What was done in CDR

- Simulation of the range of diffractive kinematics
- Simulation of diffractive structure function for proton using H1 fit B and saturation models

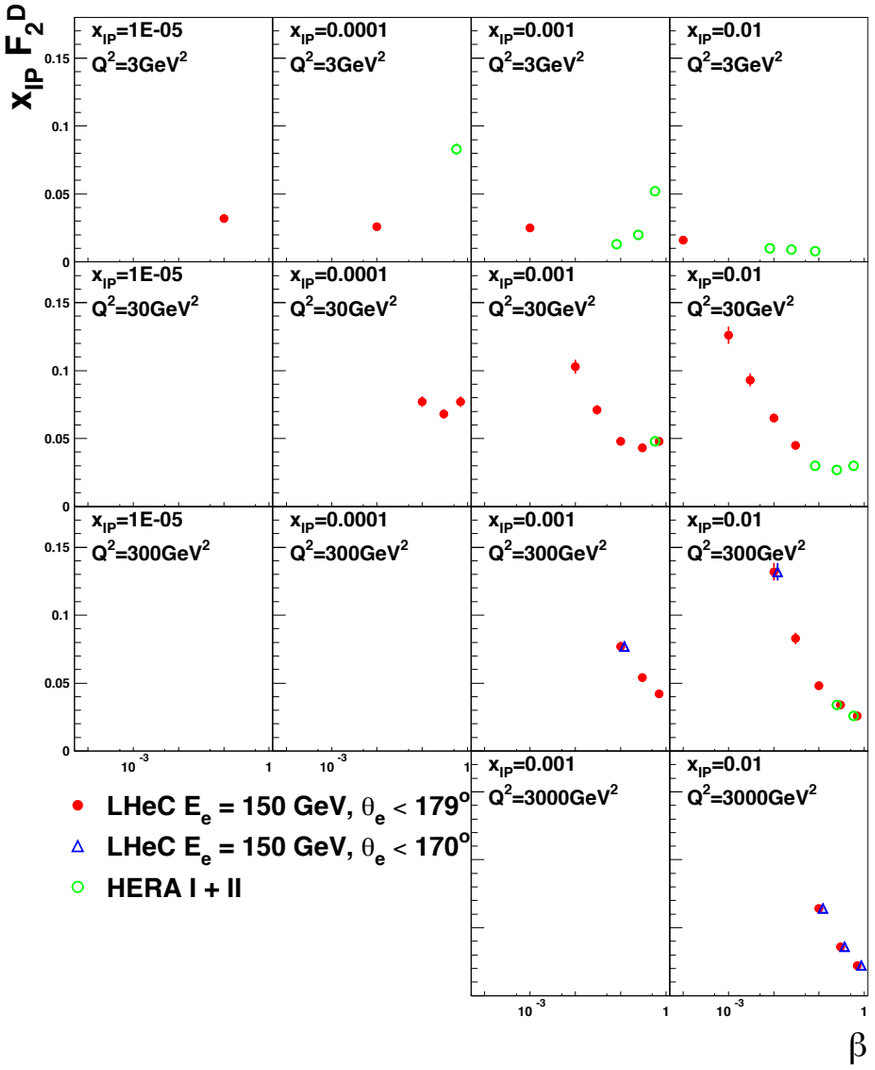

Figure 4.39: Simulation of a possible LHeC measurement of the diffractive structure function, F_2^D using a 2 fb^{-1} sample, compared with an estimate of the optimum results achievable at HERA using the full luminosity for a single experiment (500 pb^{-1}). The loss of kinematic region if the LHeC scattered electron acceptance extends to within 10° of the beam-pipe, rather than 1° is also illustrated.

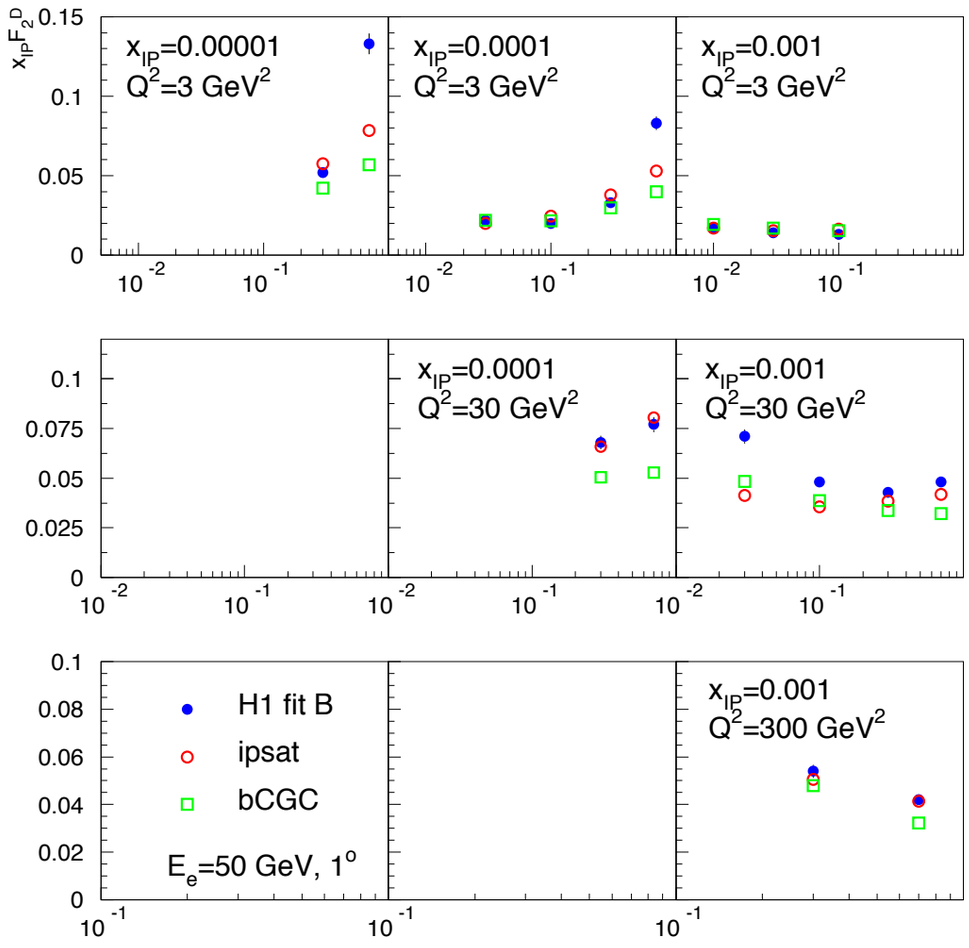

Figure 4.44: Simulated F_2^D measurements in selected $x_{\mathbb{P}}$, β and Q^2 bins. An extrapolation of the H1 Fit B DPDF fit to HERA data is compared with two different implementations of the dipole model, both of which contain saturation effects and include $q\bar{q}g$ photon fluctuations in addition to $q\bar{q}$ ones.

What was done in CDR

- Simulation of diffractive structure function for lead
- Systematics estimated to be 5%
- Ratio of diffractive to total

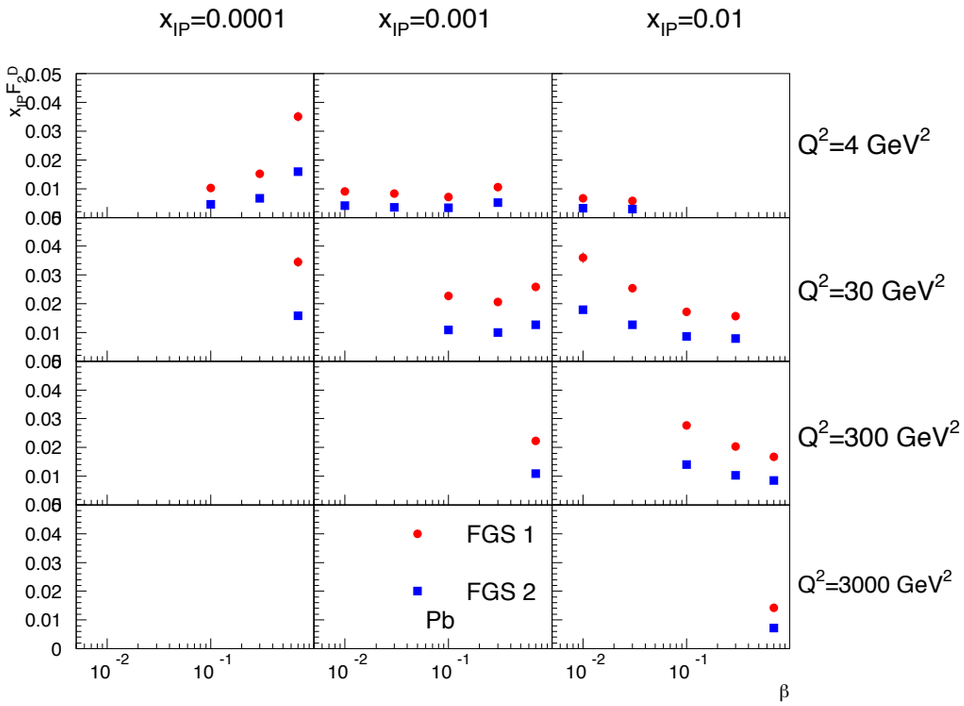

Figure 4.45: Diffractive structure function $x_{\mathbb{P}}F_2^D$ for Pb in bins of Q^2 and $x_{\mathbb{P}}$ as a function of β. Model calculations are taken from [408].

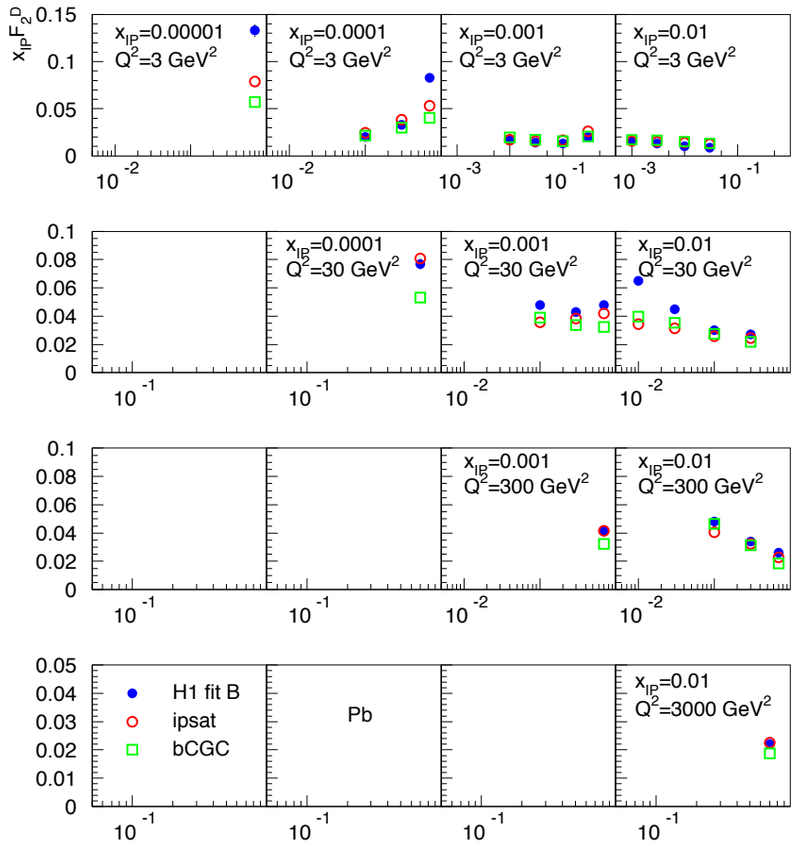

Figure 4.46: Diffractive structure function $x_{\mathbb{P}}F_2^D$ for Pb in bins of Q^2 and $x_{\mathbb{P}}$ as a function of β. Model calculations are based on the dipole framework [461, 462].

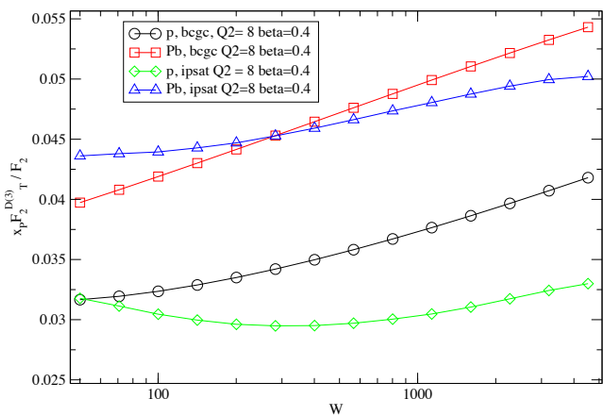

Figure 4.47: Ratio of the transversely polarised photon contribution to the diffractive structure function $x_{\mathbb{P}}F_2^D$ to the inclusive structure function F_2 in p and Pb for fixed values of Q^2 and β as a function of the energy W. Model calculations are based on the dipole framework [461, 462].

What should/could be done more

- Re-evaluate pseudodata with different errors taking into account better luminosity? What about systematics?
- Pseudodata for FCC-eh?
- Should we change binning for the presentation? LHeC/FCC have larger range of kinematics, can we better demonstrate that?
- Wojtek has started extracting the diffractive pdfs (see next slide). Demonstrate shrinking of the uncertainties
- Can we do the same for FCC?
- Nuclear DPDFS?
- What about dipole/saturation models? How can we demonstrate differences there? Nuclear ratios?
- More ideas: higher twist analysis, a la Motyka and Slominski?

First attempt to simulate DPDFs for LHeC by Wojtek

2 Extrapolation for LHeC

Here I normalize to $M_N = m_p$.

I make an estimate of predictions for LHeC by taking extrapolations of H1-2006B and ZEUS-SJ parameterizations with 15% uncertainty added. This 15% comes from ca. 10% normalization error + ca. 10% fit uncertainty.

Predictions from both parameterizations are also shown separately with 5% error bands to illustrate the expected improvement at the LHeC.

Maybe only one such curve (*e.g.* the average) would be better...

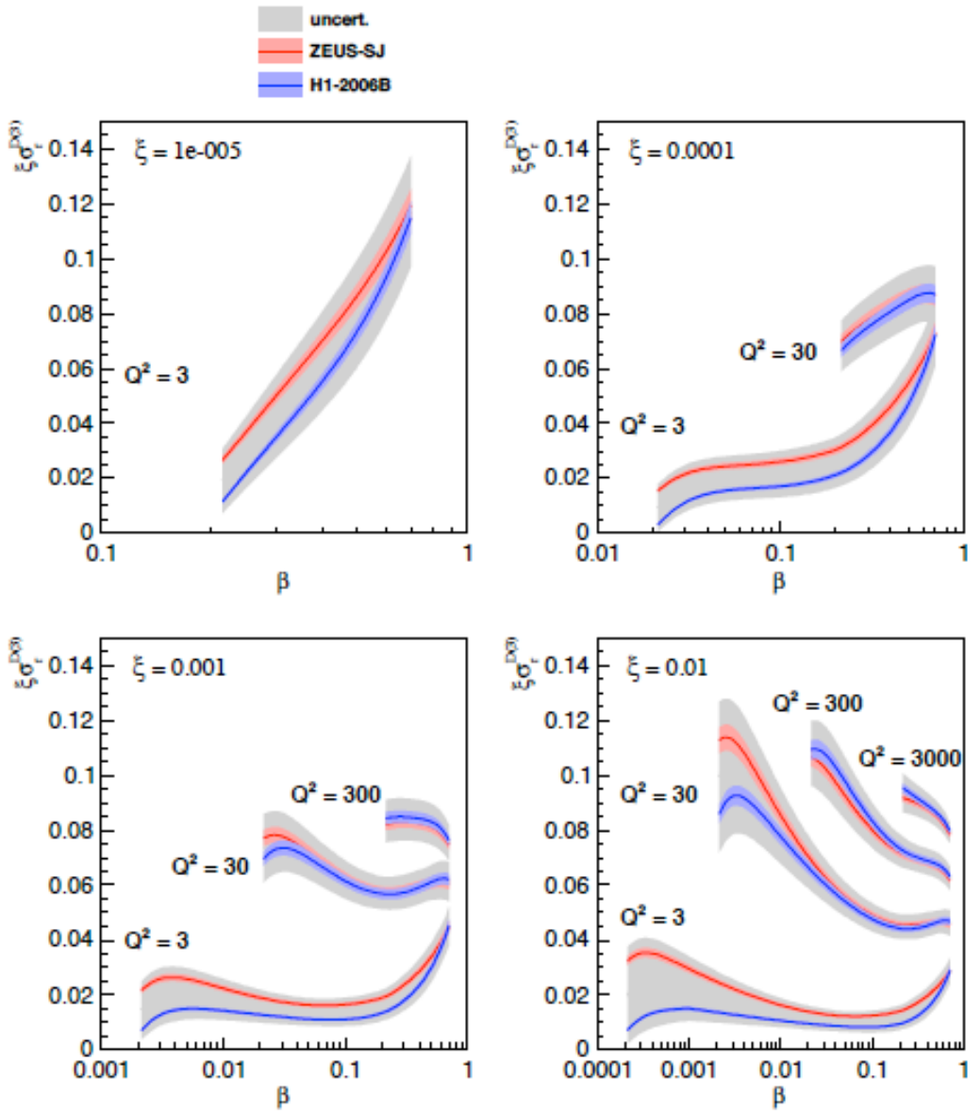

Figure 2: $E_e = 50\,\mathrm{GeV}$. The curves for $Q^2 = 3 \cdot 10^k$ are shifted up by $0.02 \times k$. The red and blue bands show 5% error. The grey band shows the uncertainty range of current parameterizations.