SMALL x & SATURATION

relative to hadron scale

- HERA $\implies$ high Q^2 & small x

pQCD calcs.

Large range of rapidity

$\implies$ gluon self-interaction important.

- Thy. & expt. $\implies$ x sects rise rapidly with energy

Rise cannot continue for ever.

- Where is saturation?
How to find it?

Data — DIS (incl.)
— DIS (diffr.) $\Big]$ &c.
— Exclusive meson production.

Fits: pdf's &c   saturation?

Dipole model — saturation built in.

Various views — are they compatible?
— are they QCD?

Questions

1. Do the data actually support the dipole model & hard scattering approach?
   └ QCD-improved parton model "DGLAP" method.

2. How does one falsify either approach?

3. What is the relationship between the approaches? Are they as incompatible as they seem? What does QCD say?

4. Are there data in the saturation region? What impact does this have on measurements of gluon density & α_s?

5. What is relationship between saturation of dipole cross-section at large r & parton saturation at small x?

6. What is relationship between "saturation" & "shadowing"? Are they the same?

7. Can NLO "DGLAP" fit down to $Q^2 = 1 GeV^2$ coexist with dipole interpretation of F_2? Are these interpretations mutually exclusive?

8. Does assumed shape of dipole x-sect in GB-W model (&c.) imply that HERA has reached a new regime at moderate Q^2 & low x? Is it beyond DGLAP (to any order), BFKL, all pQCD?

9. How does one verify/refute saturation?

10. In diffraction: What is relation between hard-scattering factn. & dipole model? Are there assumptions in one approach that are broken by the other?

11. GB-W model has Regge factorization. Does this mean it contains Pomeron & its structure? Is Pomeron structure governed by DGLAP?

12. Regge factorization is NOT part of diffractive factorization theorem (of JCC)? To what extent does the fact that the diffractive pdfs obey DGLAP evolution guarantee that there's also Regge factorization?

13. What is/are the Pomeron(s)?

14. How does one extract $\sigma_{dipole}(r,s)$ from data?

9:00 - 9:10   Introduction   (Collins)

9:10 - 9:40   Expt. $\underline{I}$ (R. Yoshida)

9:40 - 10:10   Expt. $\underline{\underline{II}}$ (M. Klein)

10:10 - 10:15   Break

10:15 - 10:35   Theory $\underline{I}$ (J. Bartels)

10:35 - 10:55   Theory $\underline{\underline{II}}$ (J. Collins)

10:55 - 11:15   Theory $\underline{III}$ (K. Golec-Biernat)

11:15 - 11:30   Break

11:30 - 13:00   Discussion

               includes presentations by
Levin, Zotov, Kowalski

1400 on :   Sem. room 5 in bldg. 1b