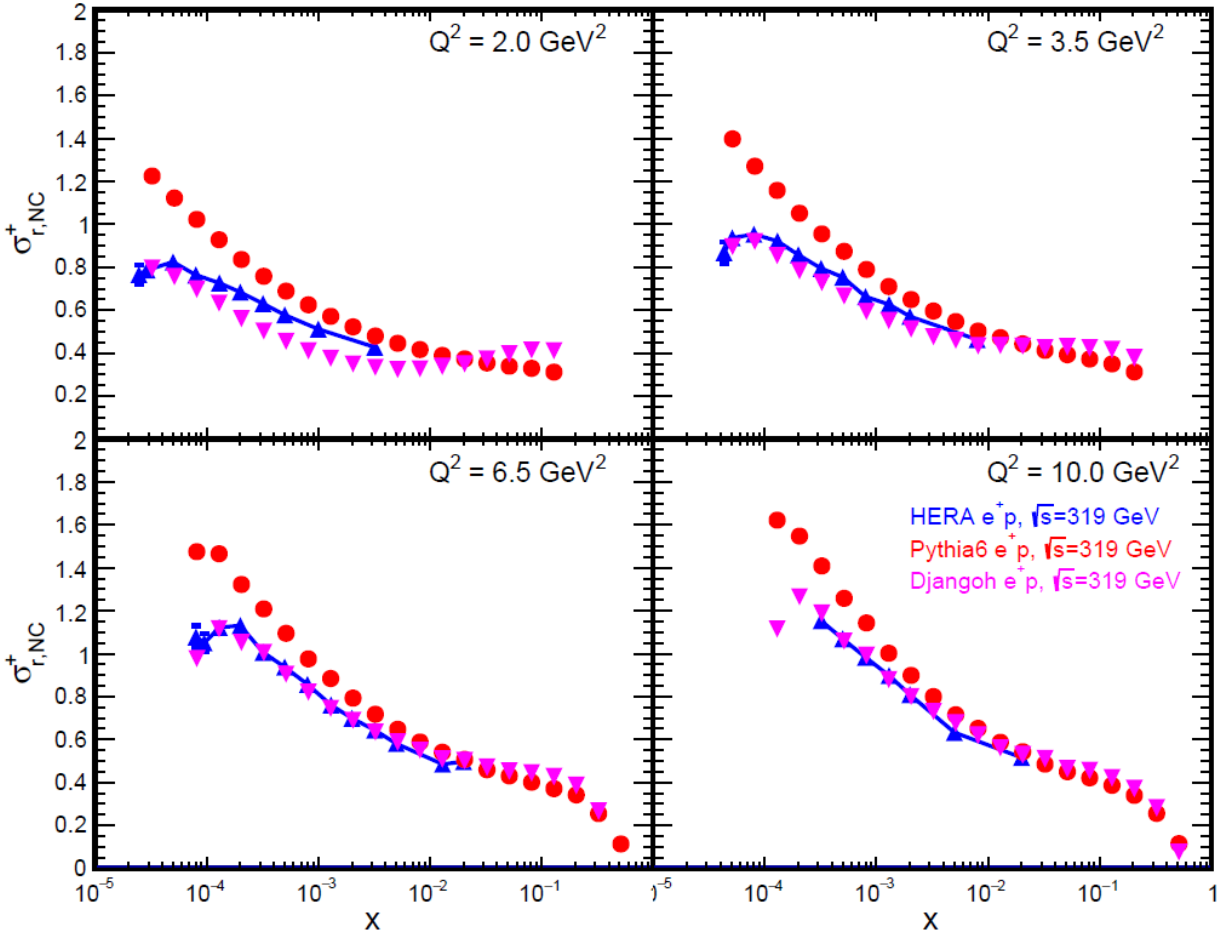


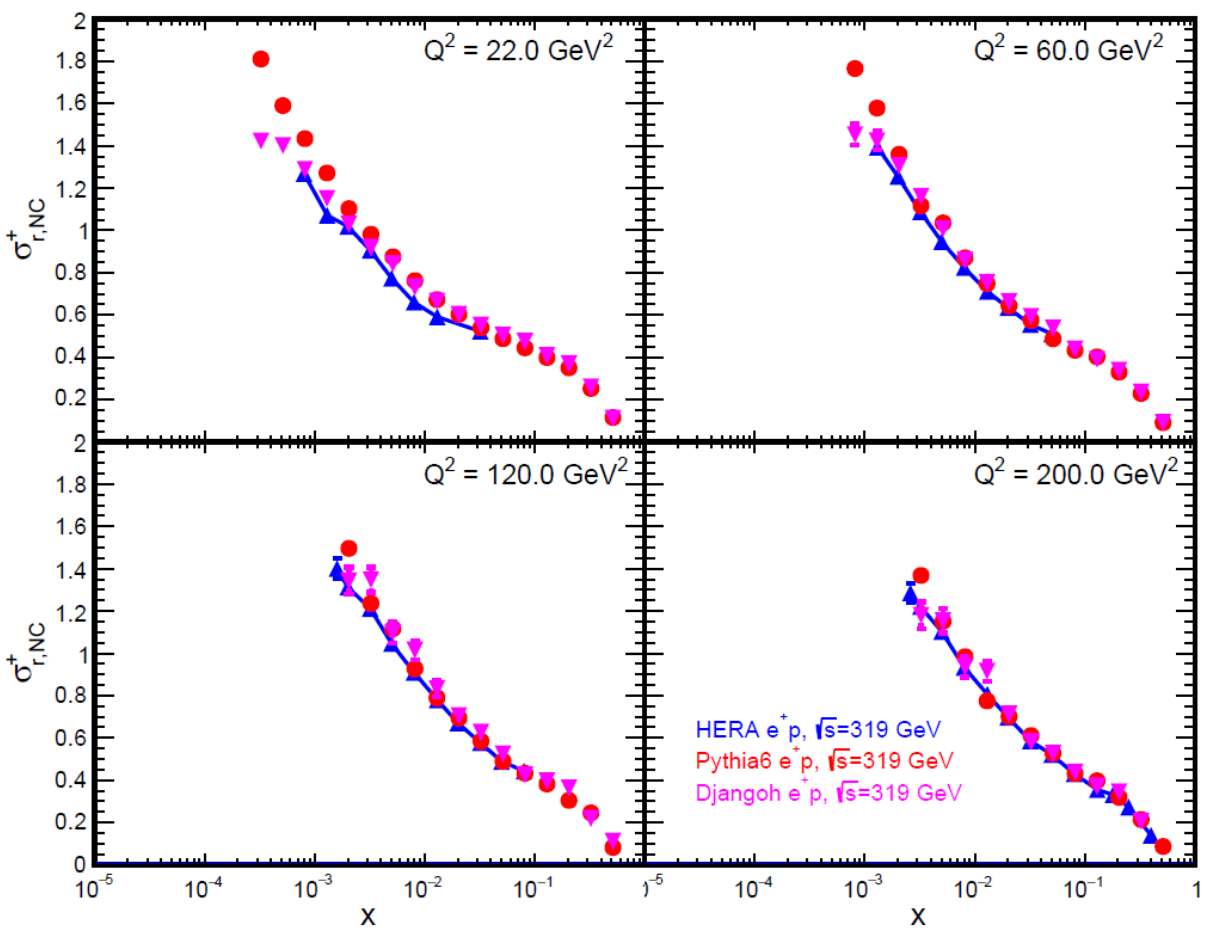
e-p Neutral-Current Cross Section



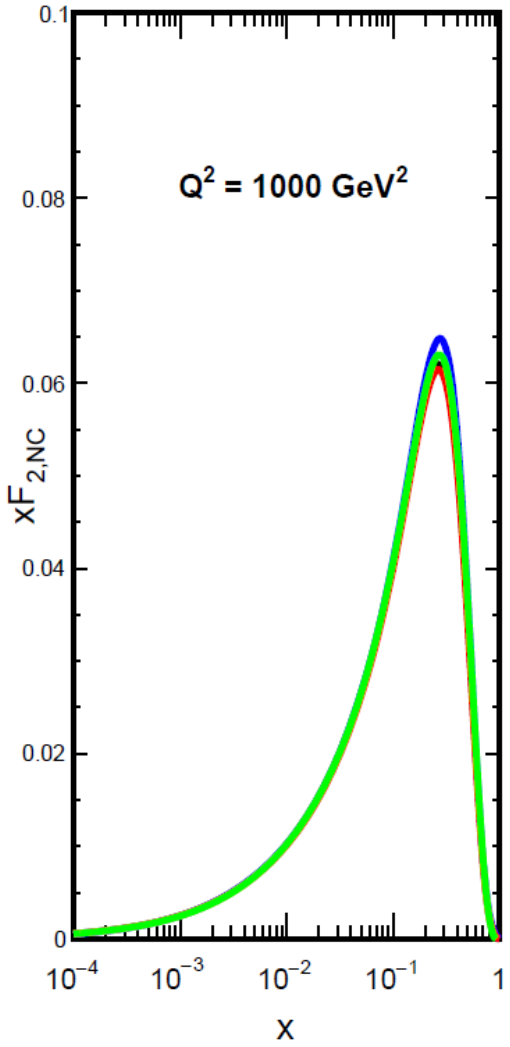


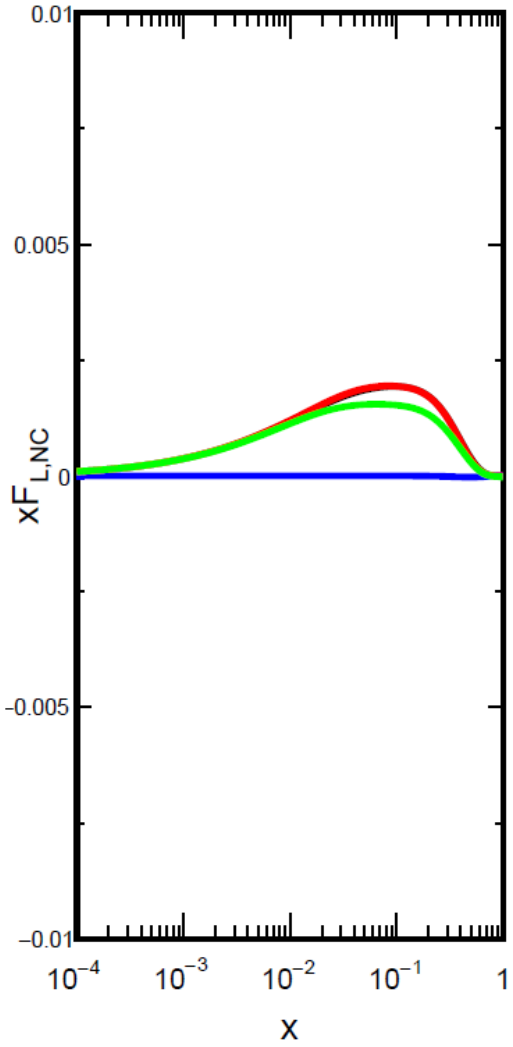
First compare generators to *HERA* Data

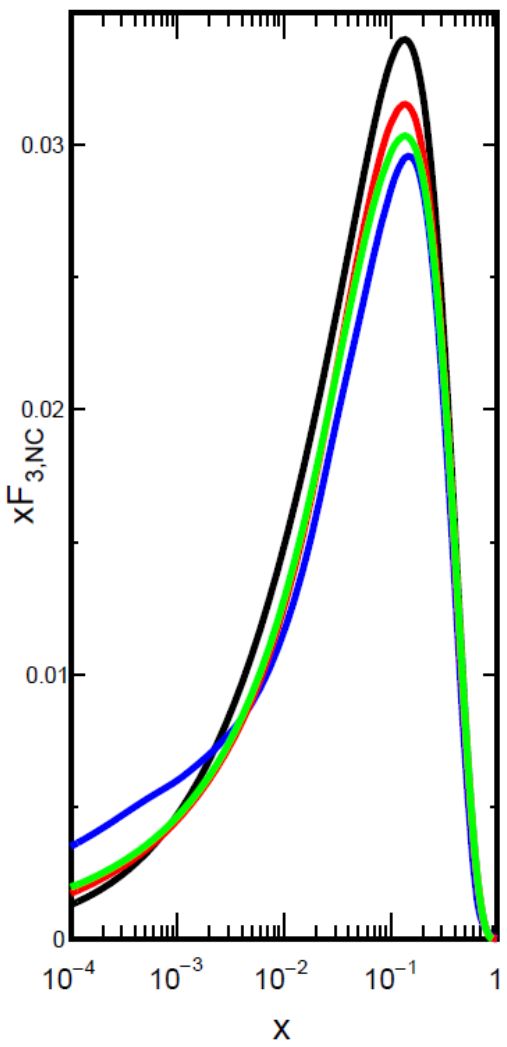




New theory code (*txgrids*) structure functions





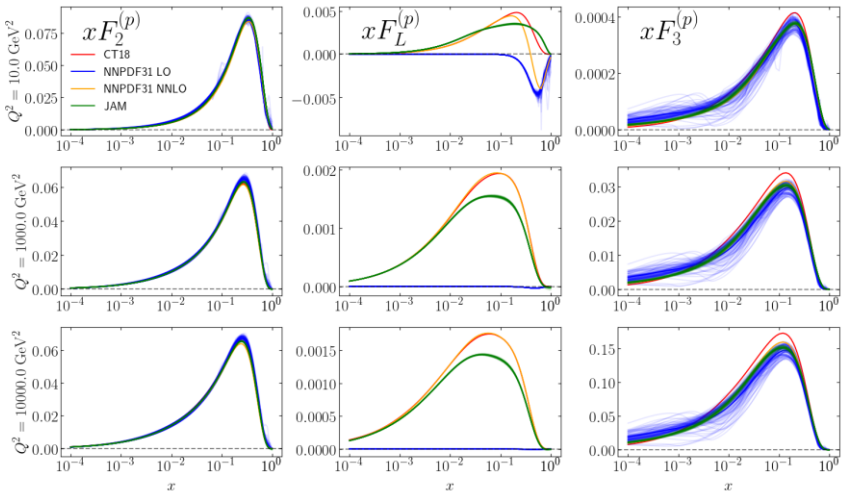


CT18ptxg

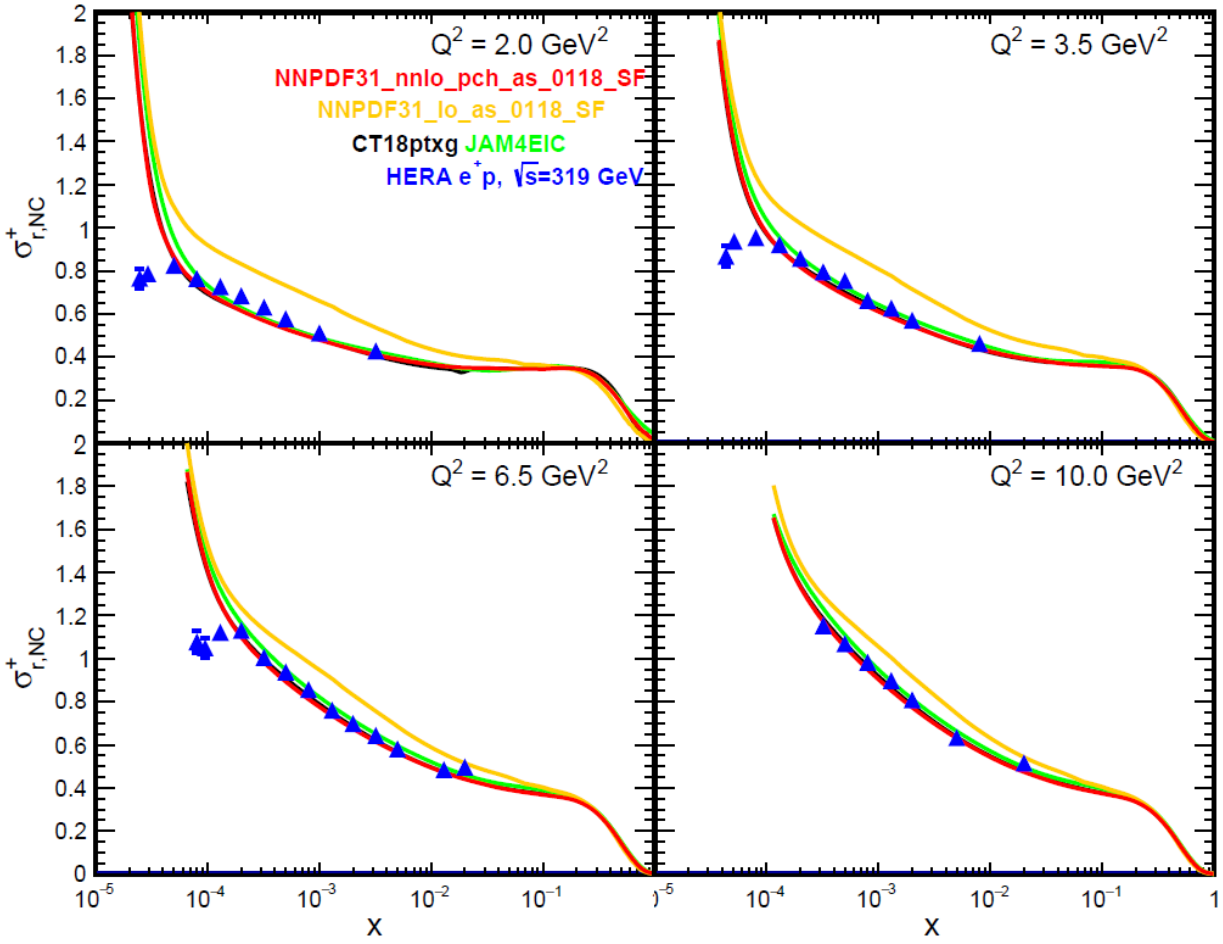
NNPDF31_lo_as_0118_SF

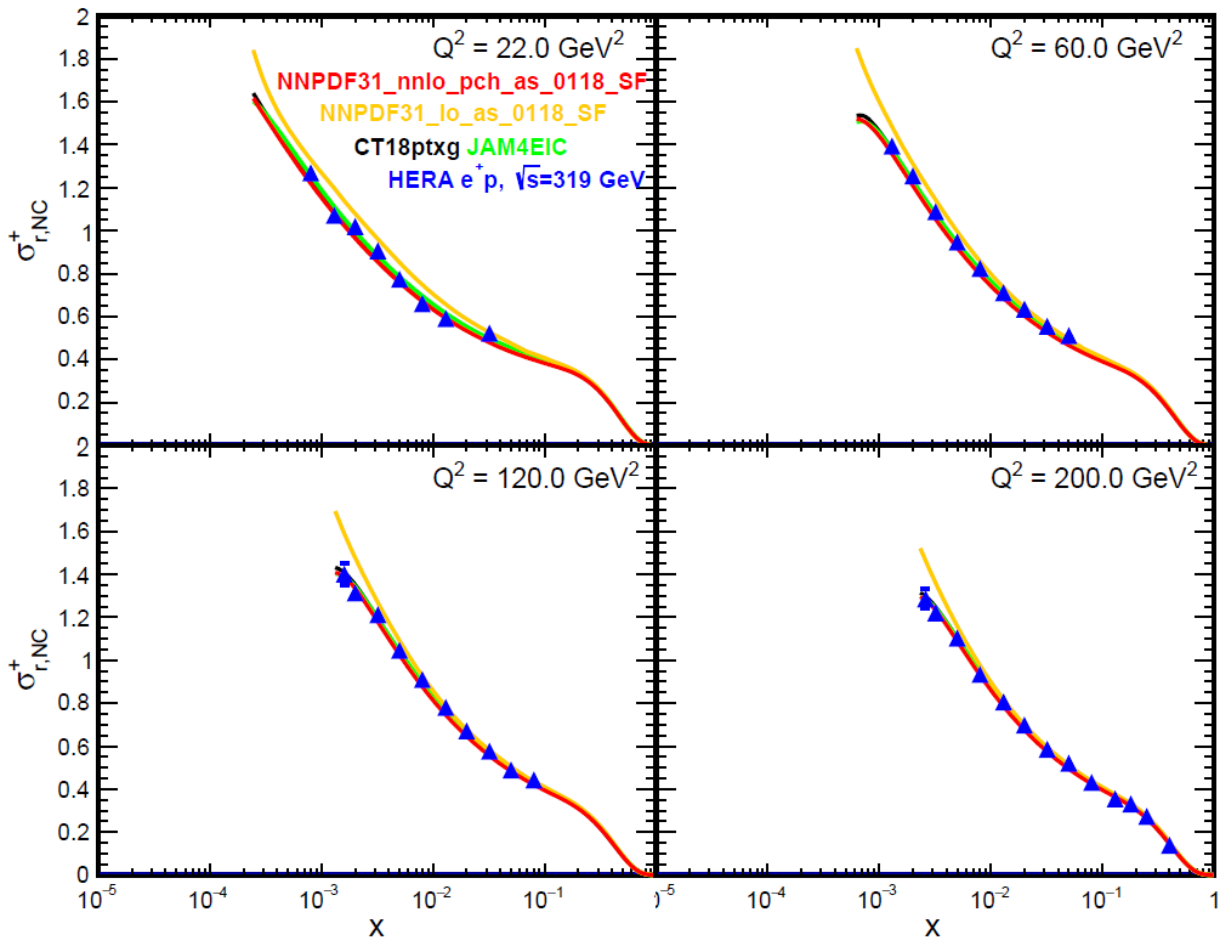
NNPDF31_nnlo_pch_as_0118_SF

JAM4EIC

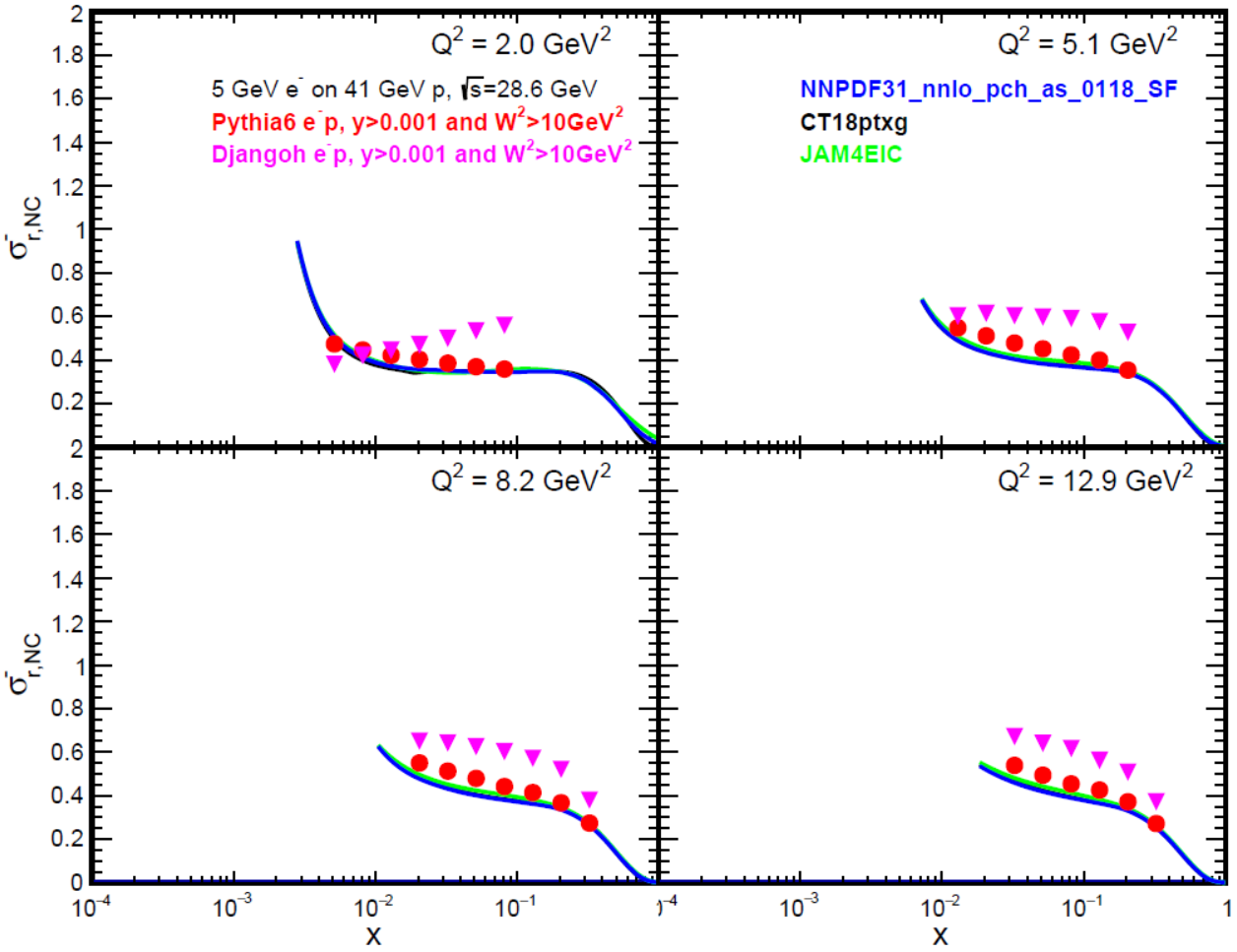


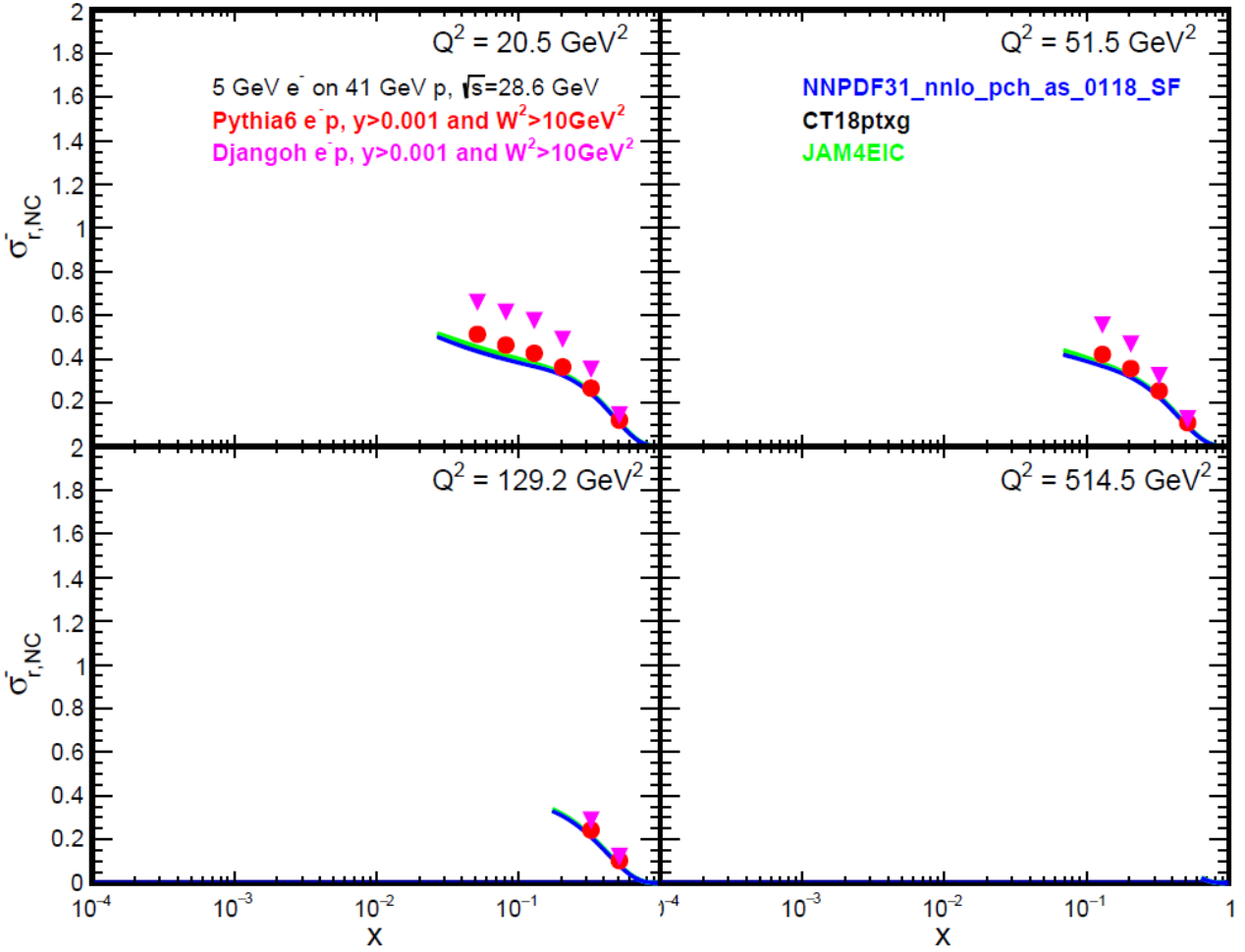
New theory code (*txgrids*) compared to *HERA* data



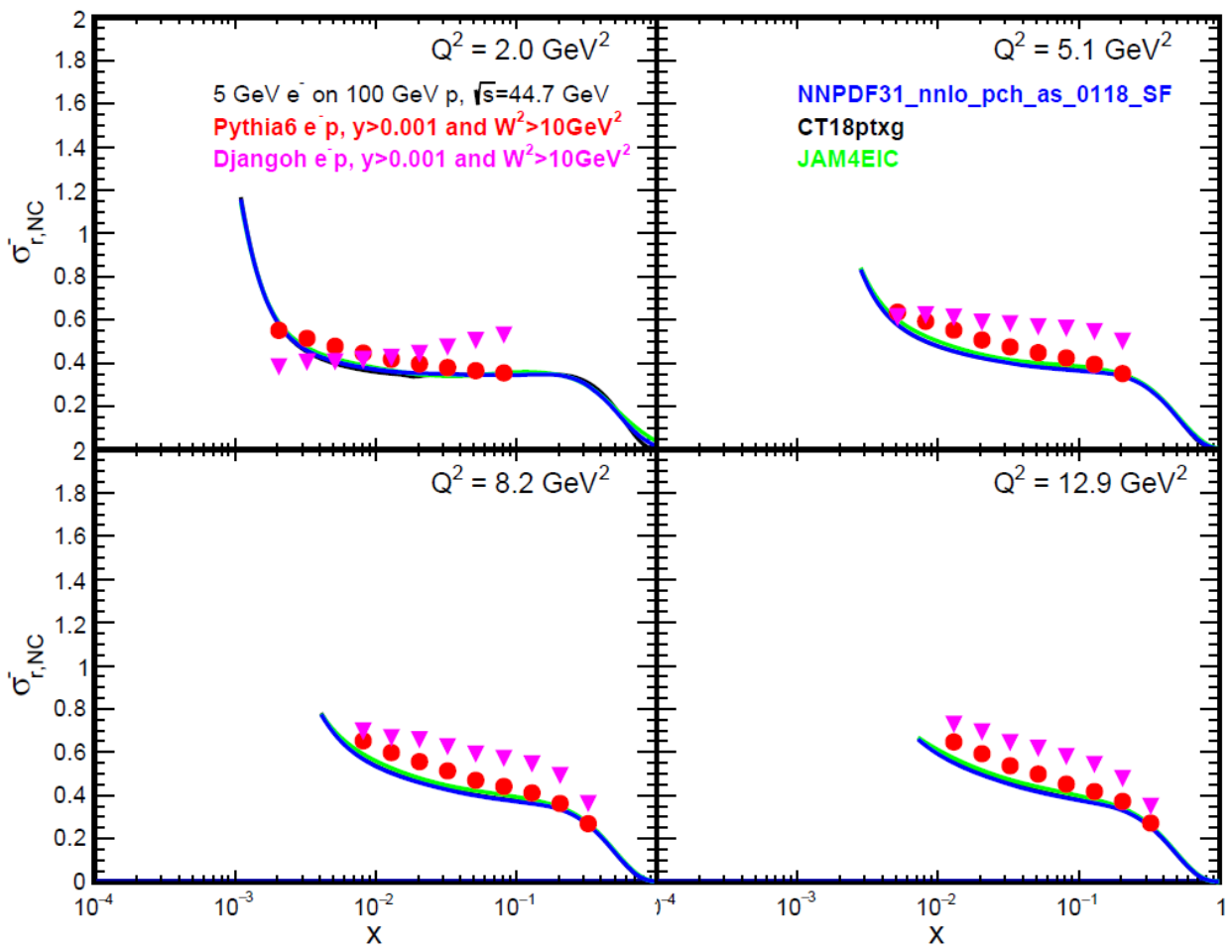


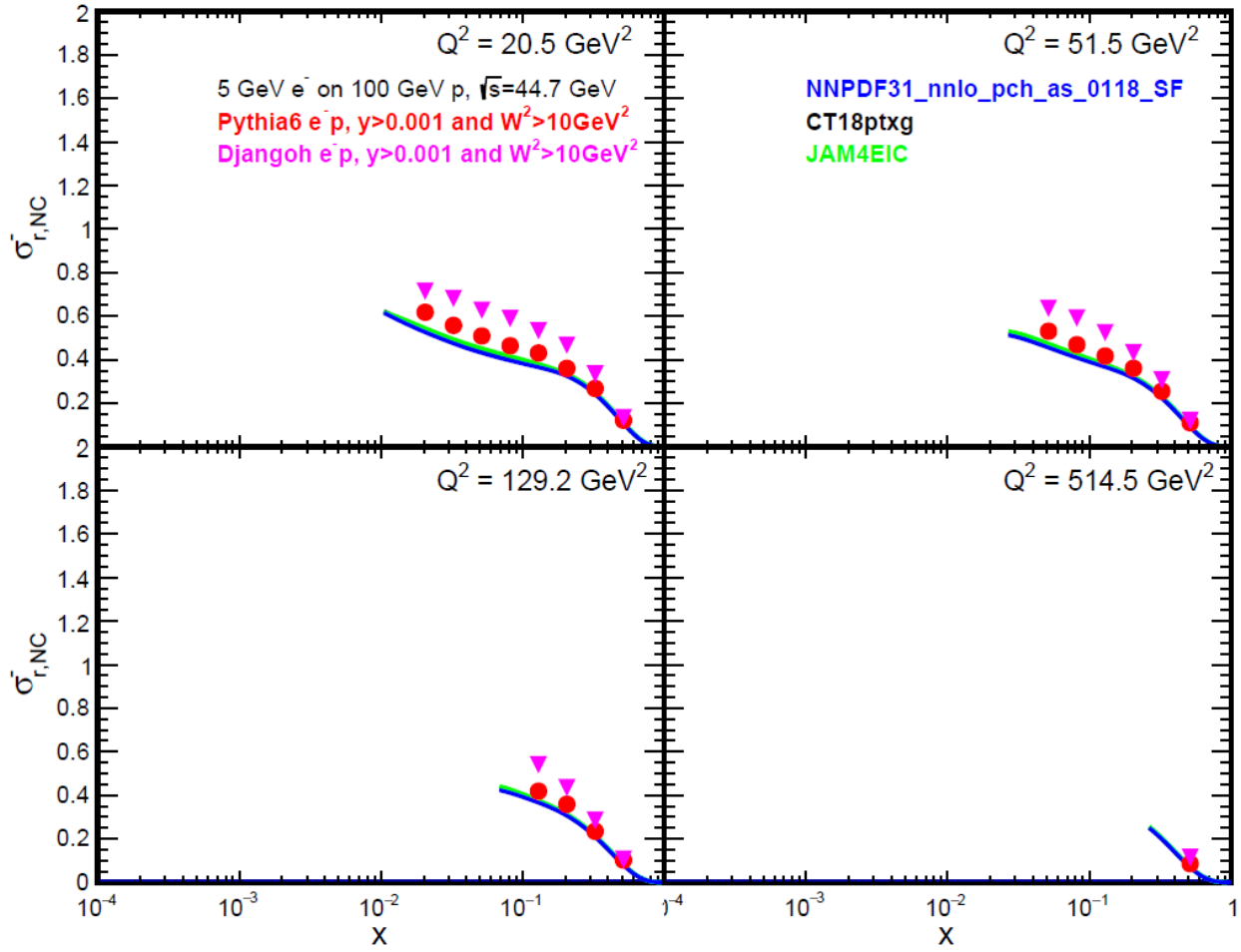
Simulated cross sections: 5GeV x 41GeV



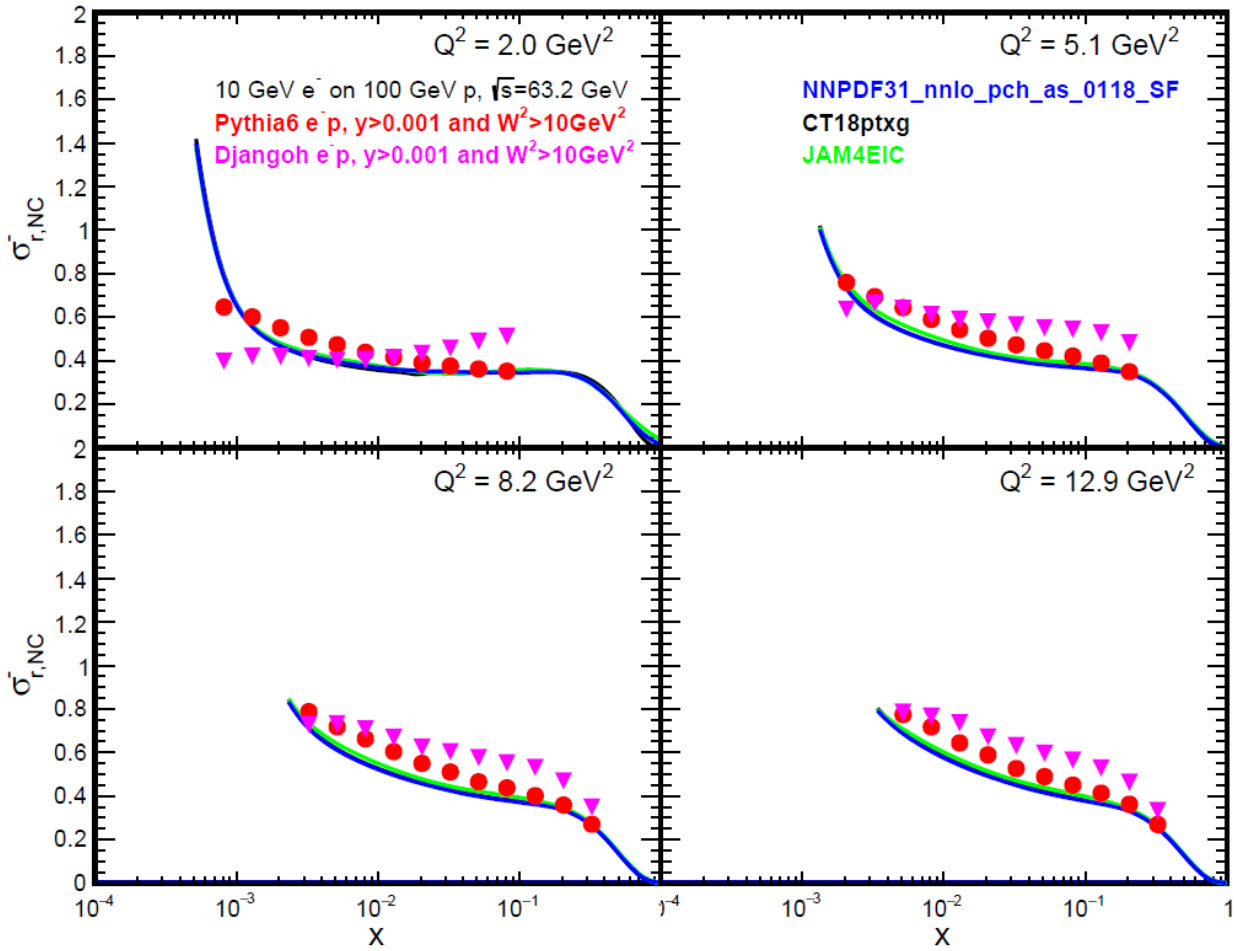


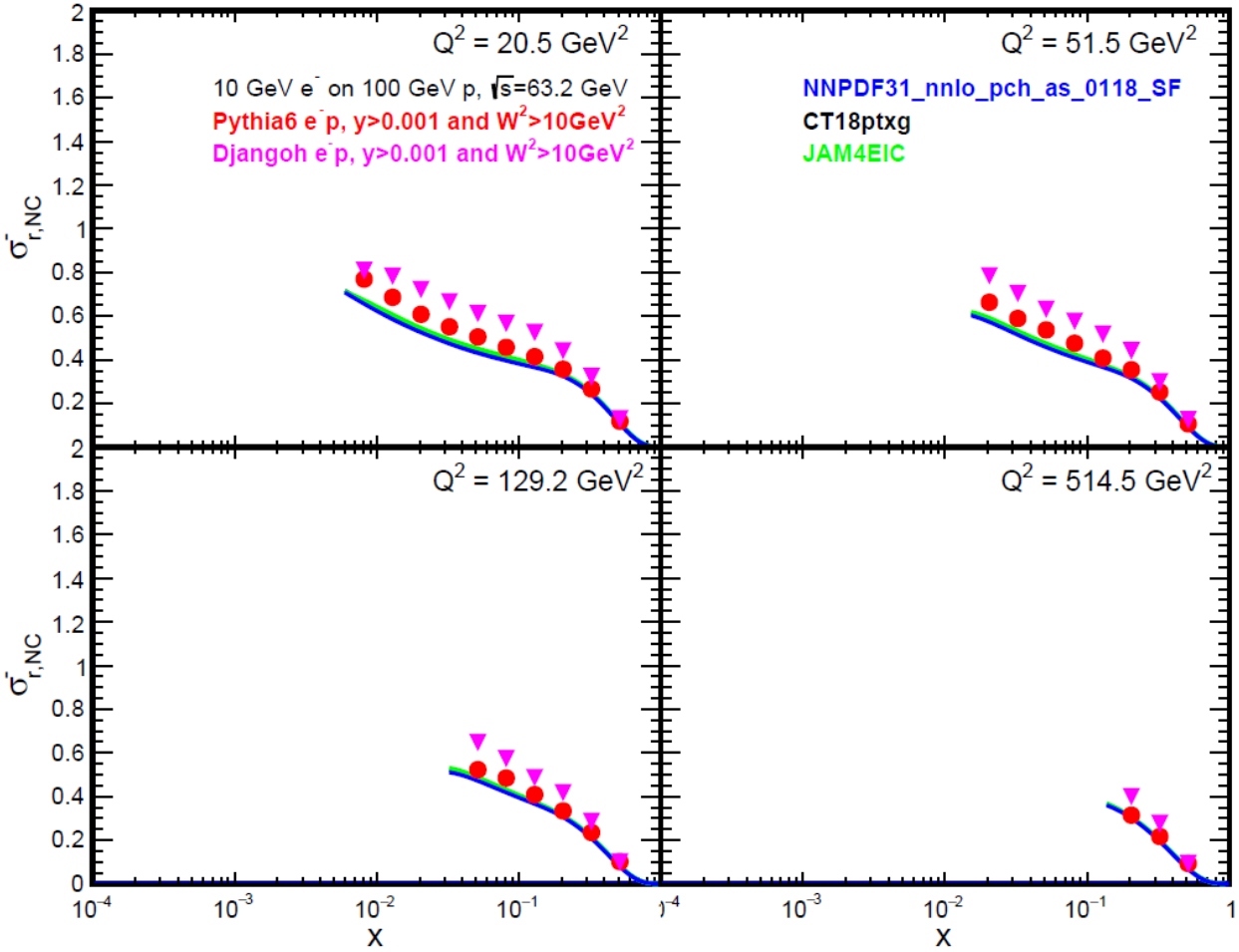
Simulated cross sections: 5GeV x 100GeV



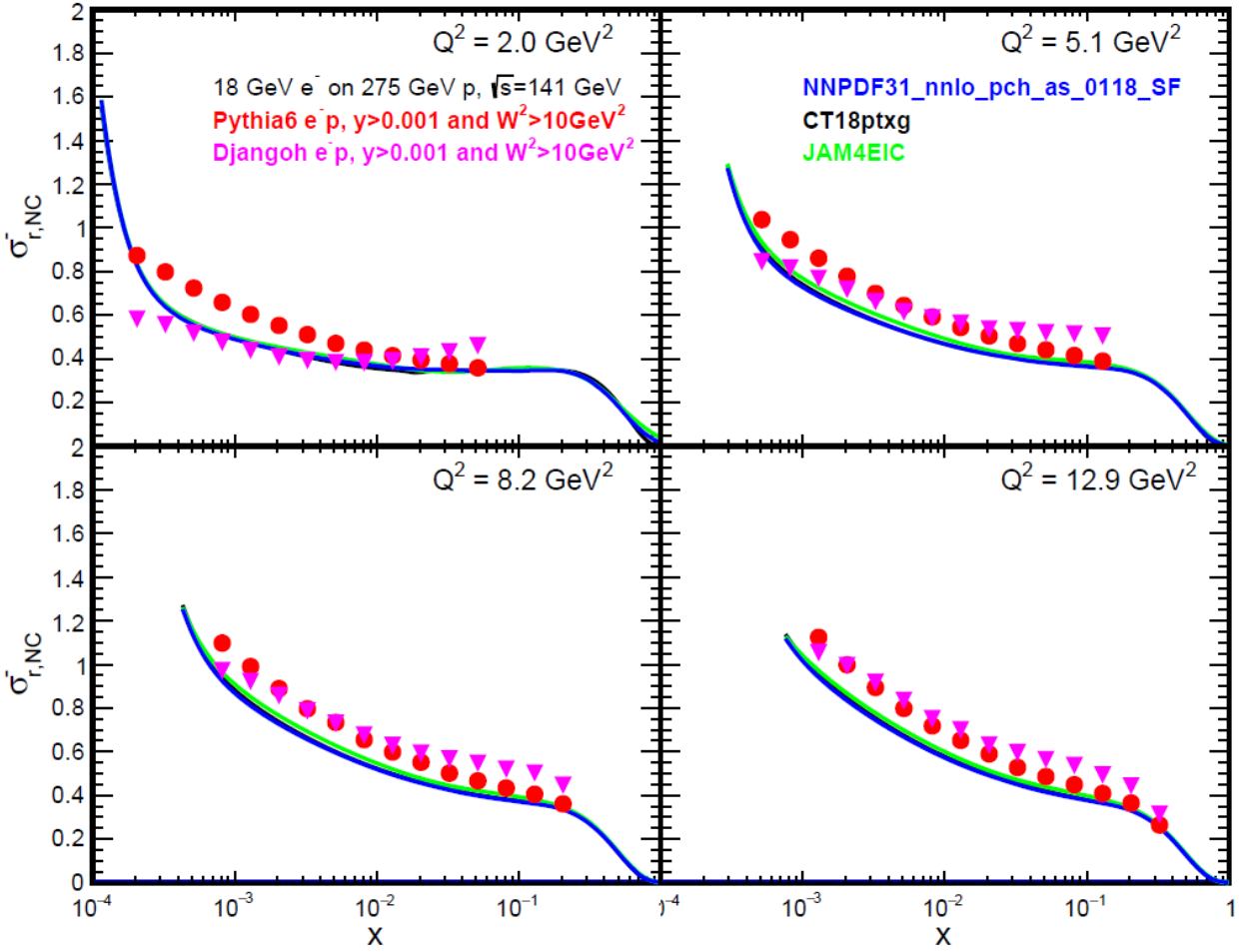


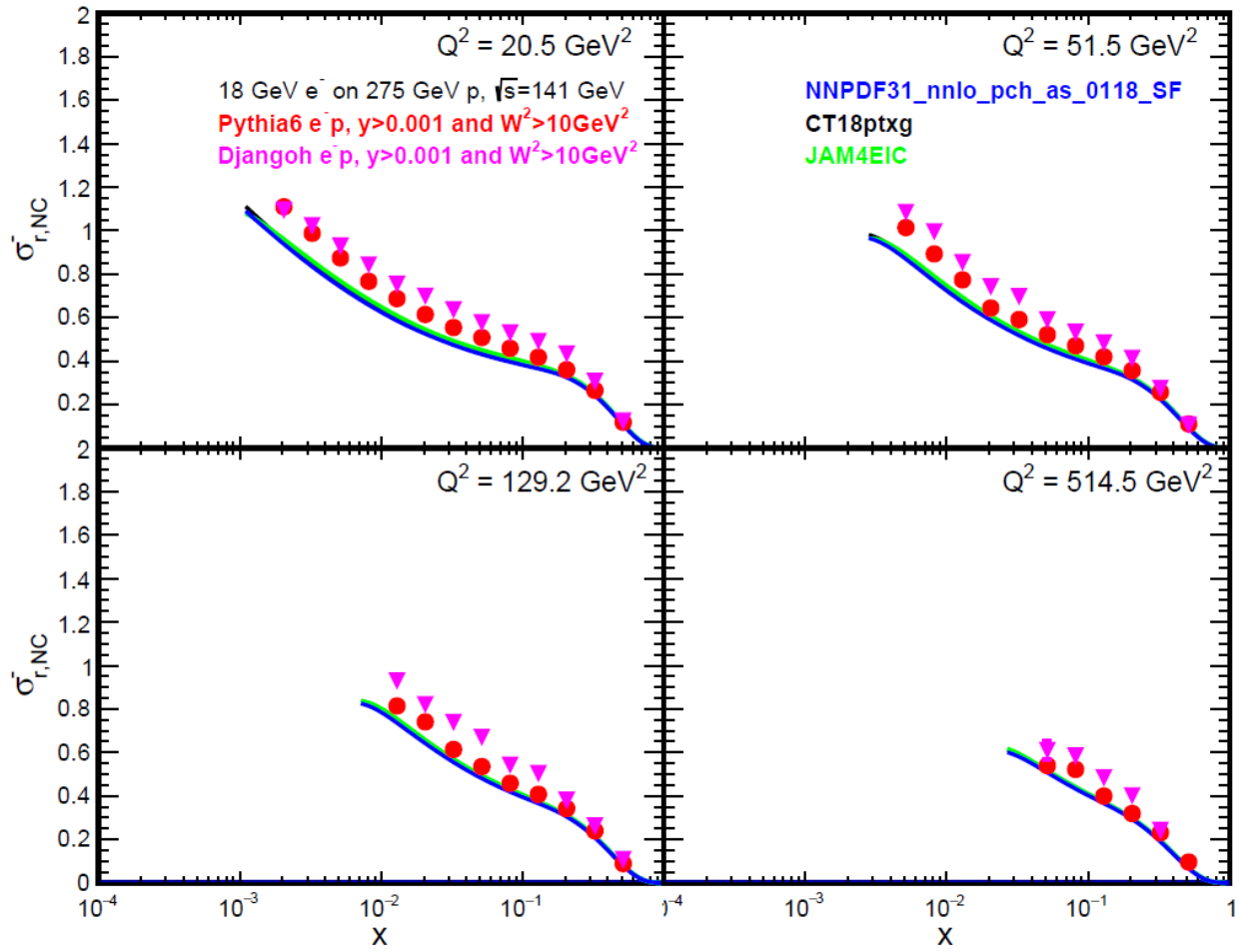
Simulated cross sections: 10GeV x 100GeV





Simulated cross sections: 18GeV x 275GeV





Cross Section Summary

- We've extracted cross sections using the *Pythia6* and *Djangoh* generators at the vertex level and made comparisons to our newly developed theory grids. On the vertex-level, the only corrections that should be applied to the simulations are bin-centering corrections.
- We will use the generator results for purity and stability studies with the fast detector simulation (*eic-smear*). This will be done for 3 reconstruction methods: Electron, Jacquet-Blondel, and Double Angle methods.
- The generators+*eic-smear* results can be used to inform systematic uncertainties.