

LHeC Electroweak and precision QCD physics - CDR outline

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1. Precision PDFs, electroweak parameters and α_s from inclusive polarised $e^\pm p$ neutral and charged current events:
 - (a) *Max Klein, Claire Gwenlan, Emmanuelle Perez*: Introduction, simulated data and NLO QCD fit
 - Structure functions and relations/sensitivities to PDFs and electroweak parameters
 - **Selected accelerator/detector scenarios, simulated data and uncertainties and expected NC and CC yields vs Q^2**
 - Introduction of NLO-QCD fit
 - Expected (improvements for) PDF uncertainty bands compared to HERA for u_v, d_v, S and g vs x for fixed Q^2 .
 - Selected highlights: u/d for $x \rightarrow 1$; xF_3 and valence quark determination down to low x ; F_L for gluon; Possible extensions: exclusive final states jets, charm and beauty for: gluon and effective heavy quark densities in the proton; charm in CC for s and \bar{s}
 - (b) *Claire Gwenlan, Paolo Gambino, Nandi Soumitra*: Combined electroweak and PDF fit
 - Light quark axial and vector couplings to Z , Propagator mass $m_W, \sin\theta_W$
 - Theoretical uncertainties, higher order corrections
 - Electroweak analysis/sensitivity to new physics, fit oblique parameters
 - (c) *Thomas Kluge*: α_s determination
 - (d) *Stefano Forte, Alberto Guffanti, Juan Rojo*: PDF fits with NNPDF
 - (e) *Alessandro Vicini*: Relevance of LHeC PDF determination to LHC physics.
2. High pt jet data in DIS and photoproduction: *Thomas Gehrmann, Joerg Behr, Thomas Schoerner-Sadenius, Claudia Glasman, Juan Terron*
 - (a) **Experimental conditions: minimal pt cuts (trigger), acceptance and expected energy resolutions and scale uncertainties**
 - (b) Differential Jet Cross sections vs E_T and Q^2 ; (c) Sensitivity to the proton gluon density; (d) Determination of α_s ; (e) Photoproduction: resolved photon structure
3. Heavy Quark Production (charm and beauty) measurements at LHeC: *Olaf Behnke, Gokhan Unel, Max Klein* (+ find some Theoretician?)
 - **Experimental conditions: minimal pt cuts, θ acceptance, tagging efficiencies and purities**
 - Charm and beauty photoproduction and the proton gluon density
 - Heavy quark production in neutral current DIS
 - F_2^{cc} and the gluon density in the proton, intrinsic charm at large x
 - F_2^{bb} and effective b -density in the proton, compared to $Z + b$ at LHC
 - Charm production in charged current DIS and determination of s and \bar{s} densities in the proton
 - Charm and beauty production at a $\gamma\gamma$ collider
4. Single top production at the LHeC: *Uta Klein*
5. Partonic structure of the Photon: *NN*
6. Prompt photons: *NN*
7. Other final state analyses (e.g. fragmentation studies of identified particles): *NN*