e-p physics opportunities at eRHIC

Key measurements & capabilities

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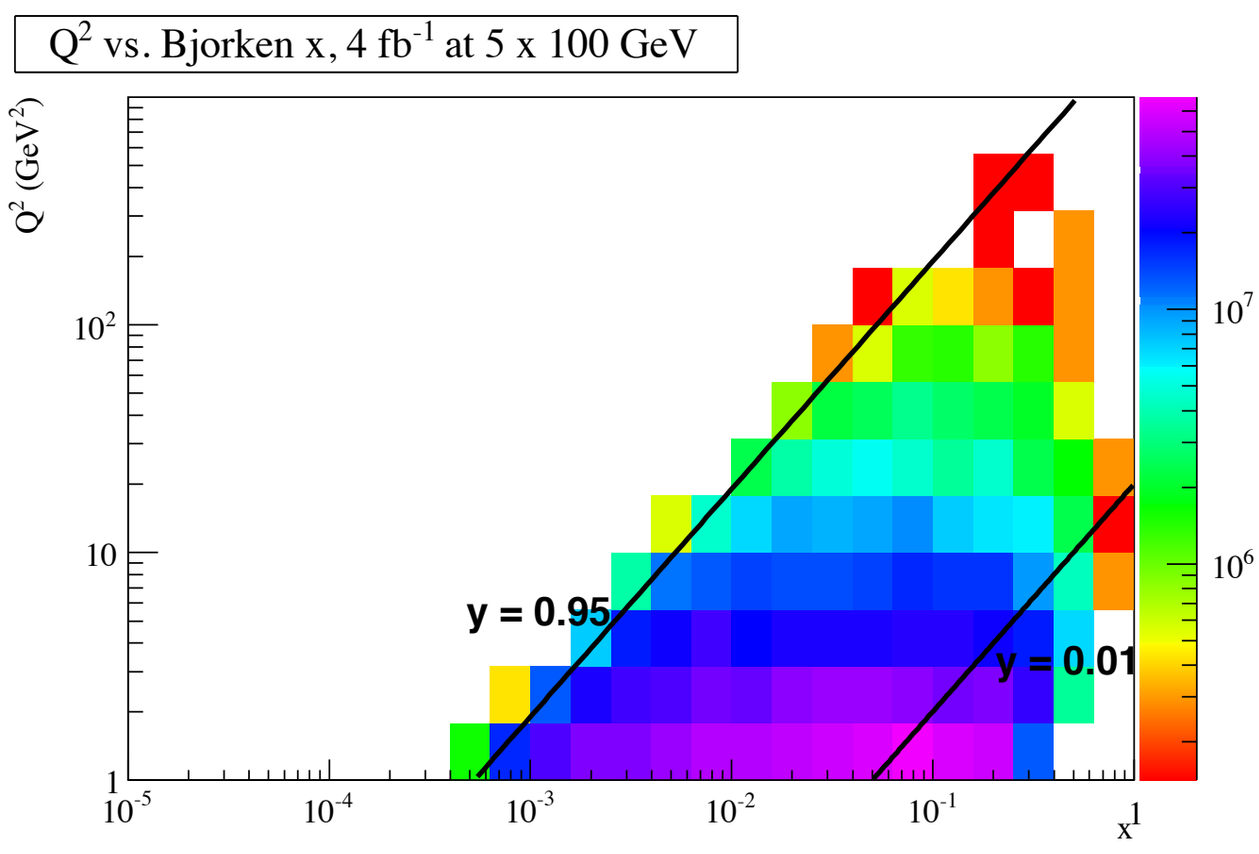
DIS 2011

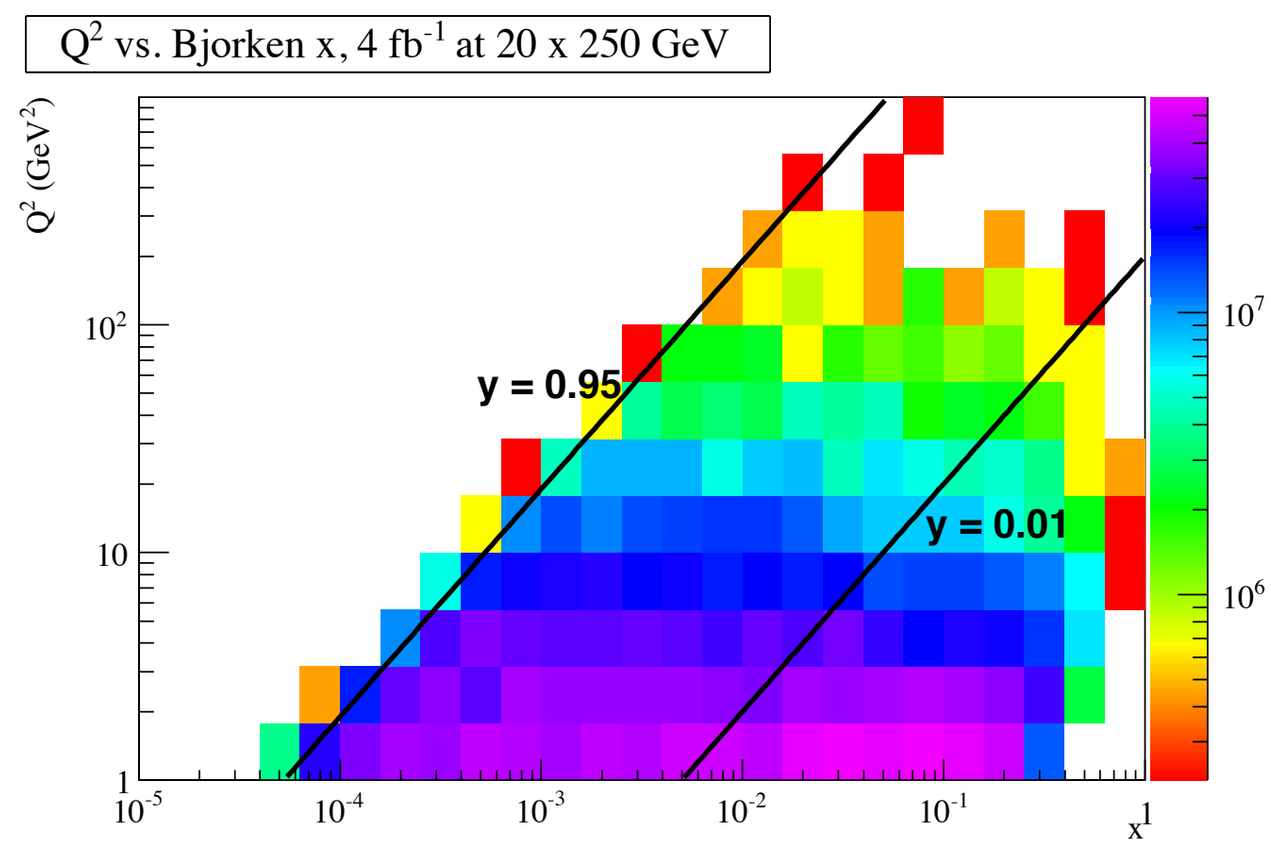
Thursday 14th April

- **Kinematic coverage**
- **g_1/DetaG**
- **F_L**
- **DVCS**
- *TMDs - mention, refer to Min Huang's talk?*
- *Sea quark spin structure, flavour separation?*
- *Charm - F2, FL,* ~~intrinsic charm, contribution to g1~~
- ~~Electroweak interactions, W-exchange DIS~~
- ~~Photoproduction~~
- ~~Small-x deviations from DGLAP~~

Kinematics

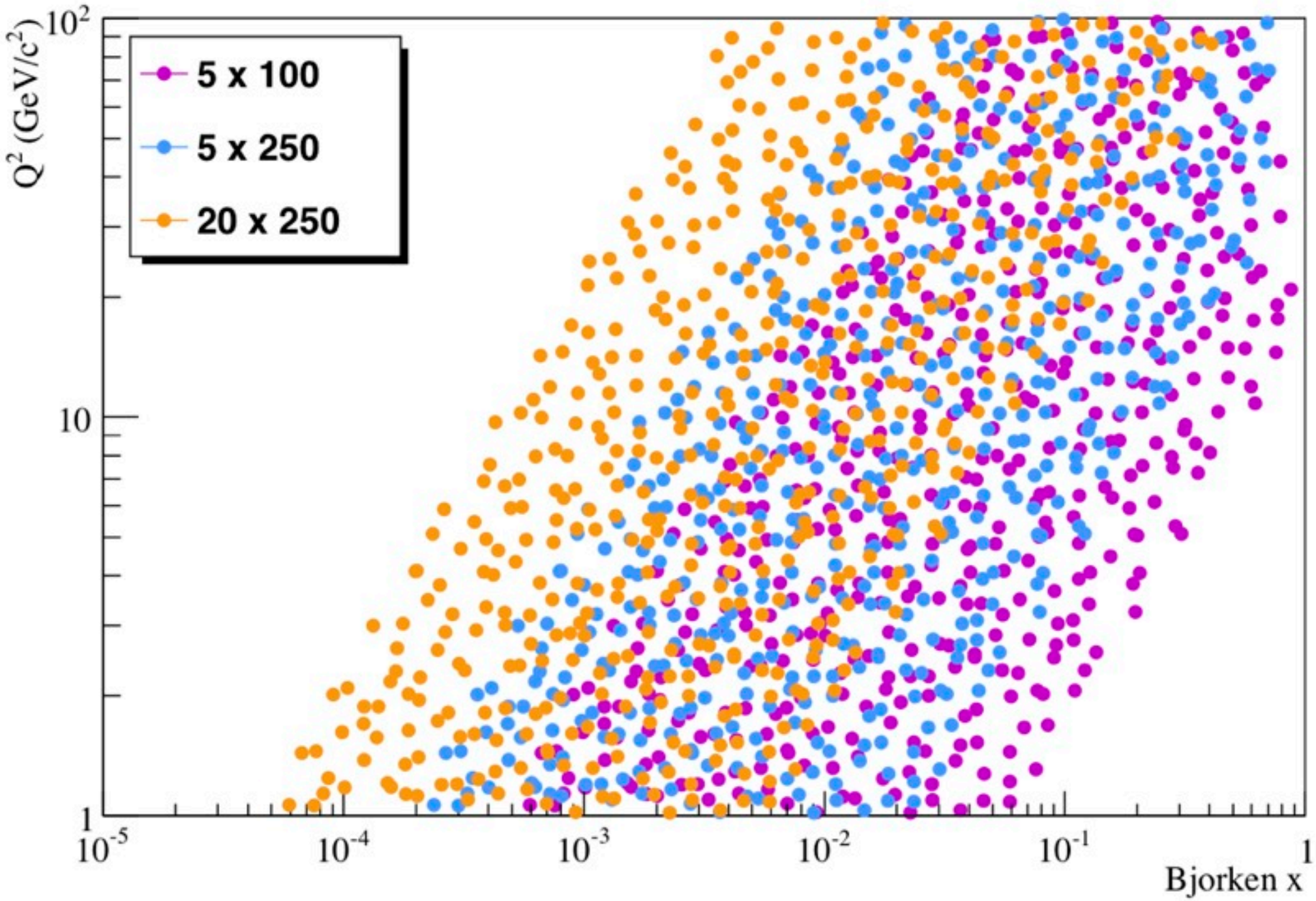
E_e	E_p	$\sqrt{s}$	L (10^{33} cm^{-2}	Days for 4
5	100	45	0.62	150
5	250	71	9.7	10
20	250	141	9.7	10





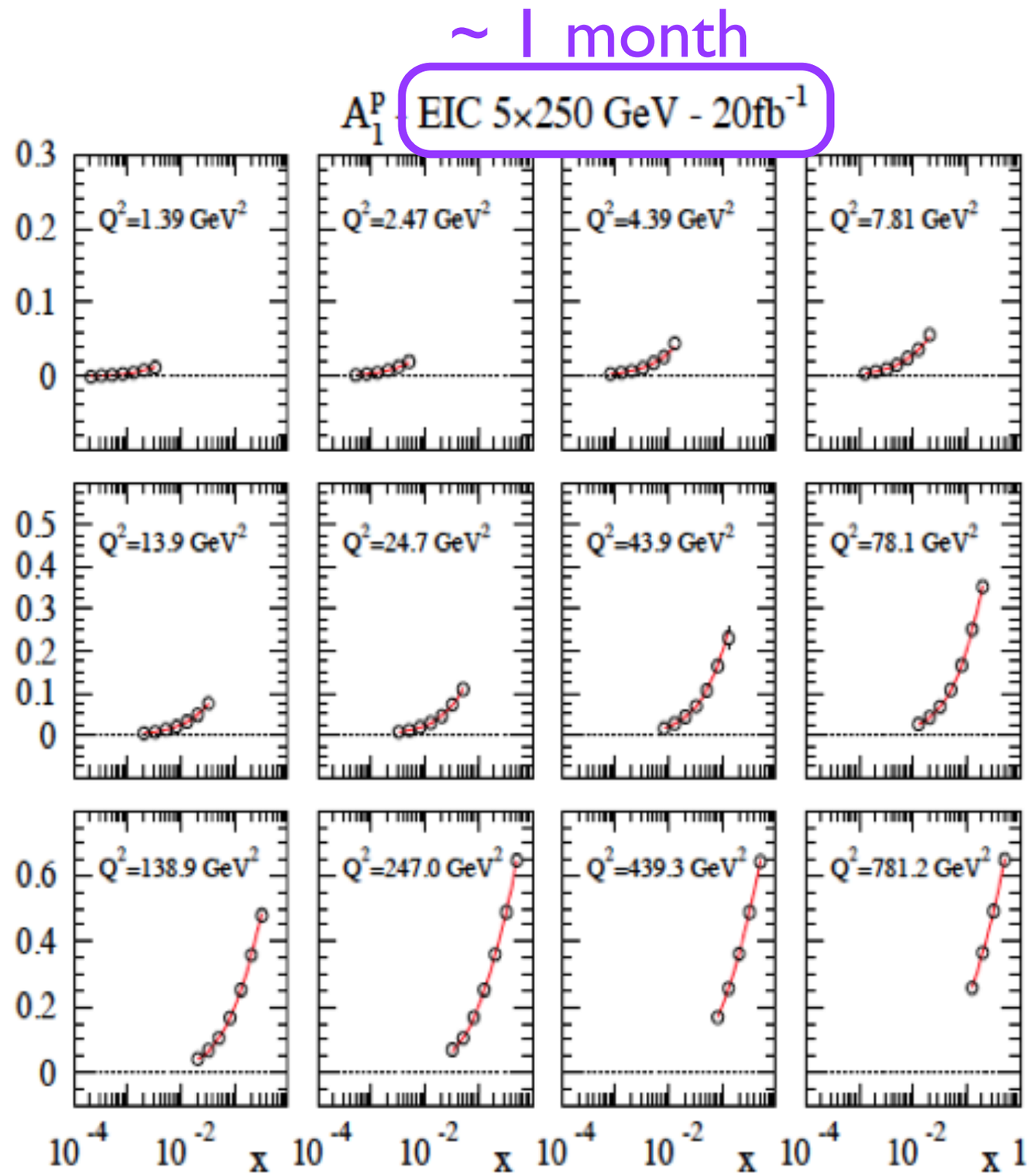
Will use Monte Carlo to investigate radiative corrections

Kinematics

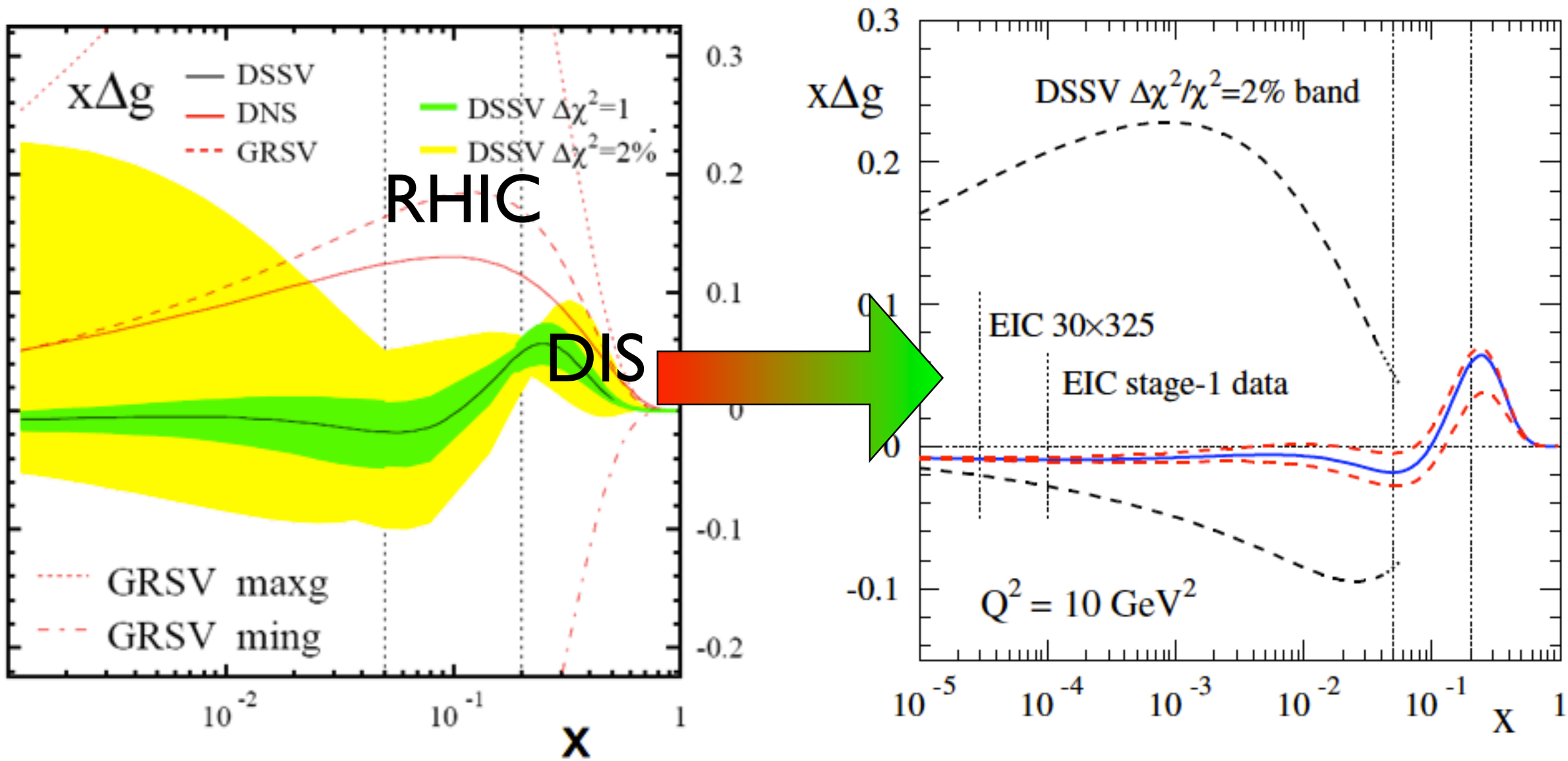


Measuring ΔG

- $\Delta G \propto dg_1/d\log(Q^2)$
- Realistic toy data
- Tiny statistical errors
  - rapidly systematics-dominated

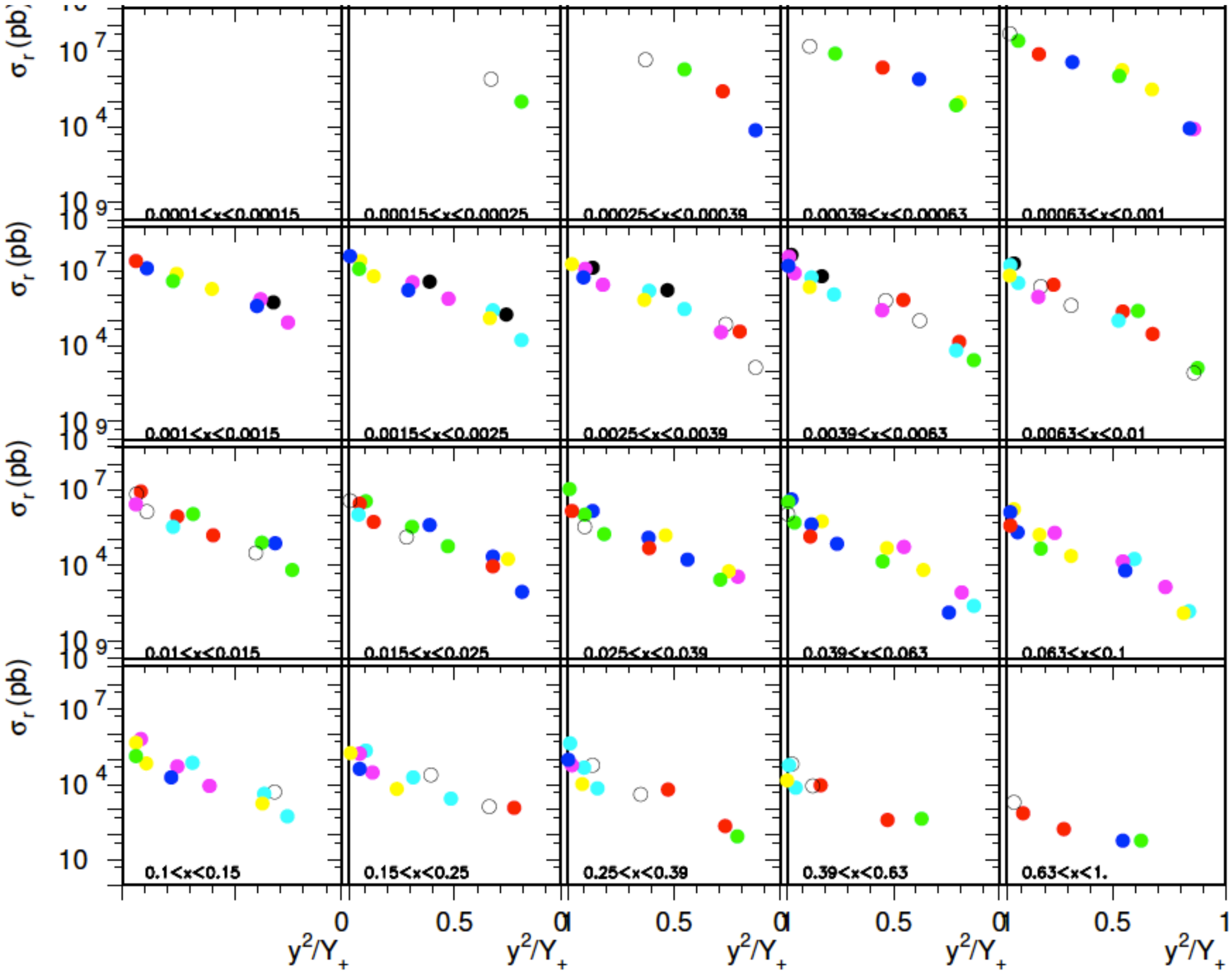


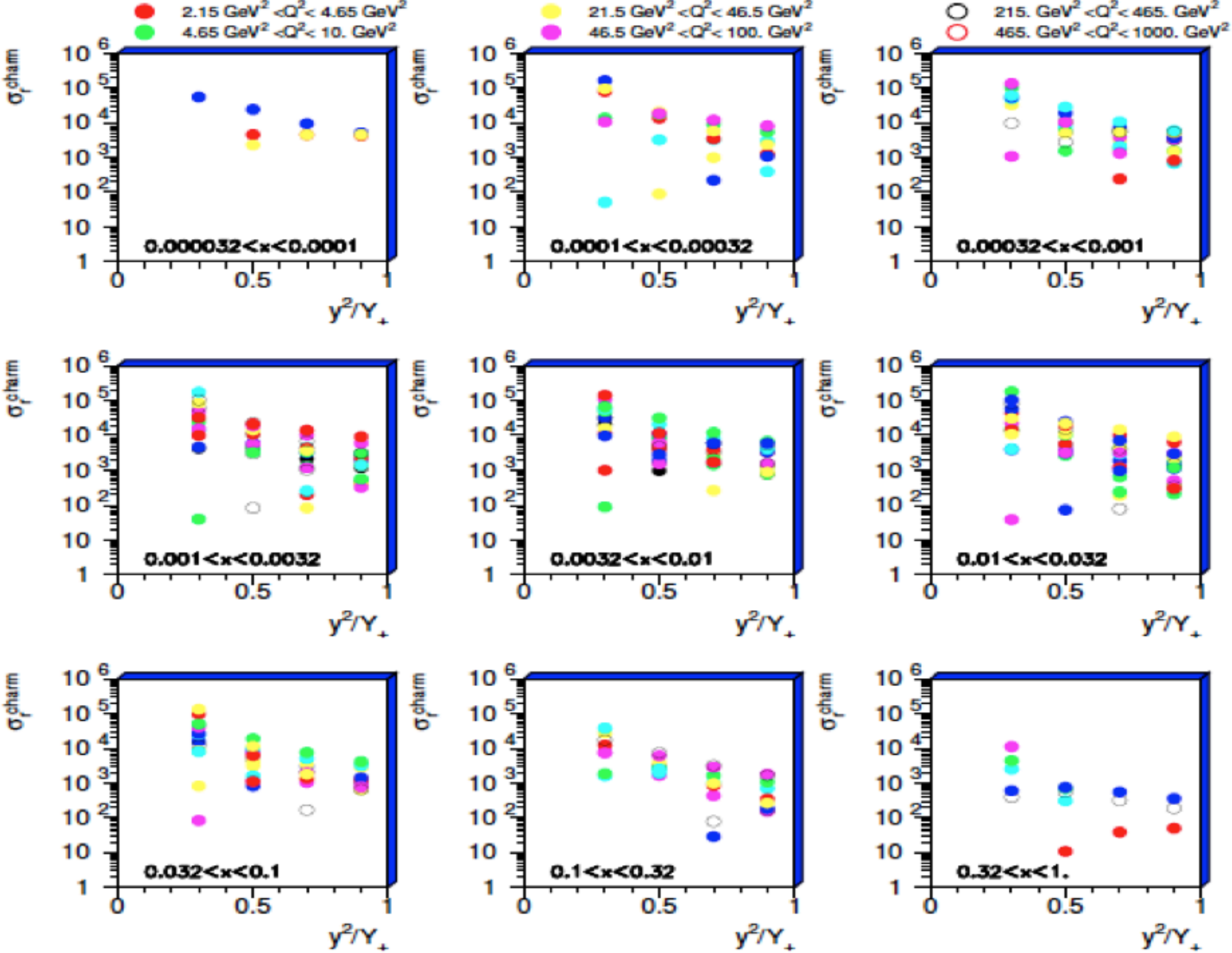
Measuring ΔG



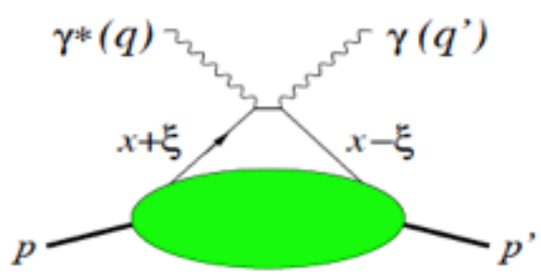
F_L

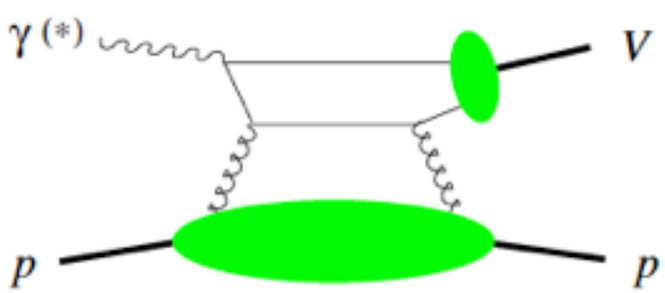
- Via variable s at fixed x, Q^2
  - Measure slope
- eRHIC strength
- $\sqrt{s}$ = 30-200 GeV


σr (pb)
10 7
10 4
10 9
0.0001<x<0.00015
0.00015<x<0.00025
0.00025<x<0.00039
0.00039<x<0.00063
0.00063<x<0.001
0.001<x<0.0015
0.0015<x<0.0025
0.0025<x<0.0039
0.0039<x<0.0063
0.0063<x<0.01
0.01<x<0.015
0.015<x<0.025
0.025<x<0.039
0.039<x<0.063
0.063<x<0.1
0.1<x<0.15
0.15<x<0.25
0.25<x<0.39
0.39<x<0.63
0.63<x<1.
10
0
0.5
1
y2/Y+

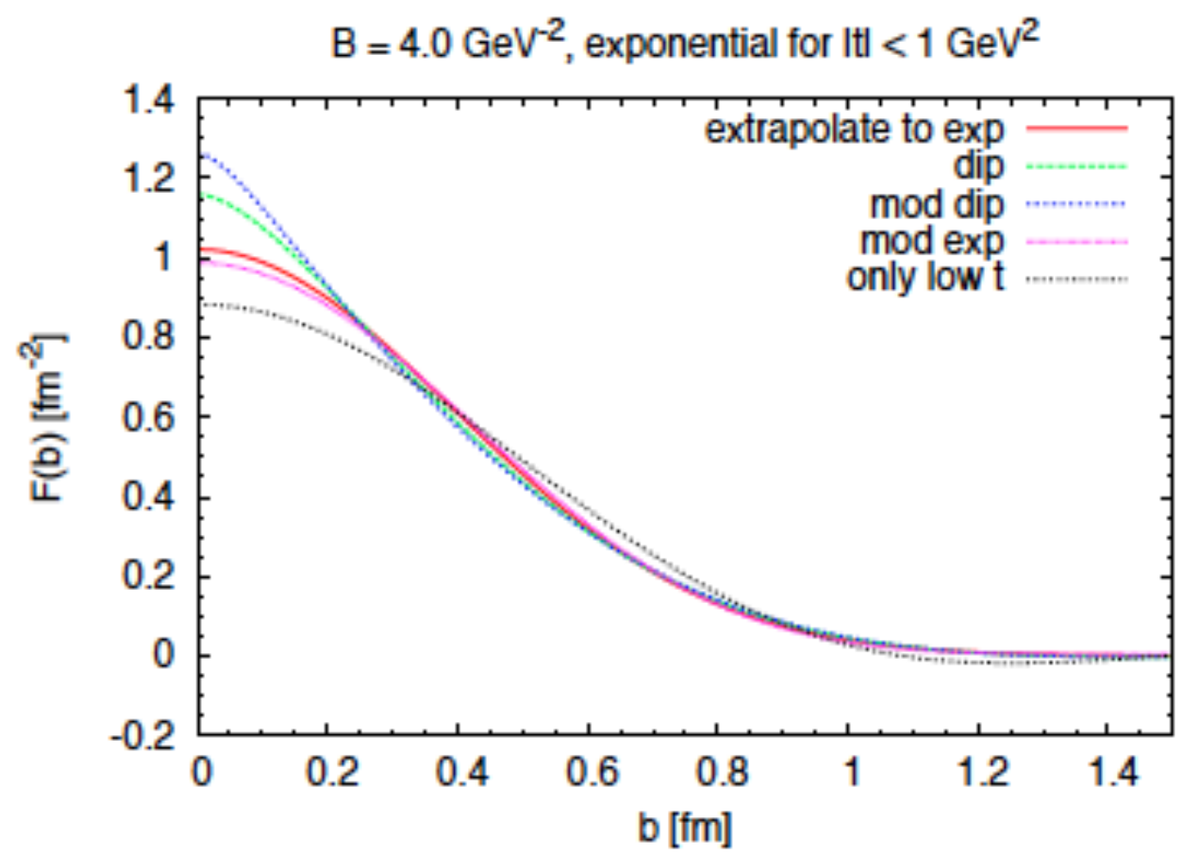

2.15 GeV² <Q²< 4.65 GeV²
4.65 GeV² <Q²< 10. GeV²
21.5 GeV² <Q²< 46.5 GeV²
46.5 GeV² <Q²< 100. GeV²
215. GeV² <Q²< 465. GeV²
465. GeV² <Q²< 1000. GeV²
σ_r^charm
y²/Y₊
0.000032<x<0.0001
0.0001<x<0.00032
0.00032<x<0.001
0.001<x<0.0032
0.0032<x<0.01
0.01<x<0.032
0.032<x<0.1
0.1<x<0.32
0.32<x<1.

GPDs





- 2+1D imaging
  - Momentum (x) & impact parameter (b)
  - b range depends on measured t range

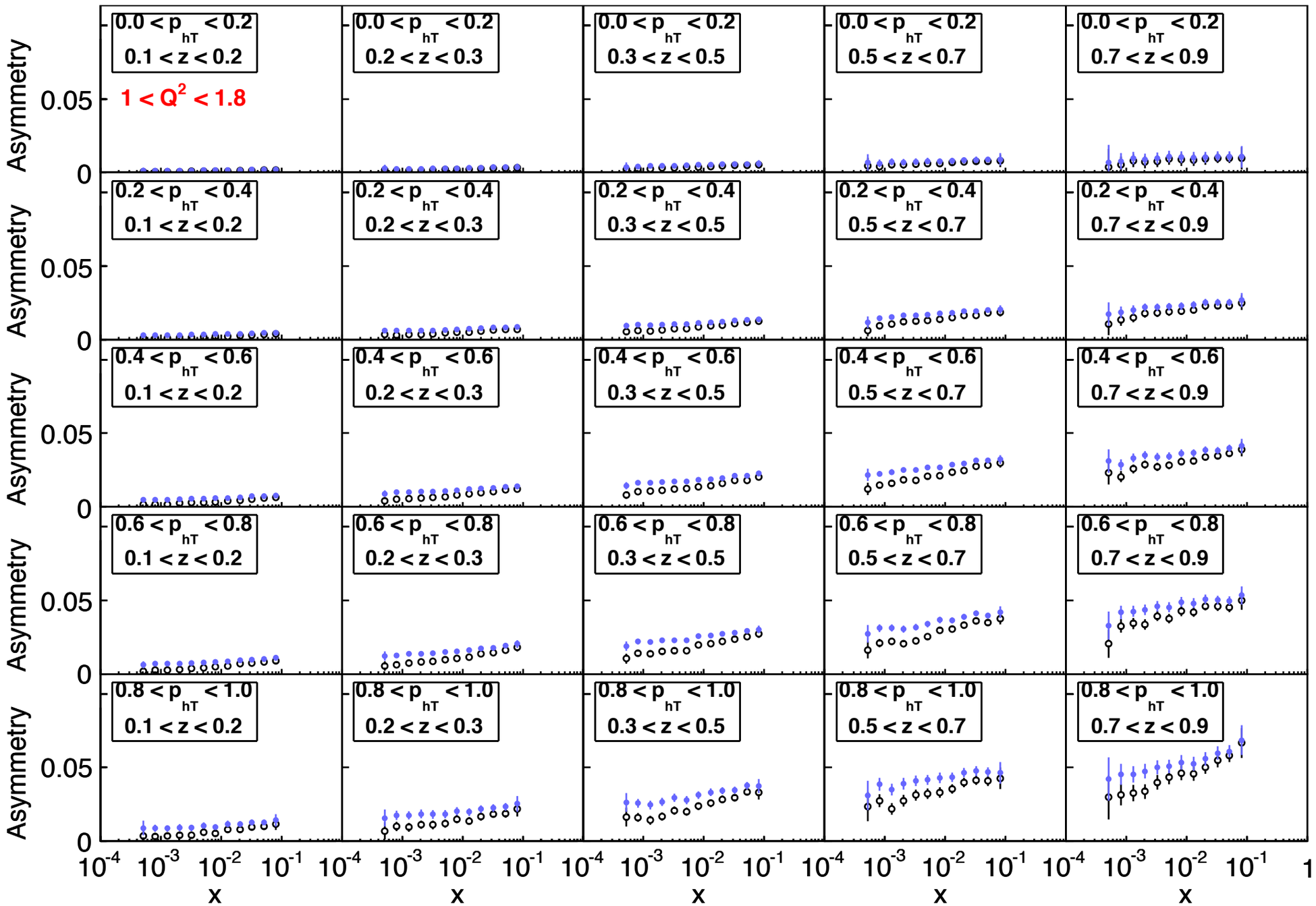


GPDs

- Images from Salvatore, JH

TMDs

- See talk by Min Huang



Summarise

- Blah