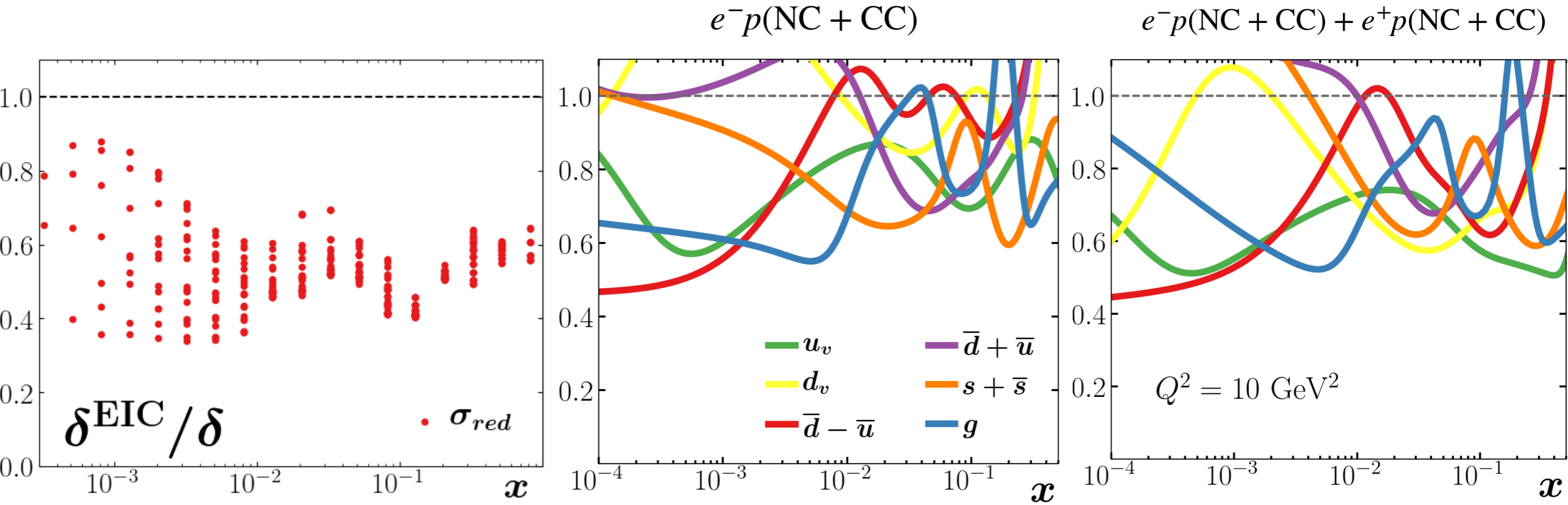# NC/CC unpolarized PDFs

FILIPPO DELCARRO

On behalf of JAM Collaboration

In collaboration with:
Wally Melnitchouk (JLab), Nobuo Sato (JLab), Christopher Cocuzza (Temple)

7.1.1 Unpolarized parton structure of the proton and neutron

$e^-p(\text{NC} + \text{CC})$

$e^-p(\text{NC} + \text{CC}) + e^+p(\text{NC} + \text{CC})$

Legend:
- u_v (green)
- d_v (yellow)
- $\overline{d} - \overline{u}$ (red)
- $\overline{d} + \overline{u}$ (purple)
- $s + \overline{s}$ (orange)
- g (blue)

$\delta^{\text{EIC}}/\delta$ · σ_{red}

$Q^2 = 10 \text{ GeV}^2$

Objective: Test the constraints of NC + CC EIC data on unpolarized PDFs

Setup: Baseline PDFs -> unpolarized fixed target DIS, HERA, DY, W/Z and jets data
Simulated data -> e-p NC, e-p CC, e-d NC, e-d CC and same for e+.
optimistic case, lum=100/fb for e- and 10/fb for e+ at EIC kinematics ($\sqrt{s}$ = 29,45,63,141 GeV)

Conclusions: significant impact on the gluon and db-ub, marginal contribution from e+

# 7.1.1 Unpolarized parton structure of the proton and neutron
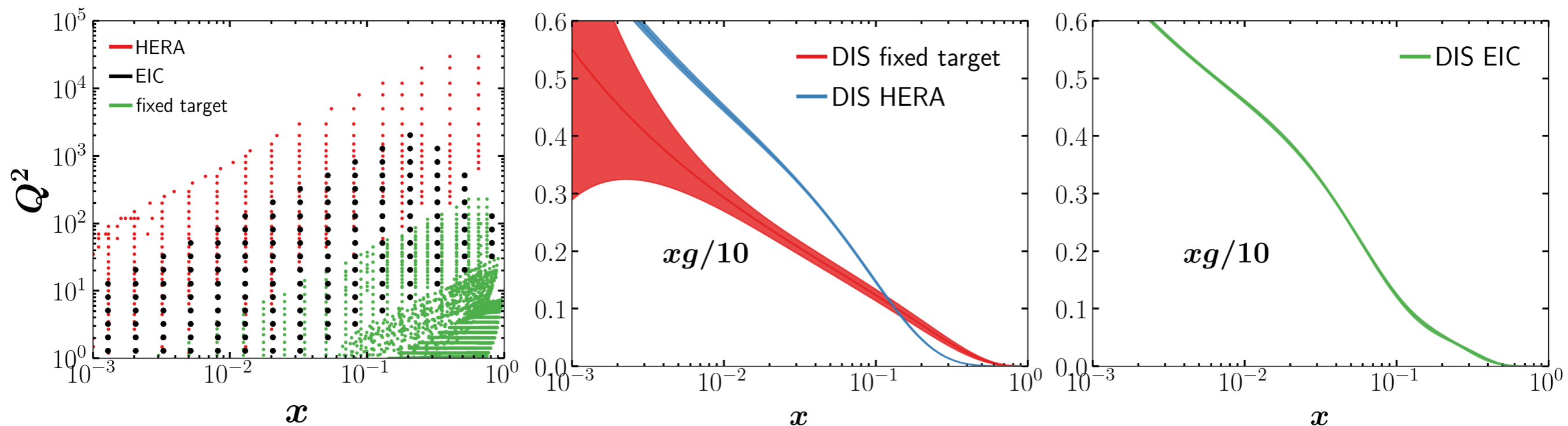
Objective: Test the EIC impact in resolving the gluon puzzle, i.e. tension between DIS fixed target data and HERA data

Setup: Isolate the impact from individual DIS experiments

Conclusion: The result from EIC will be able to constraint at the same accuracy as HERA, thus resolving the tension between the two experiments

# 7.1.1 Unpolarized parton structure of the proton and neutron
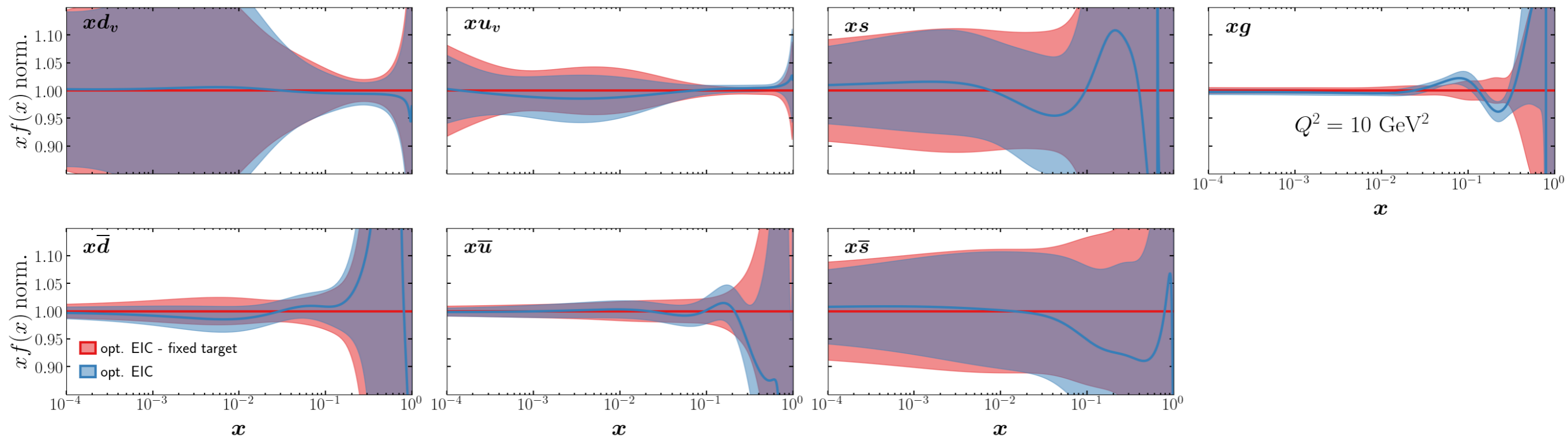
**Objective:** W~~address~~ whether EIC data will be able to ~~replace~~ fixed target DIS and improve unpolarized PDFs

Setup: In these plots we compare the uncertainty band for PDF obtained by a fit including:
>fixed target, HERA, DY, W/Z, jets and EIC data (blue)
>HERA, DY, W/Z, jets and EIC data (red) -> no fixed target
for different flavors, limited to the "optimistic scenario".

Only EIC (+non-DIS)
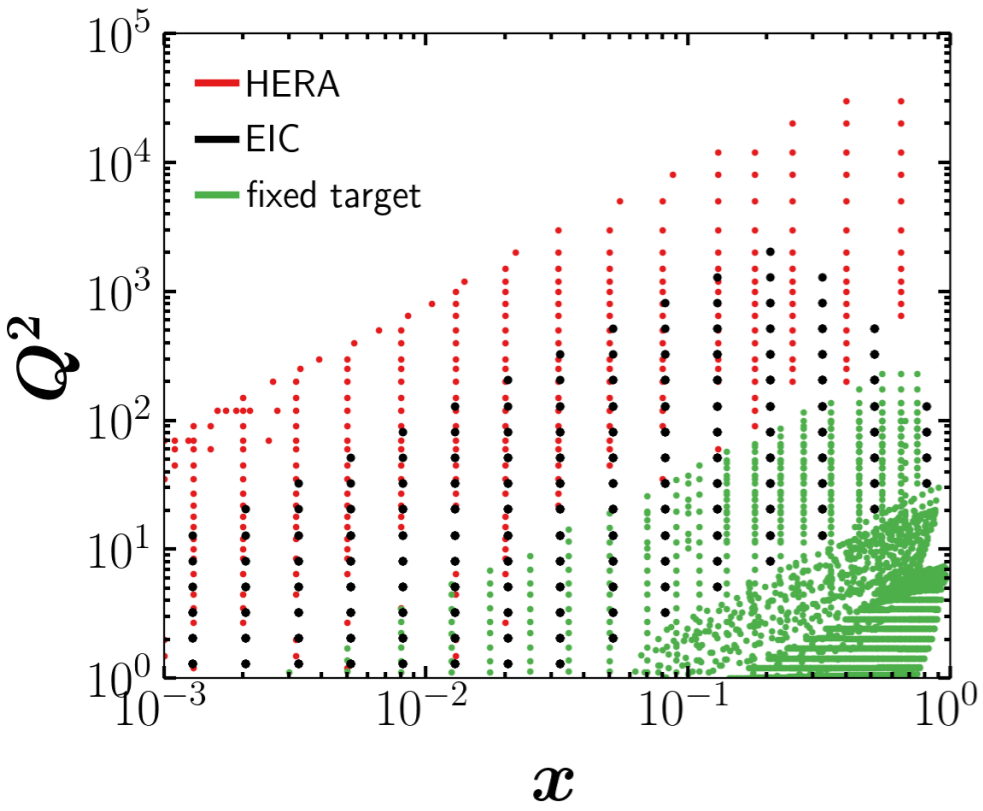
sigma_(fix + non-DIS)/
sigma_(HERA + non-DIS)

All flavors

$Q^2 = 10 \text{ GeV}^2$
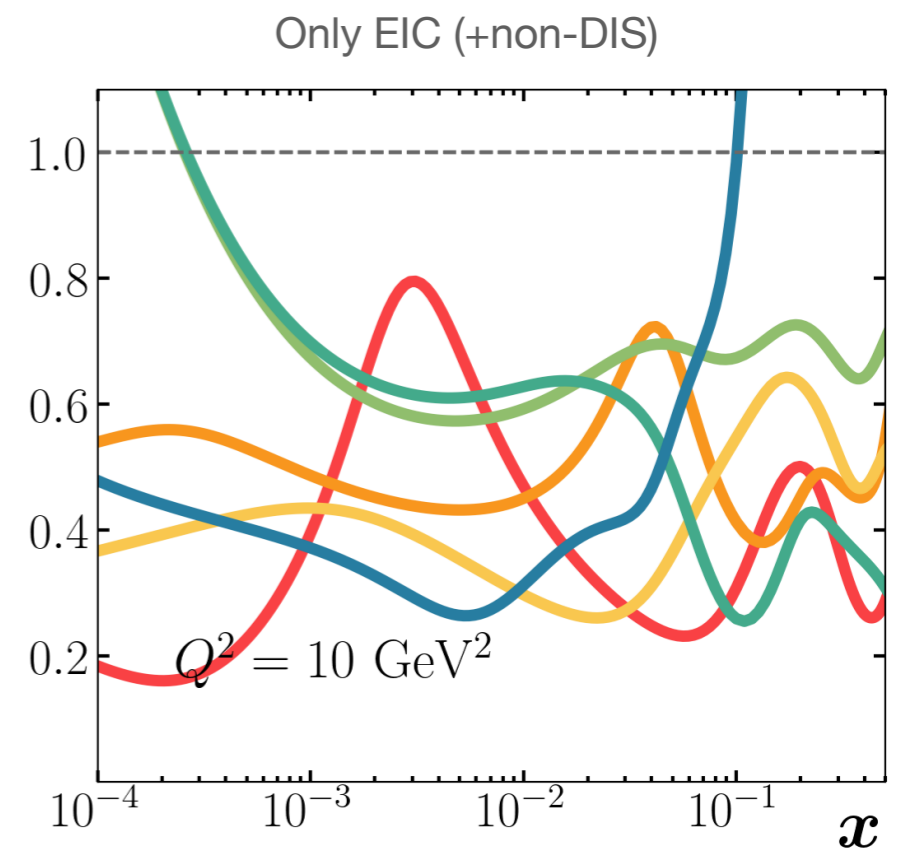
We propose a more significant analysis:

Setup: In these plots we compare the uncertainty ratio for PDF obtained by a fit including:
>fixed target DIS and non-DIS data (blue)
>EIC and non-DIS data (red) -> no fixed target
Using HERA as a baseline for the two comparisons

Conclusion:
Still in progress