# Systematics

| Systematic uncertainty | Achieved at H1/ZEUS* | Use for EIC studies | Plans |
|---|---|---|---|
| Electron finder efficiency | 0.2-5% (increase w y) | Study → | Tighten and relax cuts used in e-finding → study variation in efficiency |
| Electron energy scale | 0.5-1.9% (increases w y) (1-5% on σ) | 0.5%? | Use this, unless we get estimates from DSCs |
| Electron polar angle | 1mrad | 1mrad? | Use this (or maybe smaller value), unless we get estimates from DSCs |
| Hadronic energy scale | 1% (0.5-4% on σ) | 1%? | Use this, unless we get estimates from DSCs |
| Photoproduction background | 10% (0.5-3% on σ) | Study → | Compare number of events produced by different generators that are reconstructed as DIS |
| QED radiative corrections | 0.3-2% (increase w x,y) | Study → | Compare size of radiative correction in bins with two different event generators |
| Luminosity | 1.5% | 1.5% | Use this (estimate 1-1.6% see Alex Smith's talk) |
| Polarisation | N/A (<2% for electrons?) | 1.5% ? | Use this (estimate from those working on machine) |

* choosing the better of the values in previous publications from H1, ZEUS

# Plans for Systematics

- Remaining items on the list need studying
  - Electron finder – need efficiency benchmarks first
  - Photoproduction background estimation – need event generator samples (Pythia+Herwig?)
  - Radiative corrections – Djangoh samples coming, need Rapgap samples too

- Other items should be included in existing analyses → we have something like this for NC cross sections, is something possible for A1 studies?
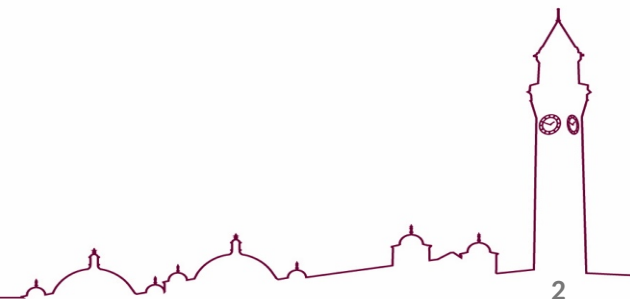
# Plans for Backgrounds

- Samples including DIS, beam-gas, SR, and min-bias DIS being generated

- Need to compare results with these samples to pure signal results
  - $E-p_z$ cut will be important to apply/optimise

- Other studies also needed
  - Impact on electron finding
  - Impact on reconstructed kinematics
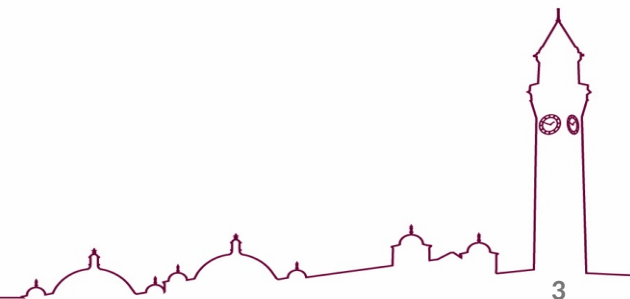
# ToDo items for the PreTDR

- Pion contamination plot (max 10% per bin from yellow report)

- Bin migration plot (to complement kinematic resolution plot)

- Single NC cross section plot for all c.o.m. energies

- Evaluate electron finding in the presence of DIS and background