

4 Pending Questions on the exclusive double Pomeron

or how theory can prepare for the future...

Robi Peschanski

SPhT, CEA Saclay

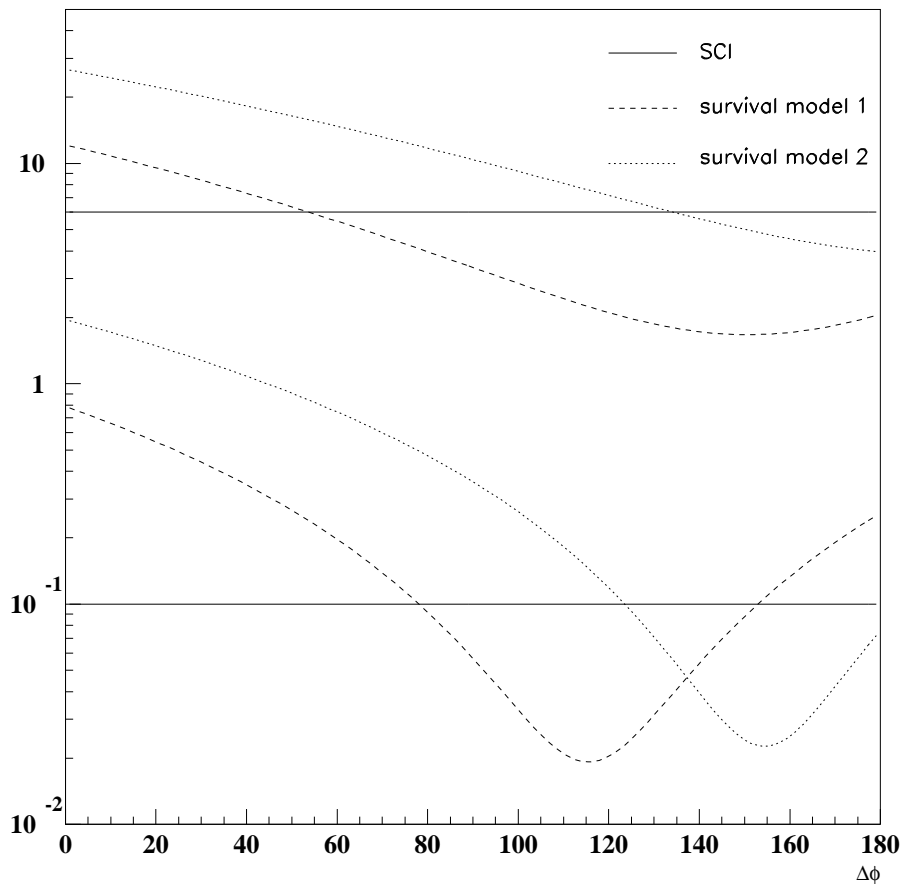
Manchester Workshop 12/04

- How to get precision in Rapidity Gap Survival (RGS)?
- How virtual form factors are taken into account?
- Proton- or Pomeron-induced process?
- Exclusive or Quasi-Exclusive process?

How to get precision in Rapidity Gap Survival (RGS)?

Exemple: “Decisive test for the Pomeron at the Tevatron”

hep-ph/0407222, A.Kupco’s talk

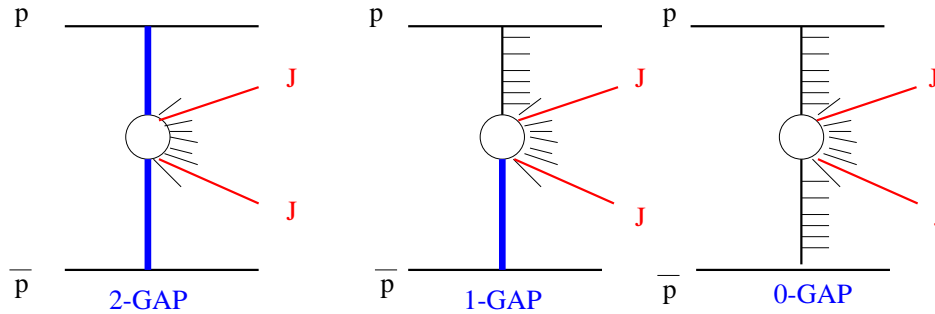


$\Delta\Phi$ distribution between the outgoing p and \bar{p} .

Gap Survival Model 2

A.Bialas: HERA/Tev; A.B.+R.P.: Tev/Tev

Diffractive/Non-Diffractive



- -0-Gap ND-Left/ND-Right
- -1-Gap ND-Left/D-Right + D-Left/ND-Right
- -2-Gaps D-Left/D-Right

Question: How these contributions emerge from soft interactions?

Formalism: Good-Walker + Glauber

Gap Survival Model 2: the ϵ^{hard} expansion

- (i) $p + \bar{p} \rightarrow p + (C) + \bar{p}$
- (ii) $p + \bar{p} \rightarrow p' + (C) + \bar{p}$
- (iii) $p + \bar{p} \rightarrow p' + (C) + \bar{p}'$,

Expansion:

$$\begin{aligned}
 |p\rangle &= |g\rangle + \epsilon^h |g + D\rangle + \epsilon_{\mathbb{P}}^h |p + D\rangle \\
 |p' + C\rangle &= -\epsilon^{h*} |g\rangle + |g + D\rangle + \epsilon^{h'} |p + D\rangle \\
 |p + C\rangle &= -\epsilon_{\mathbb{P}}^{h*} |g\rangle - \epsilon^{h'*} |g + D\rangle + |p + D\rangle
 \end{aligned}$$

Cross-sections:

$$\begin{aligned}
 \sigma_0(\vec{b}, y) &= X_{hard} X_{hard} \\
 \sigma_1(\vec{b}, y) &= X_{hard} Y_{hard} \times 1 - \sigma_{nondiff}(\vec{b}) \\
 \sigma_2(\vec{b}, y) &= Y_{hard} Y_{hard} \times 1 - \sigma_{inel}(\vec{b})
 \end{aligned}$$

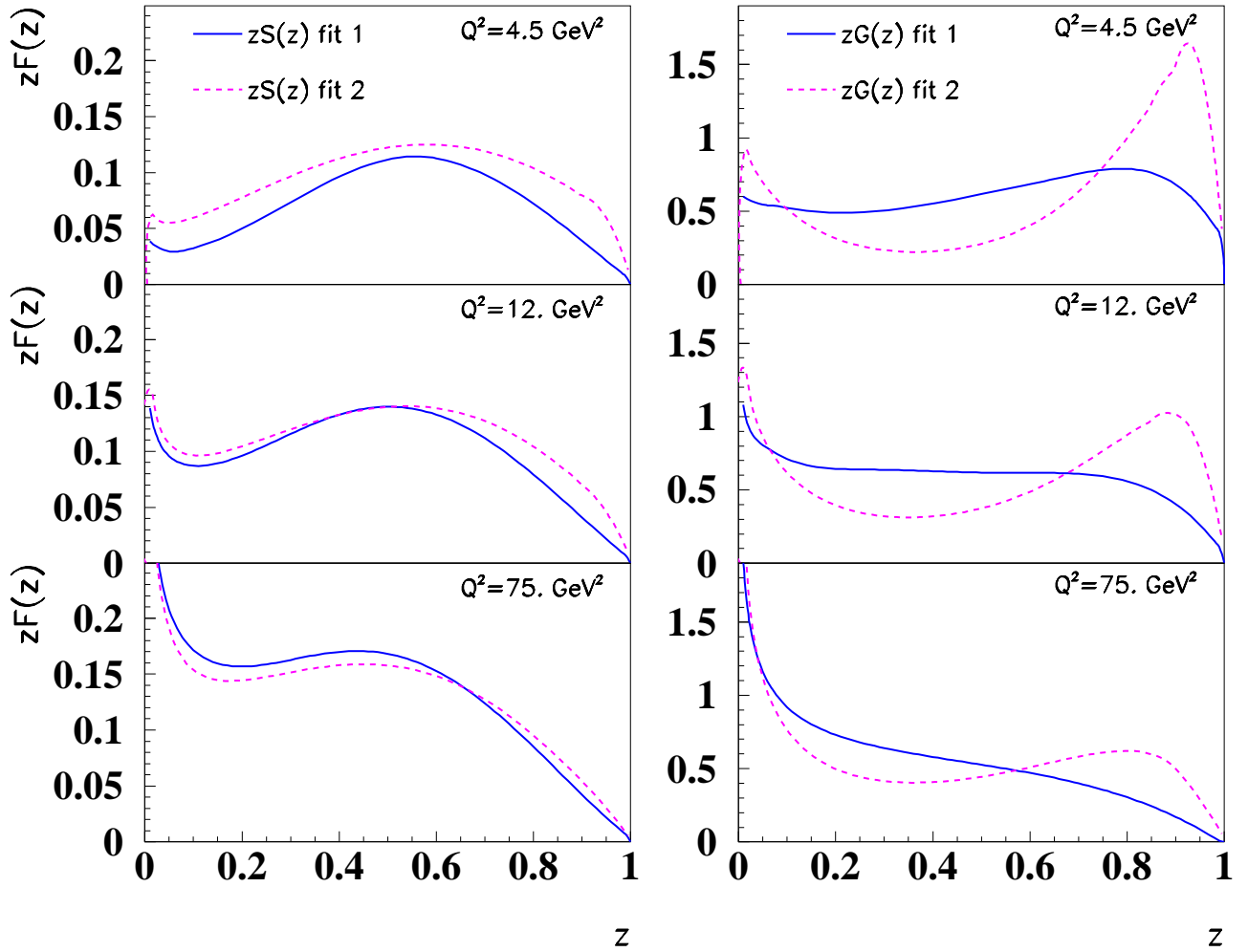
Results:

$$\frac{\sigma_2 \text{ Gaps}}{\sigma_1 \text{ Gap}} \sim \mathbf{5} \times \frac{\sigma_1 \text{ Gap}}{\sigma_{no \text{ Gap}}}$$

How Virtual Form Factors are taken into account?

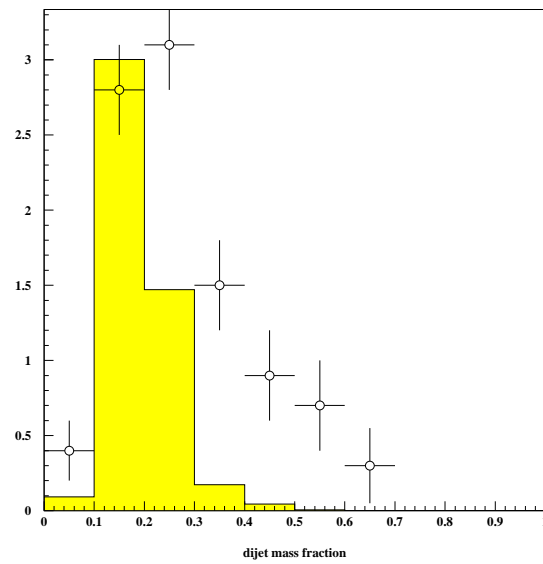
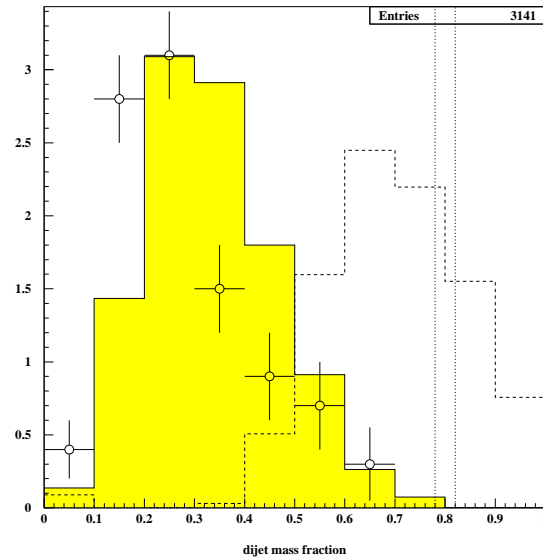
- Non-Sudakov form factors in BFKL Pomeron
- Sudakov Form Factors in $\mathbb{P} \rightarrow$ Hard transition
- Virtual Contributions in Pomeron Structure Functions near $\beta = 1$

Gluon density in the Pomeron



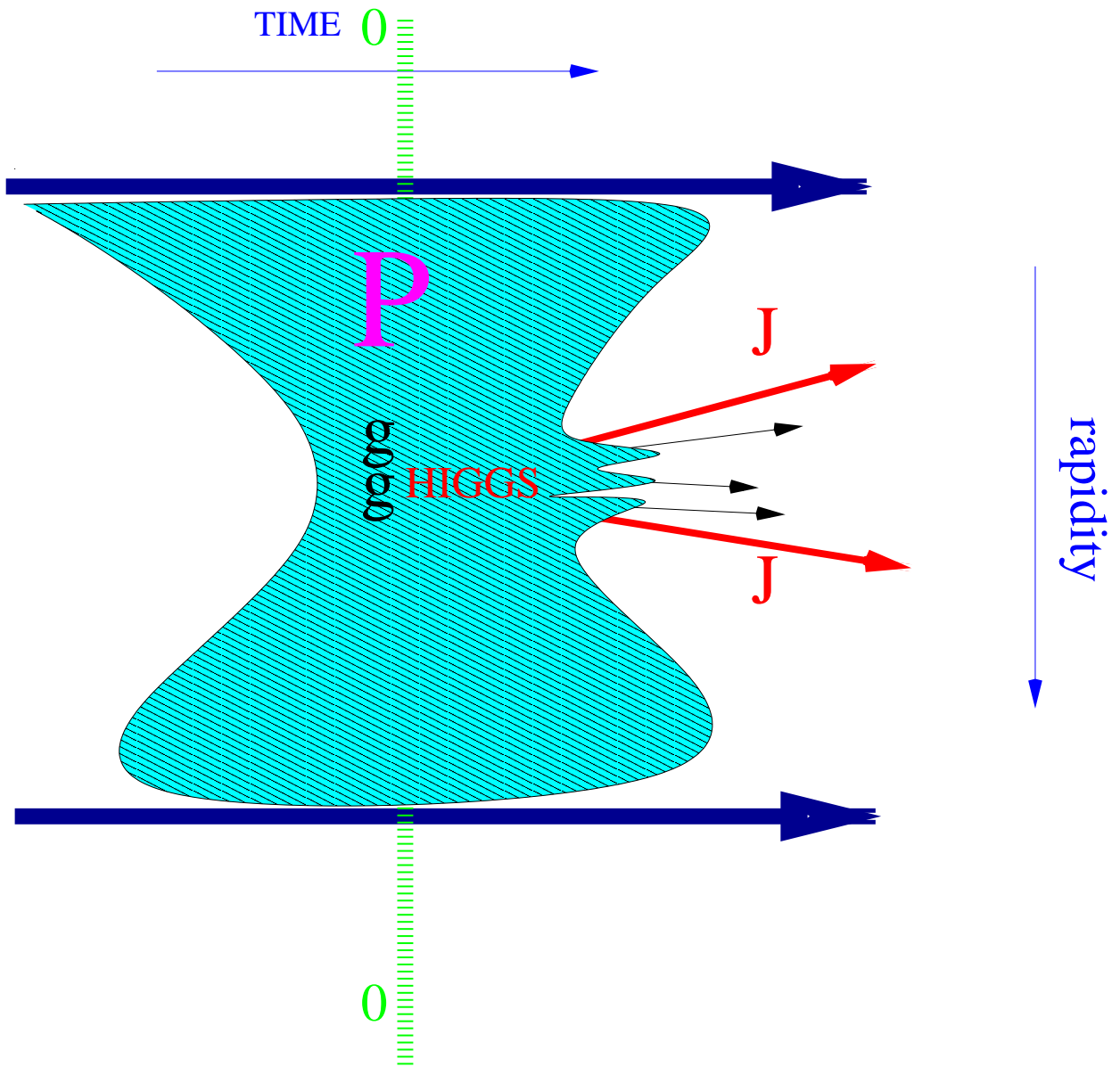
Proton- or \mathbb{P} -induced process?

Look first to inclusive data



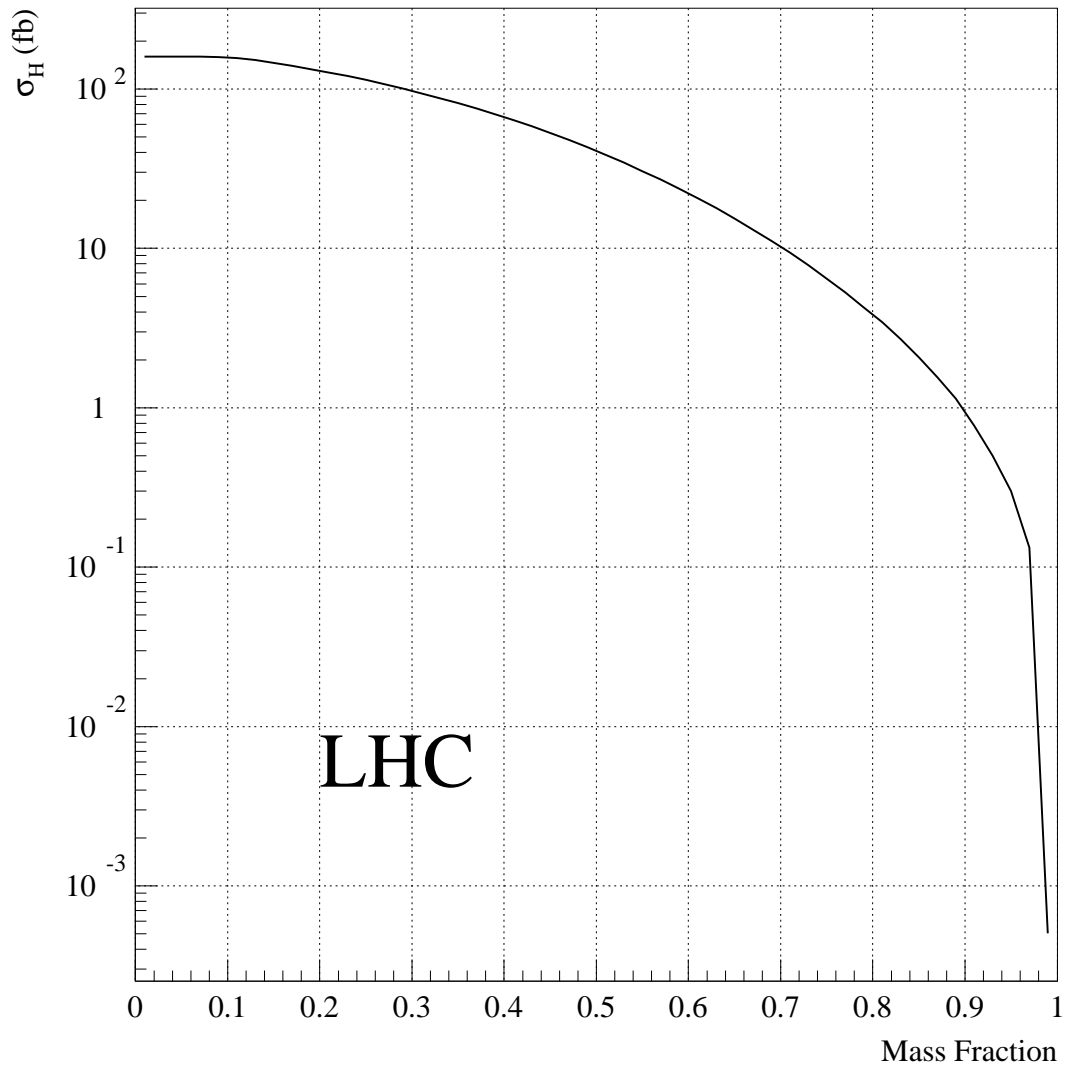
\mathbb{P} omeron as Source of Gluons

Interfacing Soft/Hard Interactions ?



Exclusive or Quasi-Exclusive process?

Study of the Quasi-Exclusive limit



Getting Answers...

- How to get precision in Rapidity Gap Survival (RGS)?
Tevatron Run II, for the models, in the best differential way
- How virtual Form factors are taken into account?
Dependence in initial state, hard scales, rapidity interval
- Proton- or \mathbb{P} -induced process?
Precise Investigation and Comparison of models
- Exclusive or Quasi-Exclusive process?
Understanding of the Connexion
Inclusive DATA/Exclusive LIMIT