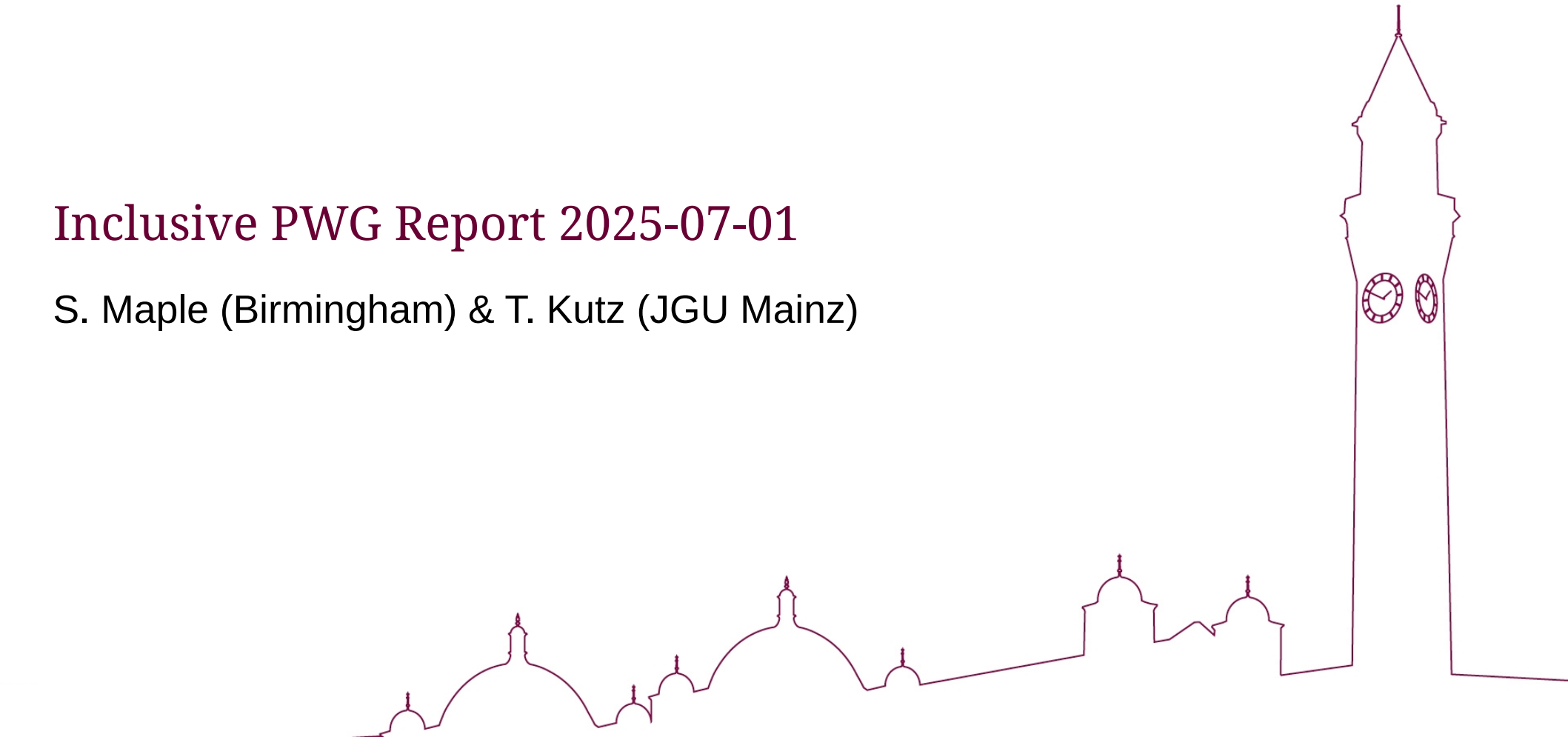
UNIVERSITY OF BIRMINGHAM | SCHOOL OF PHYSICS AND ASTRONOMY

Inclusive PWG Report 2025-07-01

S. Maple (Birmingham) & T. Kutz (JGU Mainz)



Last meeting 2025-06-17

Inclusive PWG meeting

Tuesday 17 Jun 2025, 16:00 → 17:00 Europe/London

Description Zoom link: https://mit.zoom.us/j/92661341001

16:00 → 16:20 **Update on eID**

Speaker: Win Lin (Stony Brook University)

EID progress II.pdf

16:20 → 16:35 **Update on systematics studies**

Speaker: Stephen Maple (University of Birmingham)

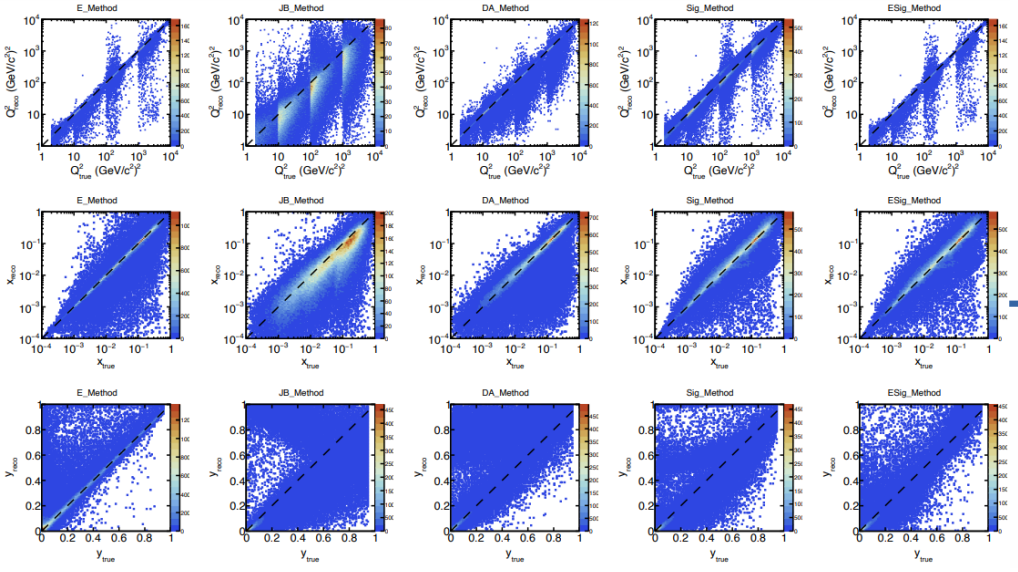
inclusive_systemati...

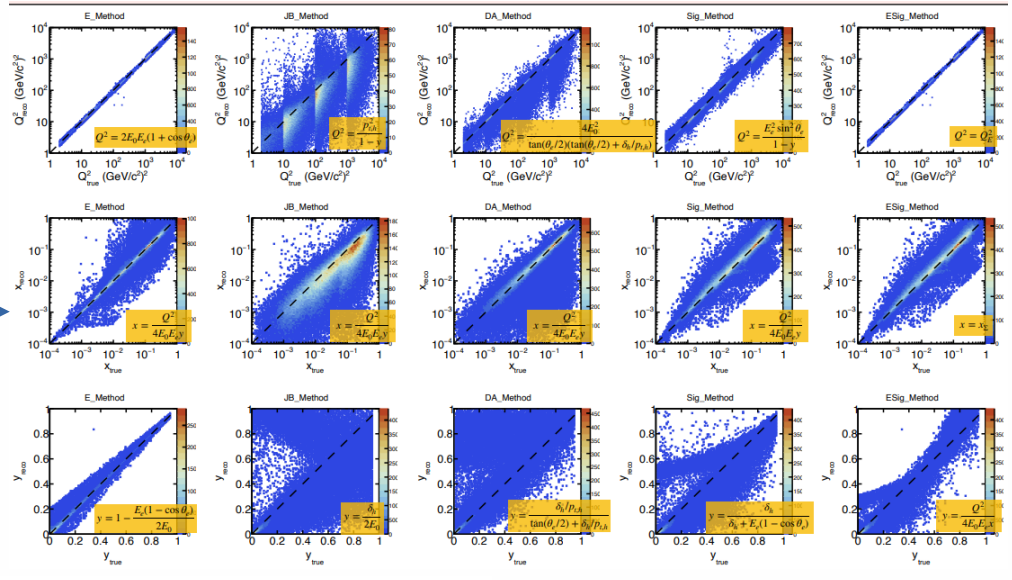
16:35 → 16:55 **Discussion: Available Topics/Projects for New Analysers**

Speakers: Ciprian Gal (Jefferson Lab), Juliette Mammei (University of Manitoba), Stephen Maple (University of Birmingham), Tyler Kutz (MIT)

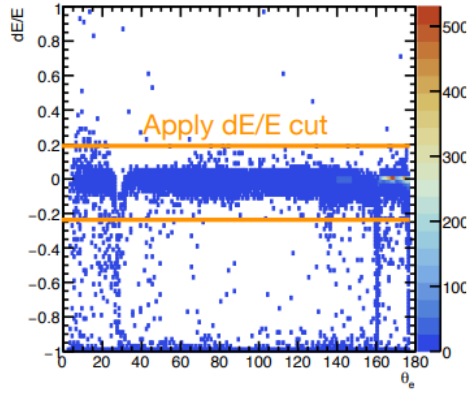
Inclusive Task List ...

Update on eID (W. Lin, SBU)

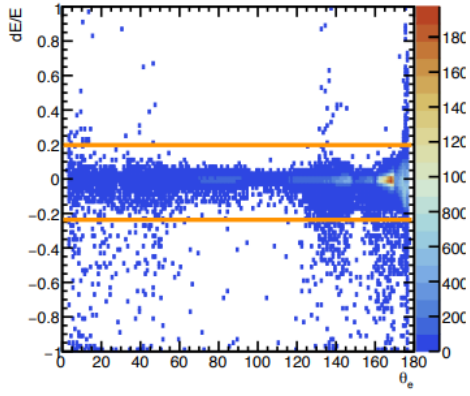




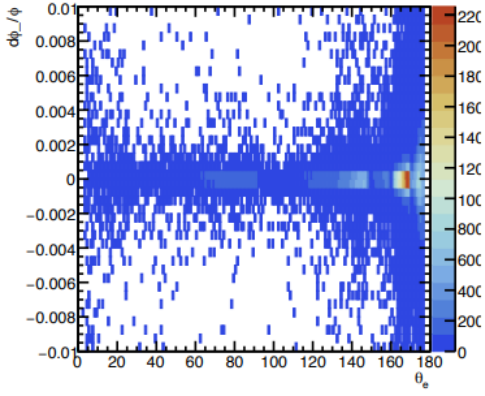
dE_{cal} vs θ_{mc}



dE_{track} vs θ_{mc}



$d\phi$ vs θ_{mc}



Tails removed in electron method by requiring strict E_e recon → mostly removes events in calorimeter transition region

Update on inclusive A_1^n from e-^{3}He (W. Lin, SBU)

A_1^n from e^3He DIS:

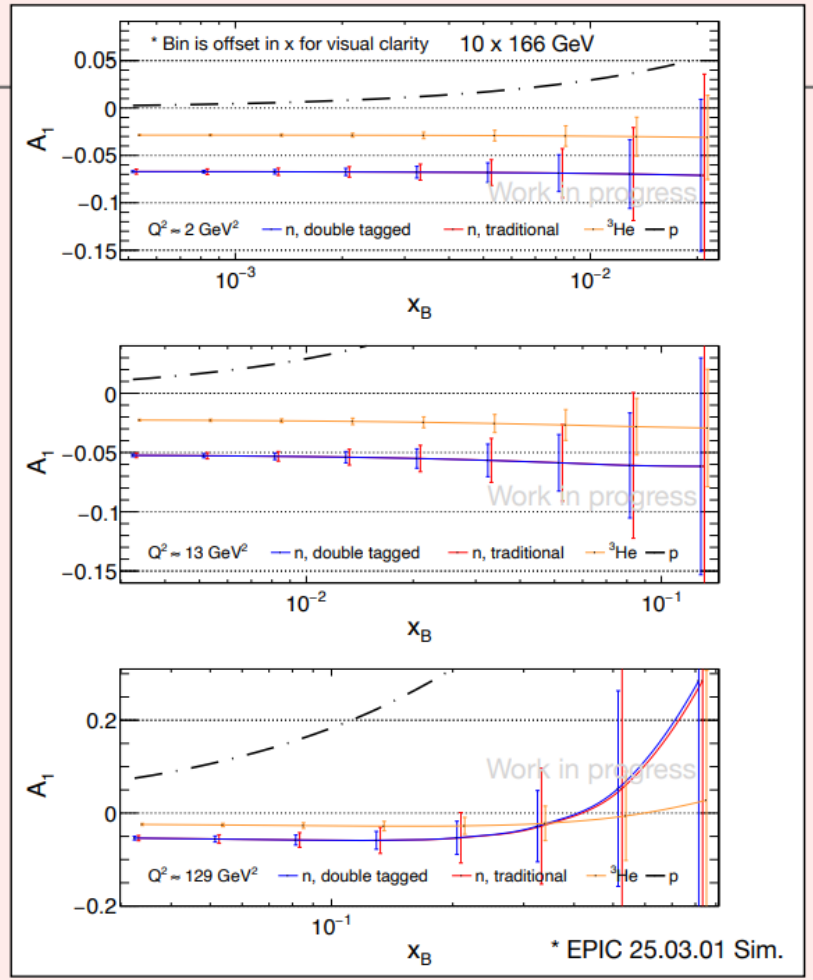
- $A_1(x,Q^2) \equiv \frac{\sigma_{1/2}-\sigma_{3/2}}{\sigma_{1/2}+\sigma_{3/2}} = \frac{A_\parallel}{D(1+\eta\xi)} - \frac{\eta A_\perp}{d(1+\eta\xi)}$
- $\mathscr{L} = 8.65\ \mathrm{fb}^{-1}$, $P_e = P_n = 70\,\%$
- Data split evenly between $A_\parallel$ and $A_\perp$
- $\delta A_{\parallel,\perp} = \frac{1}{\sqrt{N} P_e P_N}$

Correction!

- $A_1^{^3\mathrm{He}} = P_n \frac{F_2^n}{F_2^{^3\mathrm{He}}} A_1^n + 2P_p \frac{F_2^p}{F_2^{^3\mathrm{He}}} A_1^p$

↖ Was using $F_2^{^3\mathrm{He}}$ per nucleon

- Bin A_1^n calculated from: Doi: 10.2172/824895
- $F_2^{^3\mathrm{He}} = F_2^D + F_2^p$, all F_2's are taken from JAM22
- Correction not yet applied

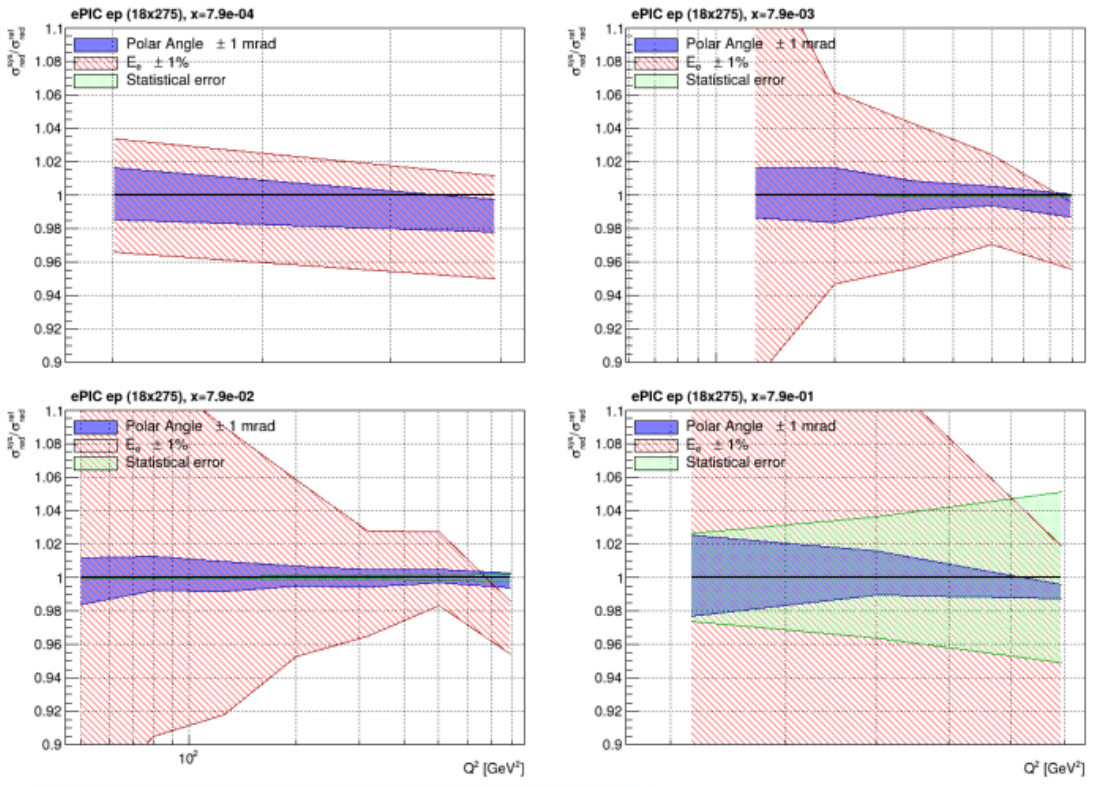


Update on impact of systematics for NC cross sections

Results

- After repeating the same analysis procedure (same acceptance and BCC), compare result to original analysis
- Note: at fixed x, lower Q^2 = lower y
- Systematics can be addressed in different ways
  - E scale uncertainty? DA method
  - Extend/merge bins in x/Q^2

Very preliminary



Initial look at impact of a couple of sys errors at HERA level

Ele only recon

Other possible sys errors to be studied, test with different recon methods, reevaluate binning scheme

Discussion on task list

- Opened discussion on current tasks

- Looking to update what is currently on wiki page and migrate to epic website

Software:

- Electron ID development - integration of eID with PID (refer to PID cross cutting group)
  - **Description:**
- HFS Reconstruction (Particle flow etc)
  - **Description:**
- Novel Reconstruction methods (Machine Learning/Kinematic Fitting)
  - **Description:**

- Others?

Physics:

- Inclusive NC cross sections + structure functions (polarised/unpolarised/ep/eA)
  - F2(p,d,A), FL(p,A), A1p, A1n etc
  - **Description:**
- Inclusive CC cross sections
  - **Description:**
- Separating physics from backgrounds (photoproduction, beam related etc)
  - **Description:**
- Inclusive photoproduction
  - **Description:**
- Optimising E-pz for improving s/b in conditions such as photoproduction + radiative events
  - **Description:**
- Systematic uncertainties
  - **Description:**
- Others?