

Discussion session: Low x and diffraction

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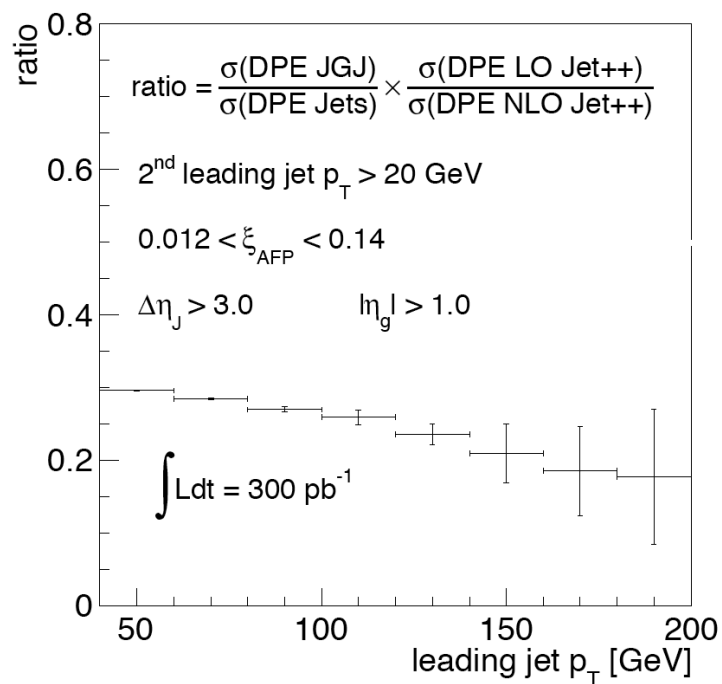
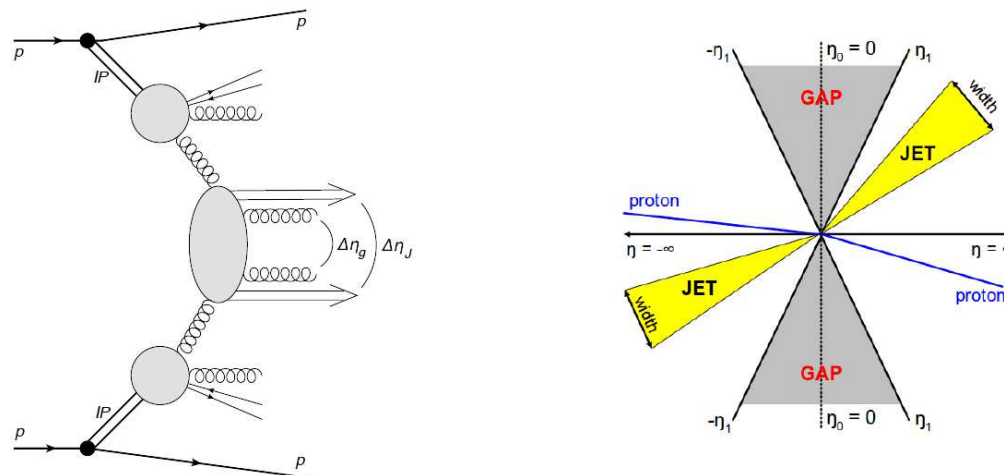
Contents:

- Elastic cross section: the need for 2 TeV data, non-exponential cross section
- Survival probability: high mass? gluon vs photon exchanges?
- Proton dissociation? Tag vs rapidity gaps?
- Factorization?
- higher order calculation in diffraction?
- MC tuning?



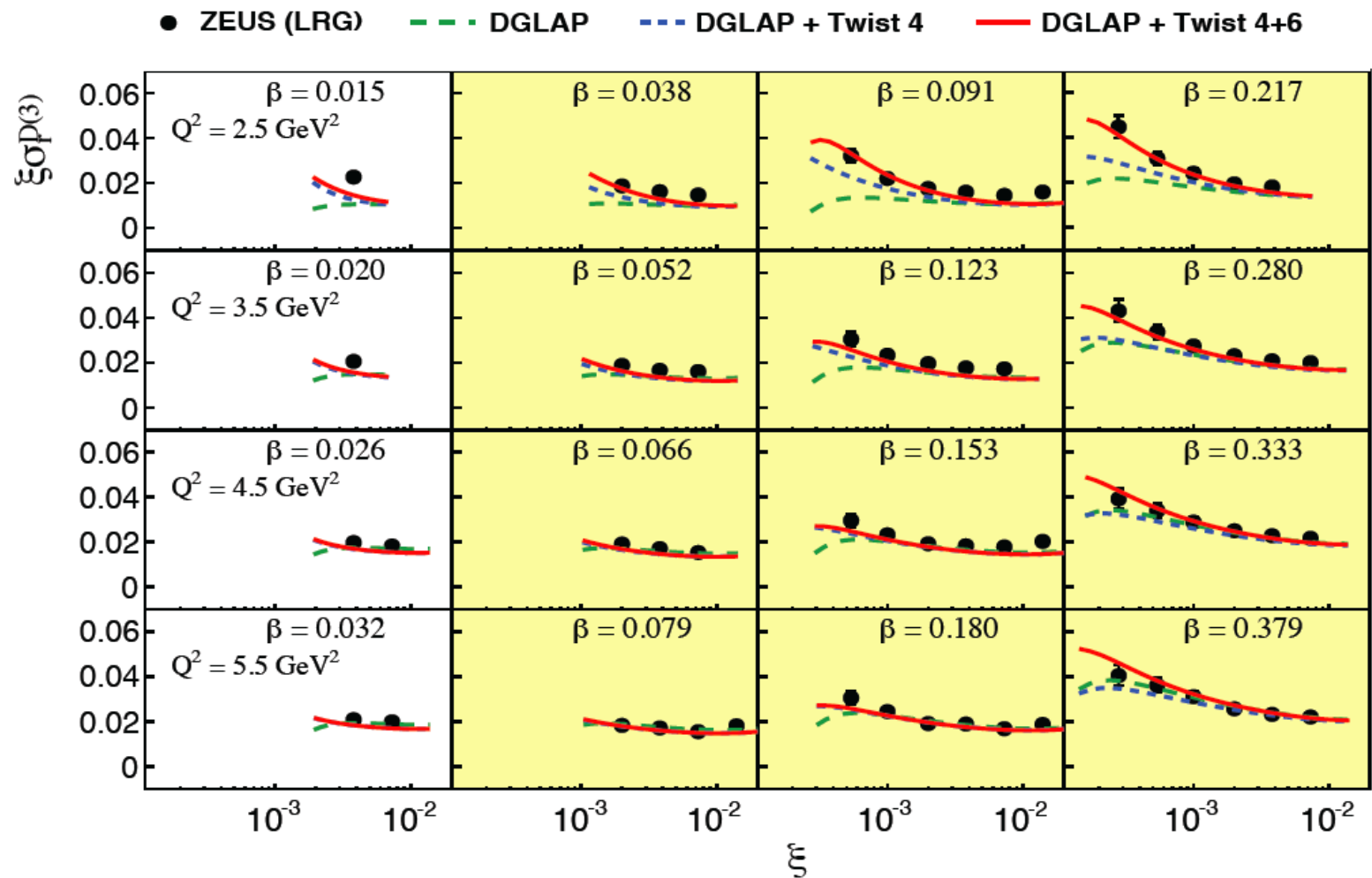
Looking for BFKL dynamics / saturation?

- Mueller Navelet jets
- Jet gap jets in diffraction or not



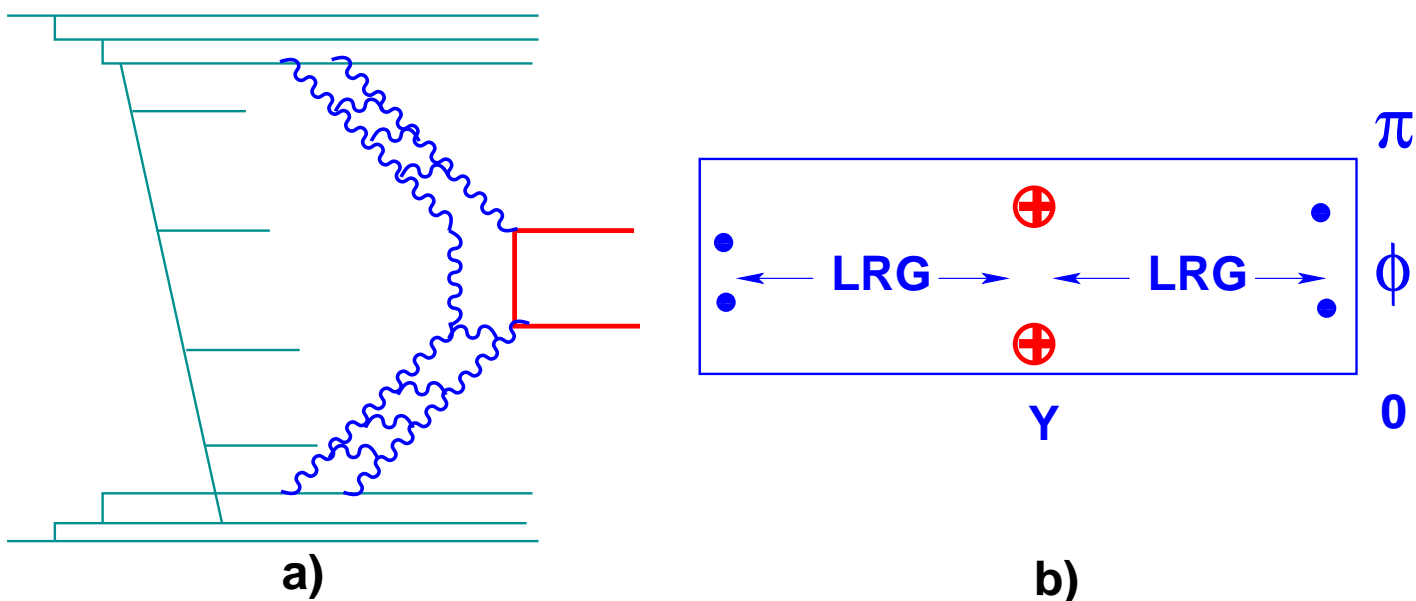
Higher twist contributions

- Diffractive data at HERA cannot be described at low Q^2 : higher twists 4 and 6 evaluated by dipole saturation model (Motyka, Sadzikowski, Slaminski)
- Improves the fit at low Q^2 : higher order calculations needed? dependence on A? energy? Can we see this at the LHC? Dedicated measurements?.



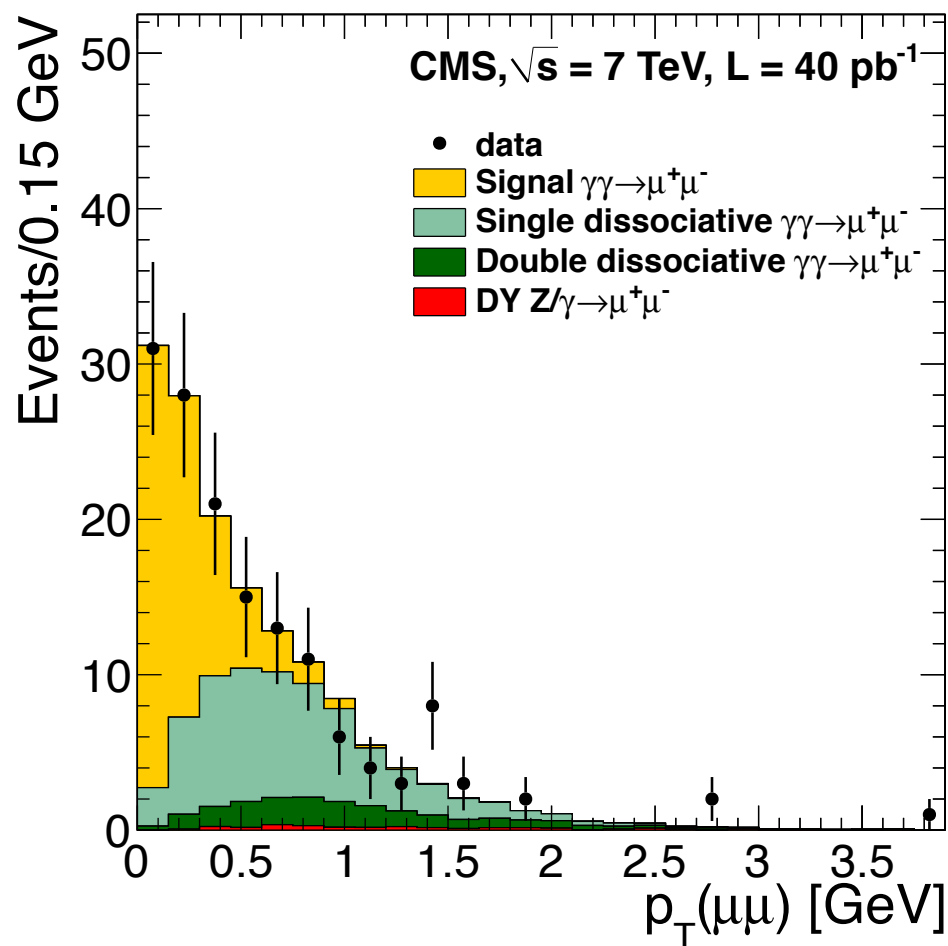
Hard diffraction: survival probability/factorization

- LHC/HERA photoproduction: Factorisation is not expected to hold: soft gluon exchanges in initial/final states
- **Survival probability:** Probability that there is no soft additional interaction, that the diffractive event is kept
- Value of survival probability assumed in these studies: Computation of survival probabilities? Order of magnitude: 0.03 at 14 TeV for QCD exchanges, 0.9 for photon exchanges
- MC: Superchic 2 for exclusive observables
- Experimental observables (how to distinguish PDF from survival effects)? Ratio of cross section addressing the same kinematical space...



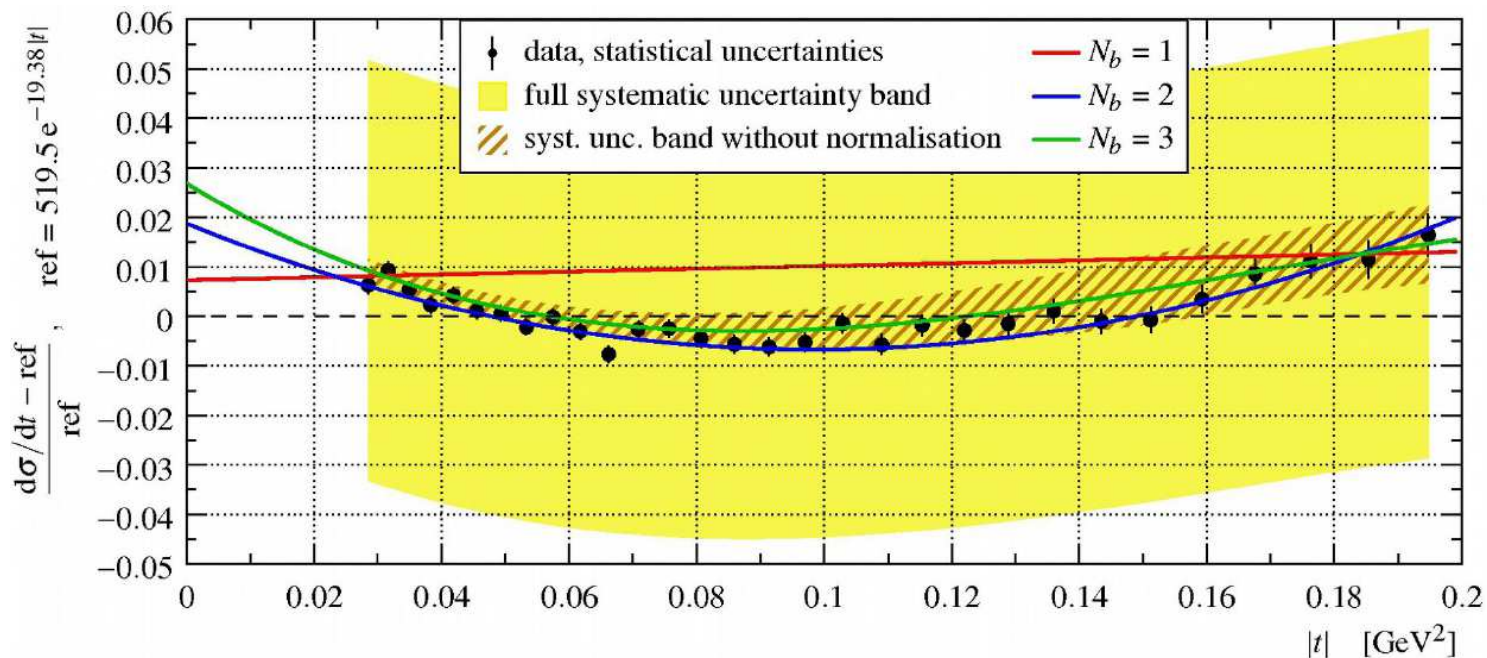
Proton dissociation

- At HERA: about 20% difference
- Can be measured at the LHC: Compare rapidity gap and tag methods
- Low mass di-lepton production in CMS: important contribution of proton dissociation



- Proton dissociation in Alice (higher masses): negligible...

pp scattering at 8/13 TeV: non-exponential form



- Exponential fit: $d\sigma/dt = A \exp(-B(t)|t|)$
- Pure exponential form ($N_b = 1$) excluded at 7.2σ
 - $N_b = 1$ $B = b_1$, reference
 - $N_b = 2$, $B = b_1 + b_2 t$
 - $N_b = 3$, $B = b_1 + b_2 t + b_3 t^2$
 - See Nucl. Phys. B 899 (2015) 527-546

Additional topics

- MC tuning for diffraction: which best variables to be used?
- MC tuning for different QCD dynamics (BFKL), which variables to be used, in which domain?
- MC tuning: which additional data? LHCf data taken, but might need proton-oxygen data for cosmic ray tuning?
- Exclusive production of χ_C ? Differences between KMR and Szczurek et al. predictions
- sensitivity to other model in diffraction: soft color interactions (cf Grzegorz's talk)
- AOB?

