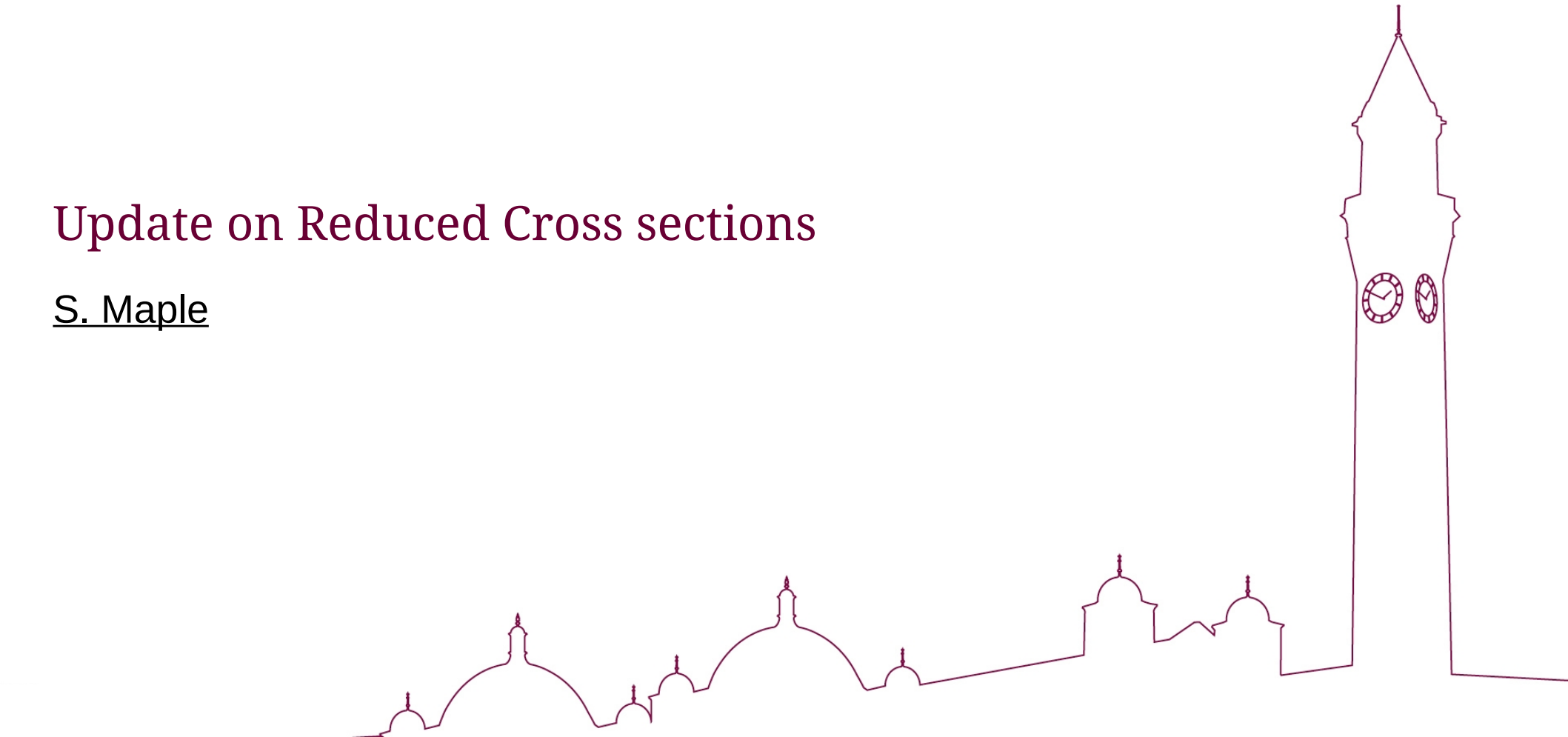
UNIVERSITY OF BIRMINGHAM | SCHOOL OF PHYSICS AND ASTRONOMY

Update on Reduced Cross sections

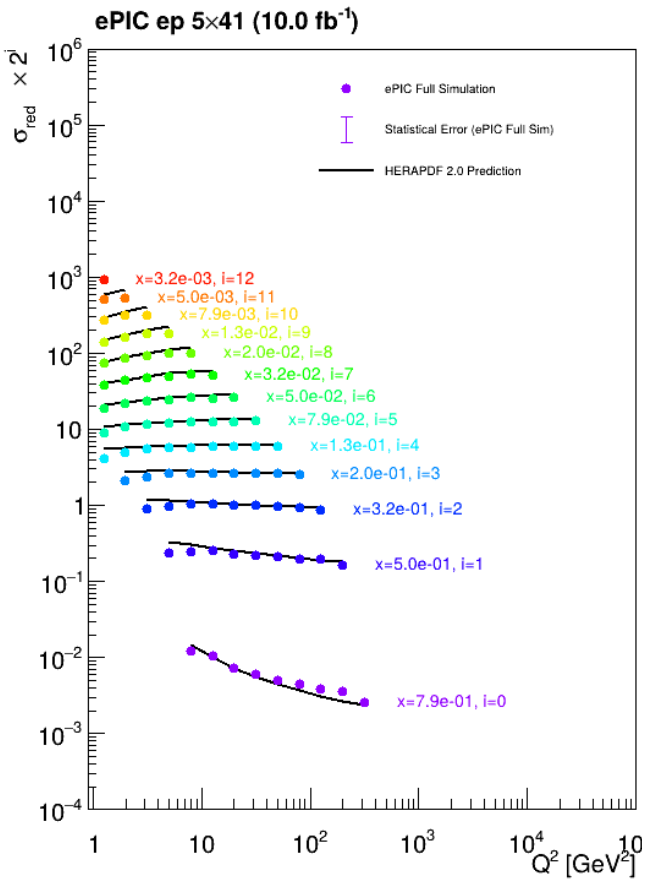
S. Maple

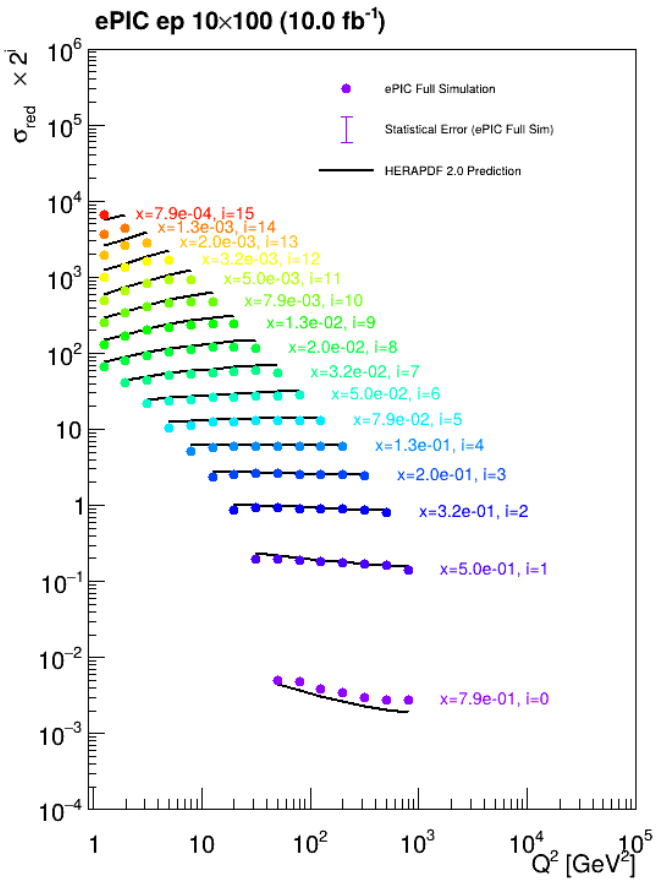


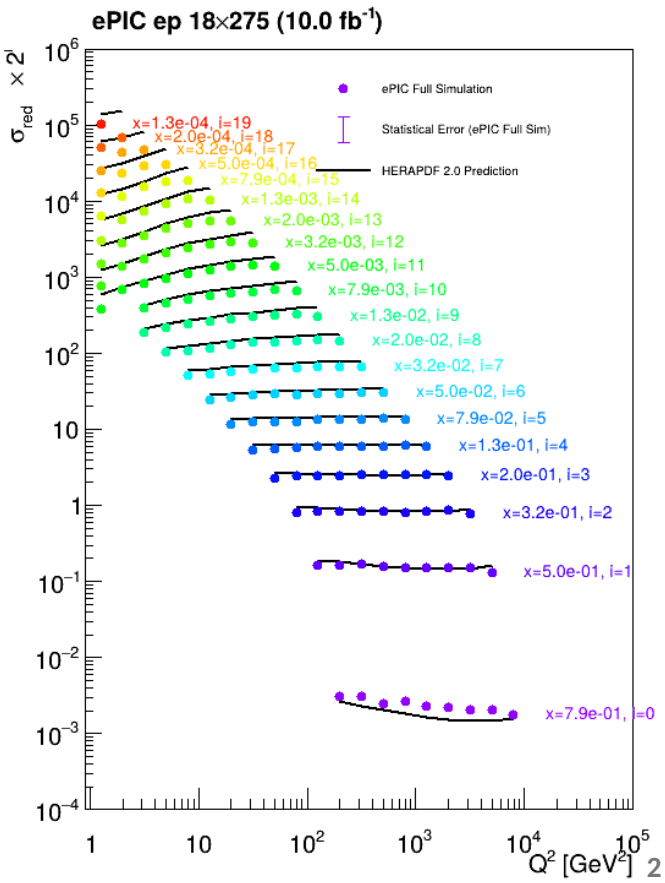
Reduced Cross Sections (25.04.0 Campaign)

*Stat error smaller than points

- **Note: campaign uses Pythia8**



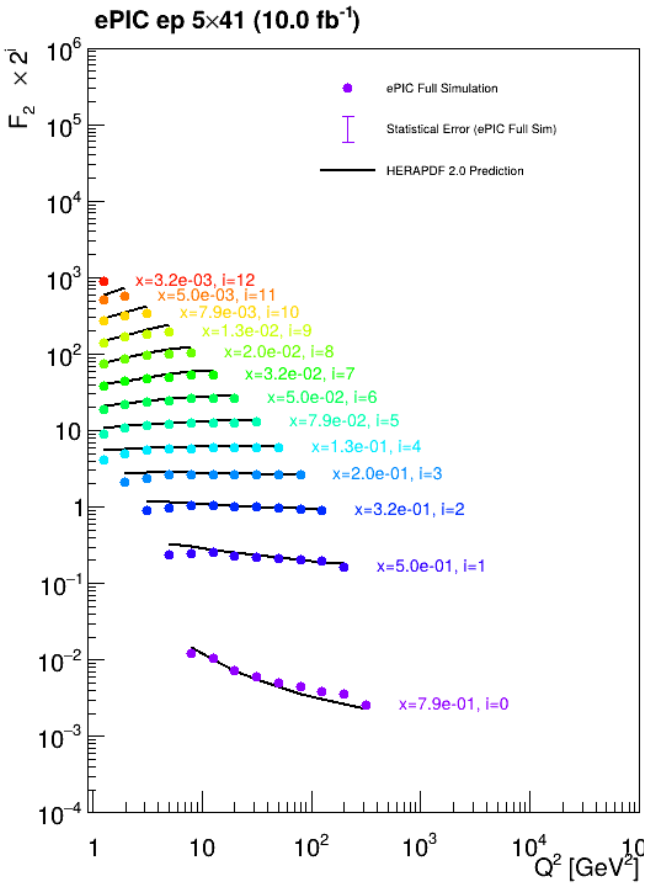


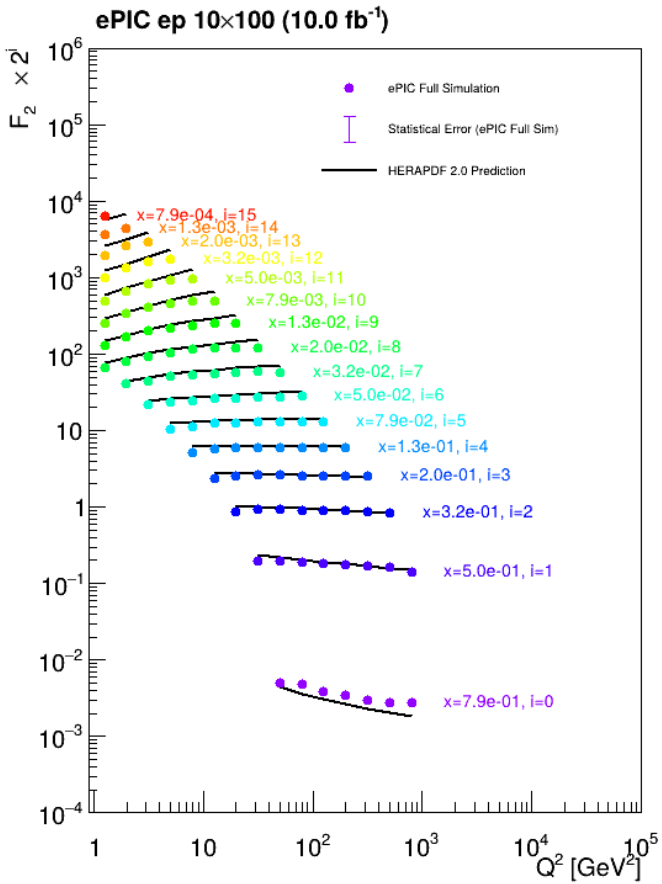


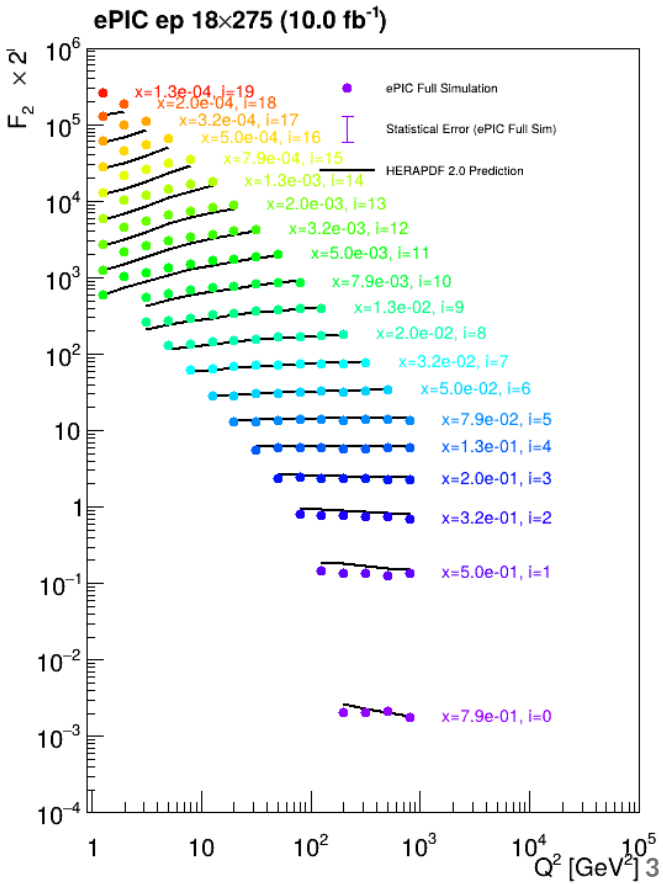
F_2 (25.04.0 Campaign)

*Stat error smaller than points

- **Note: campaign uses Pythia8**



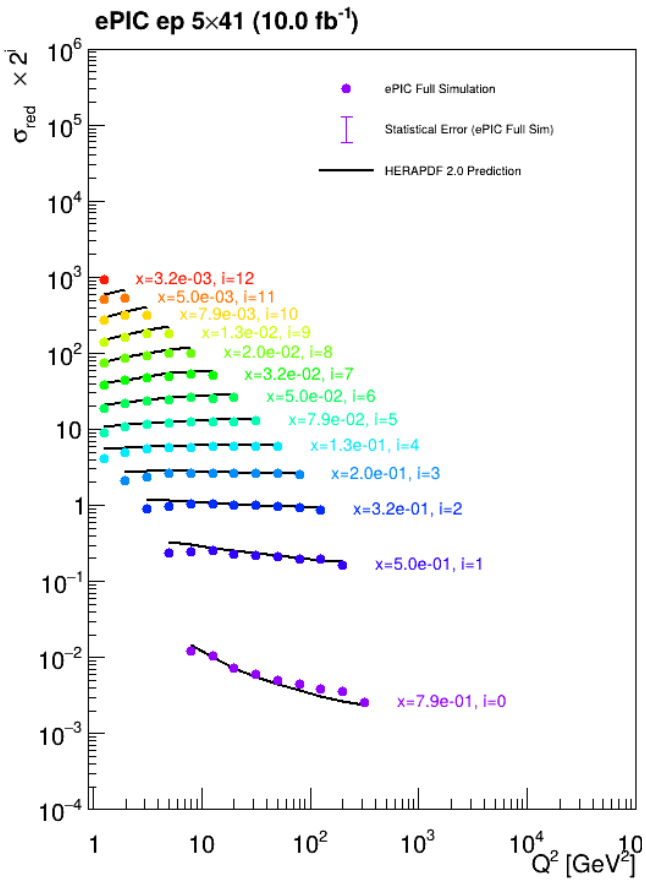


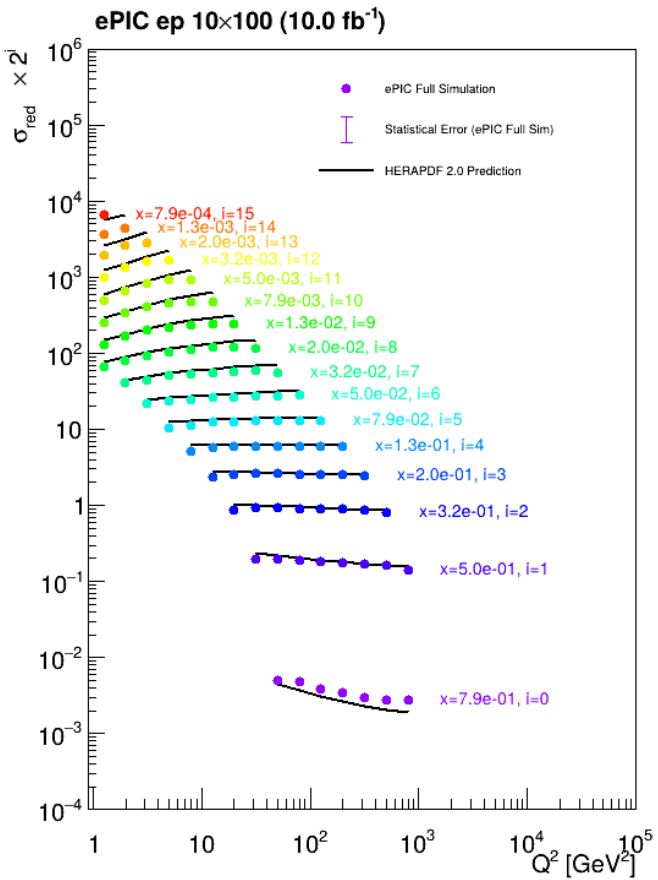


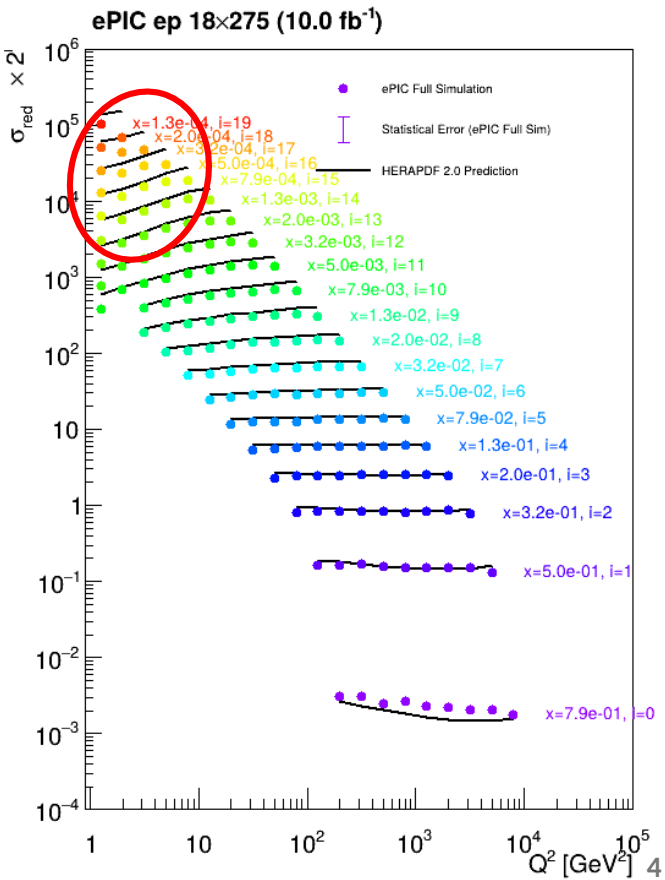
Reduced Cross Sections (25.04.0 Campaign)

*Stat error smaller than points

- **Some discrepancies become apparent at low-x (and correspondingly low-Q^2)**



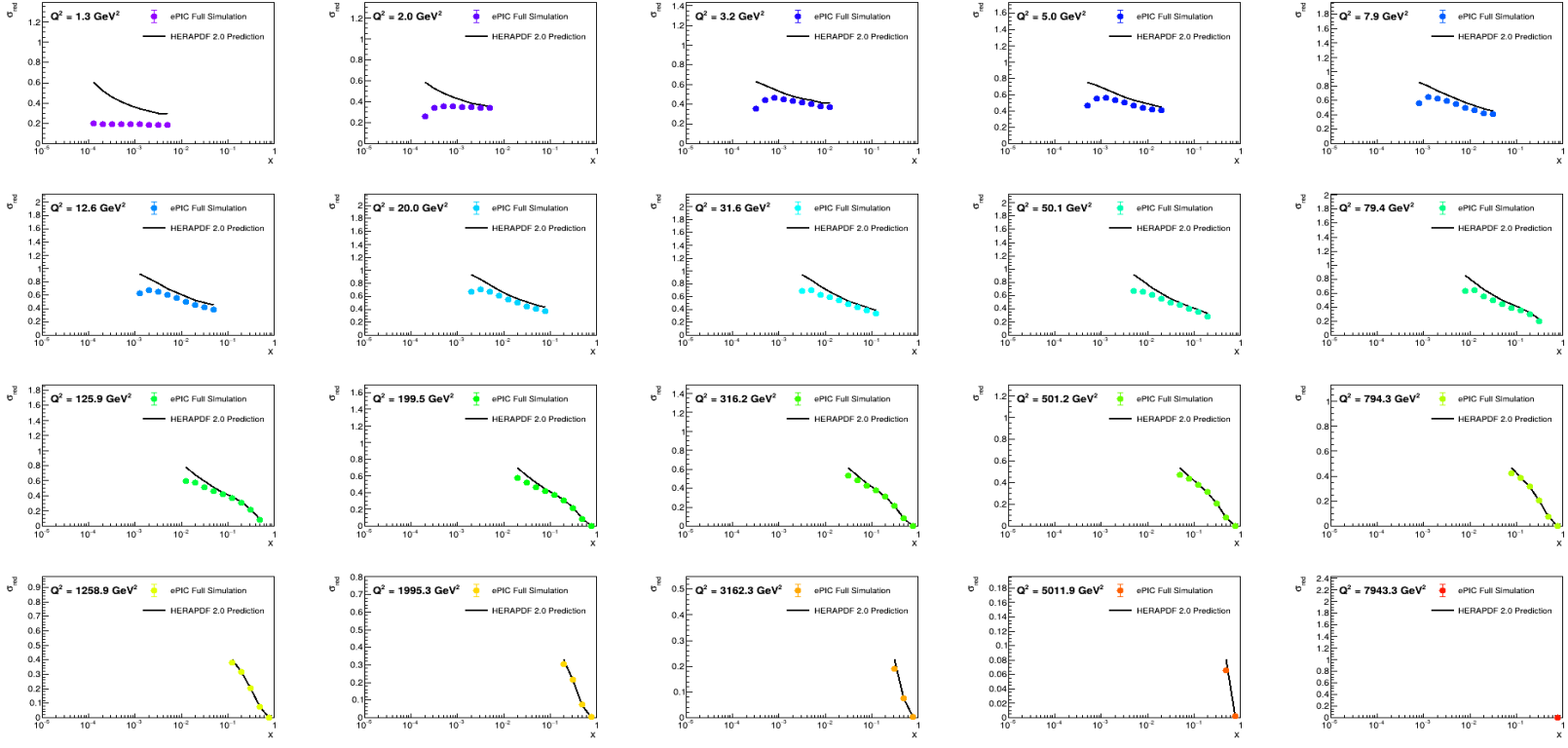




Reduced Cross Sections vs x (25.04.0 Campaign)

- **Strange behaviour at low-x → validate with different generator**

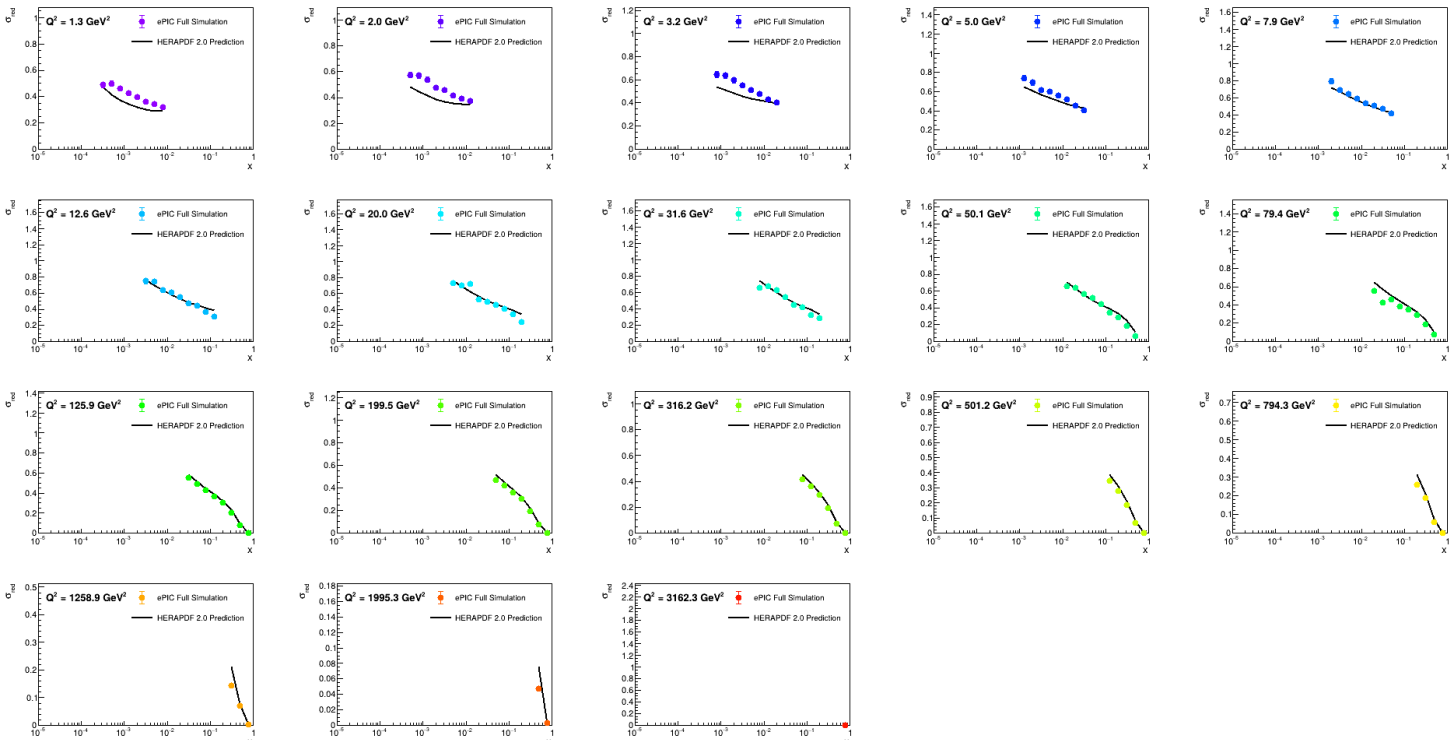
18x275 ep σ_{red} vs x (25.04.0 pythia8 campaign files)



Reduced Cross Sections vs x (10x250 pythia6 w/ CTEQ61)

- **Note: private production, same analysis**
- **Much better agreement → Pythia6 files underestimate where Pythia8 overestimates**

10x250 ep σ_{red} vs x (25.04.0, pythia6 w/ CTEQ61)

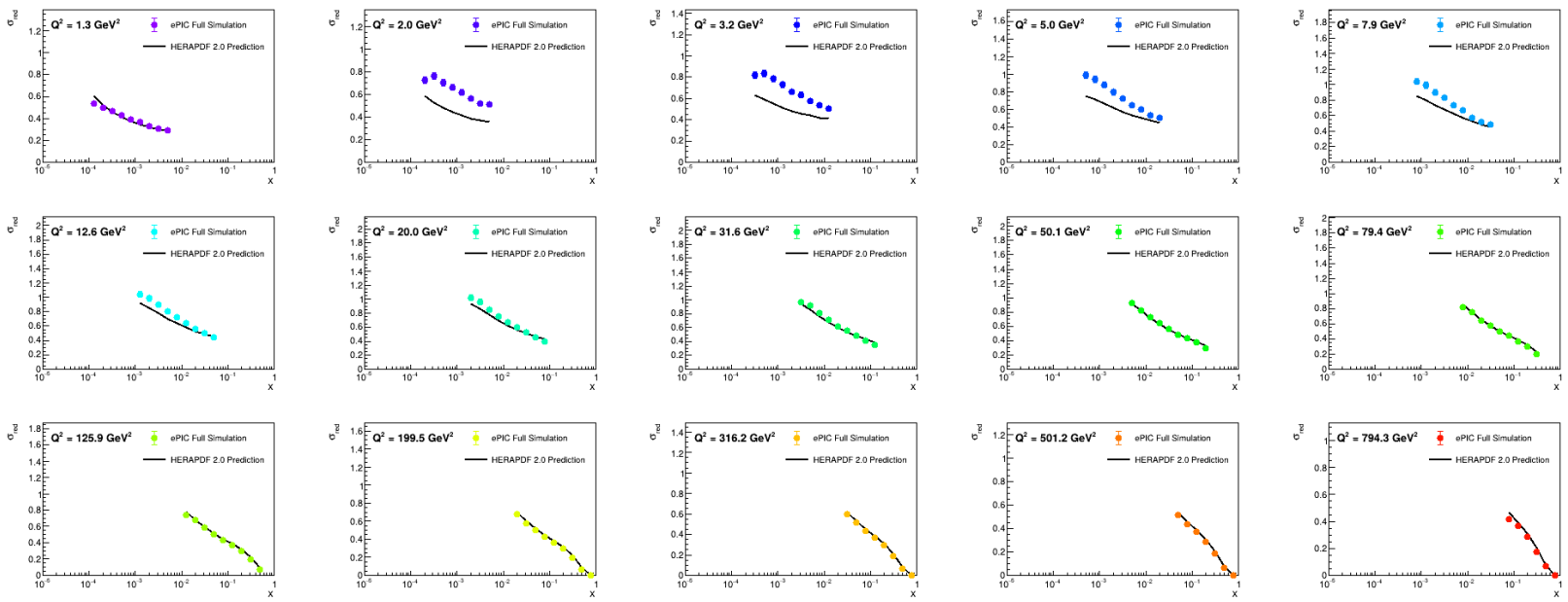


Note different c.o.m. energy

Reduced Cross Sections vs x (18x275 pythia6 w/ HERAPDF1.5)

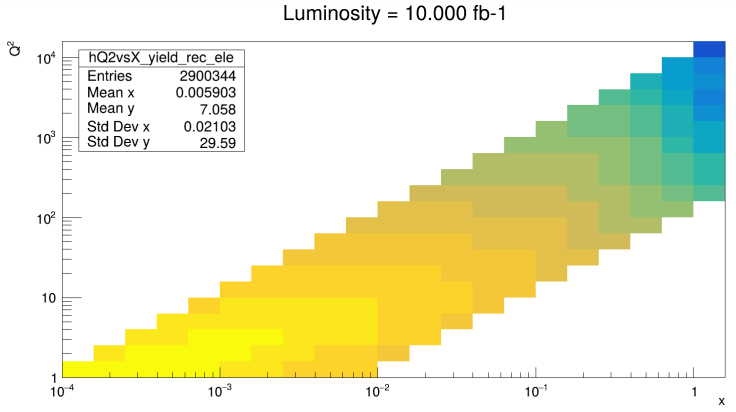
- **Pythia6: HERAPDF1.5 overestimates at low Q^2 more than CTEQ61**
  - **Note: different c.o.m. so lower x than previous slide**

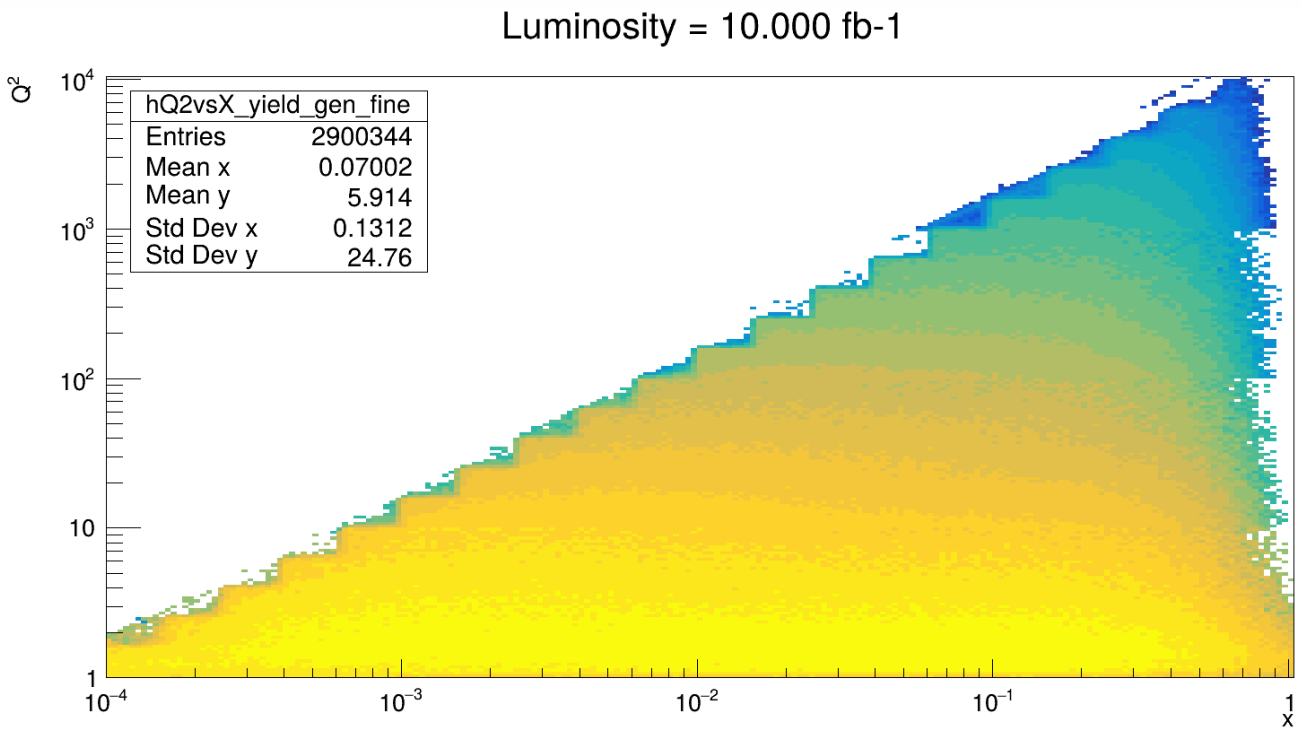
18x275 ep σ_{red} vs x (25.04.0, pythia6 w/ HERAPDF1.5)



Pythia8 Generated Events

- **Generated events vs x-Q^2 (after y_{ele} cut)**
  - **Number of events at low-x and Q^2 underestimated?**





Next steps

- **Double check BCC**
- **Generate + run Djangoh events → compare**
- **Generate + run Djangoh w/ QED=on → study radiative corrections**

A comment on systematics and path forward

- **To date we've used a lot of educated guesswork (based on HERA experience) for systematic estimates**

- **Note that systematics dominate t uncertainty except at the very largest x-Q² values**

- **My take: we should prioritise getting some informed systematics estimates for the preTDR as well as:**
  - **Money plots for eA (light and heavy A) → ratios? e.g. σ_r^D/σ_r^p, σ_r^{Au}/σ_r^D ?**