

Diffraction Higgs: The Non-Factorizable Pomeron Models

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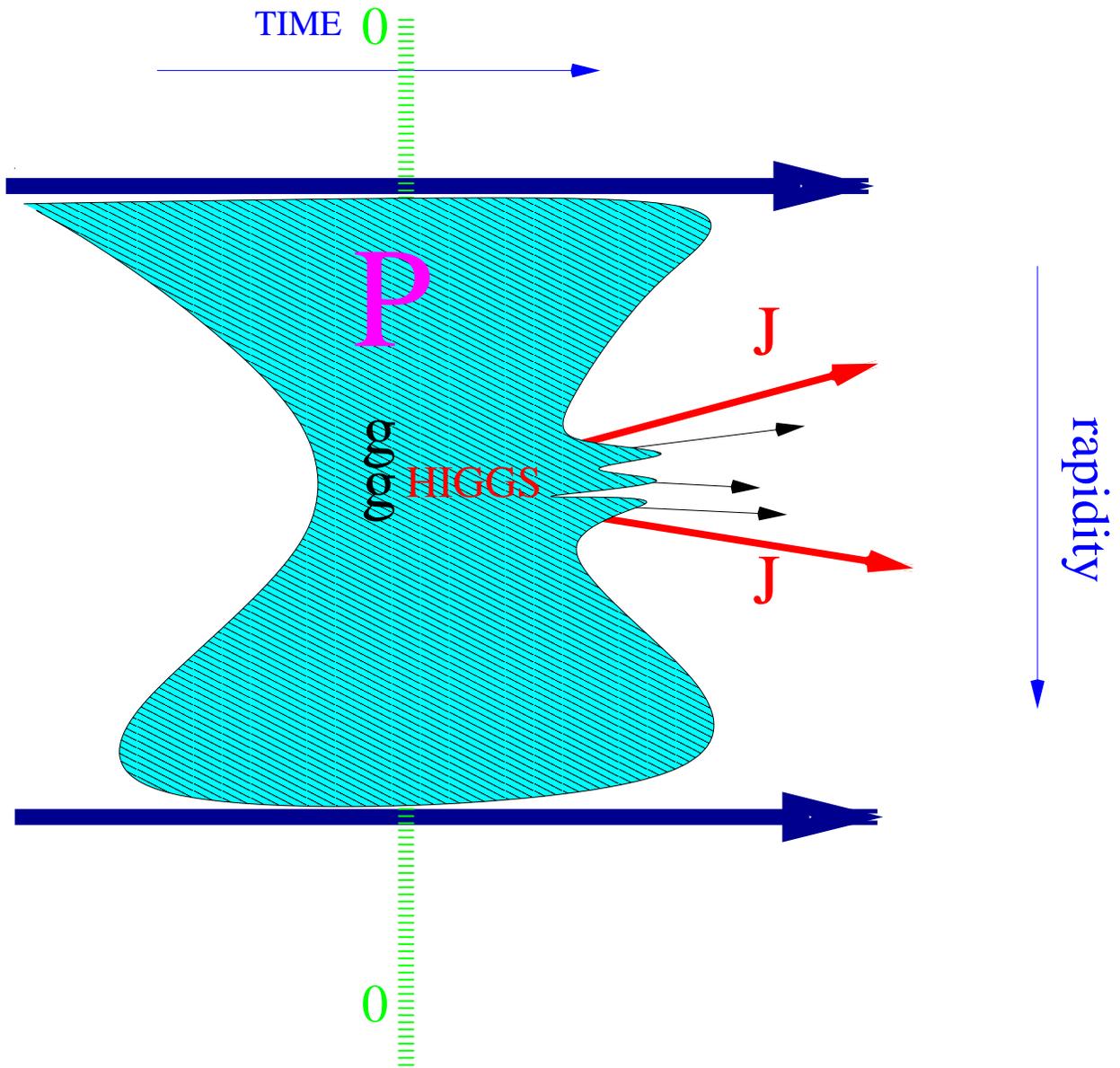
Contents

- **The Idea:** A soft/hard QCD Admixture
- **The Models:** The Excl./Inclusive Versions
- **The Tools:** Exemple: Evaluating the $b\bar{b}$ S/B

The question now: A correct determination of the
chances for Diffractive Higgses at LHC

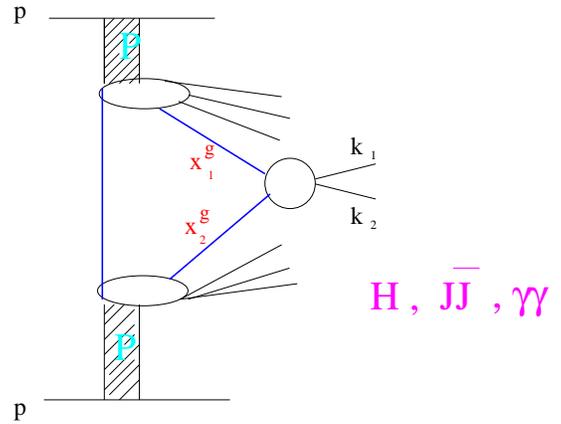
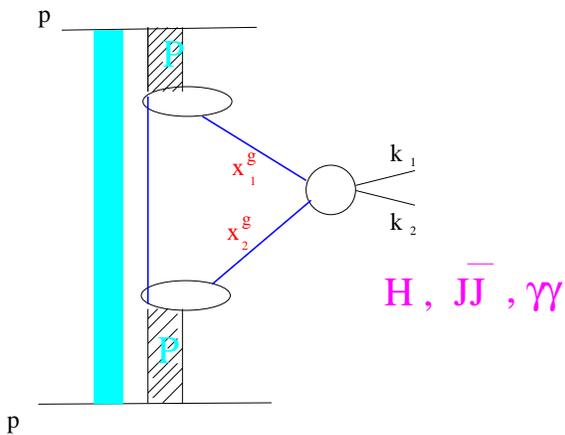
^aIn Collaboration with M.Boonekamp and Ch.Royon,
and now P.Demine, T.Kucs, A.Kupco

The general idea



Time Evolution \Rightarrow Hard QCD but Soft
Non-Factorized Pomeron

The Exclusive and Inclusive Versions



"Exclusive, Non fact. POM."

"Inclusive, Non fact. POM."

Exclusive production: gluon density $\delta(x_g - 1)$

$H, q\bar{q}$ Bialas-Landshoff/Szeremeta/Janik (+gg)

- Expected Good signal, $b\bar{b}$ suppression
- But Low X-sections, Rapid.Gap Survival

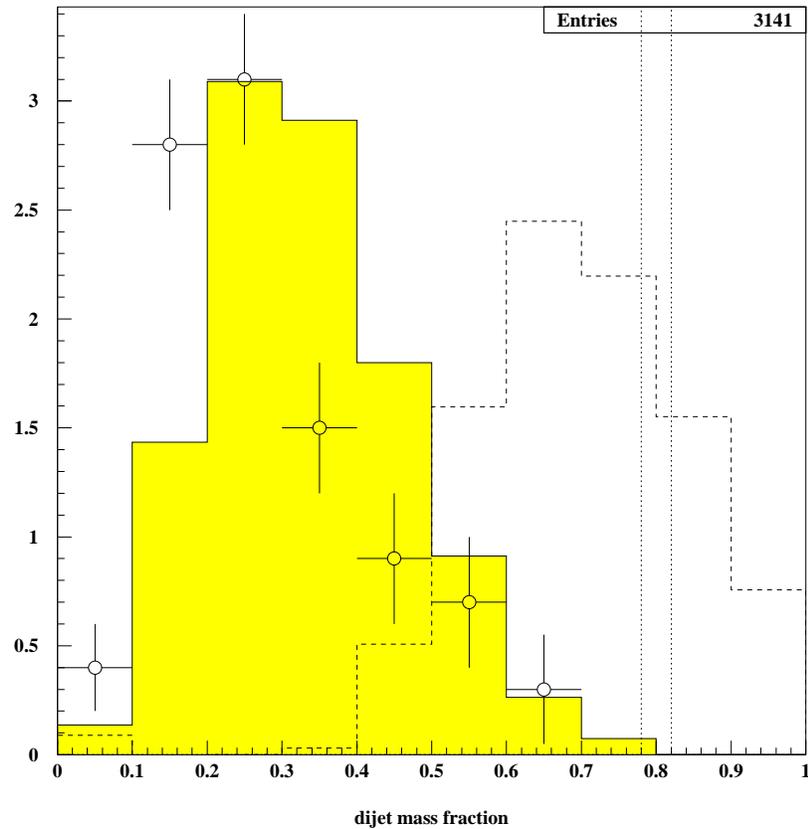
Inclusive production: from HERA: $x_g G_{\mathcal{P}}^g$

Boonekamp-R.P.-Royon

- Expected High X-sections, Quasi-Exclusive tail
- But no $b\bar{b}$ suppression, Pomeron remnants

Tevatron Constraints

CDF dijet mass fraction (2000)



- Dijet mass fraction: not “soft”, not “hard”
- Exclusive signal smeared and bounded!
- Constraints from Run II! $JJ, \gamma\gamma, l^+l^-$

BPR

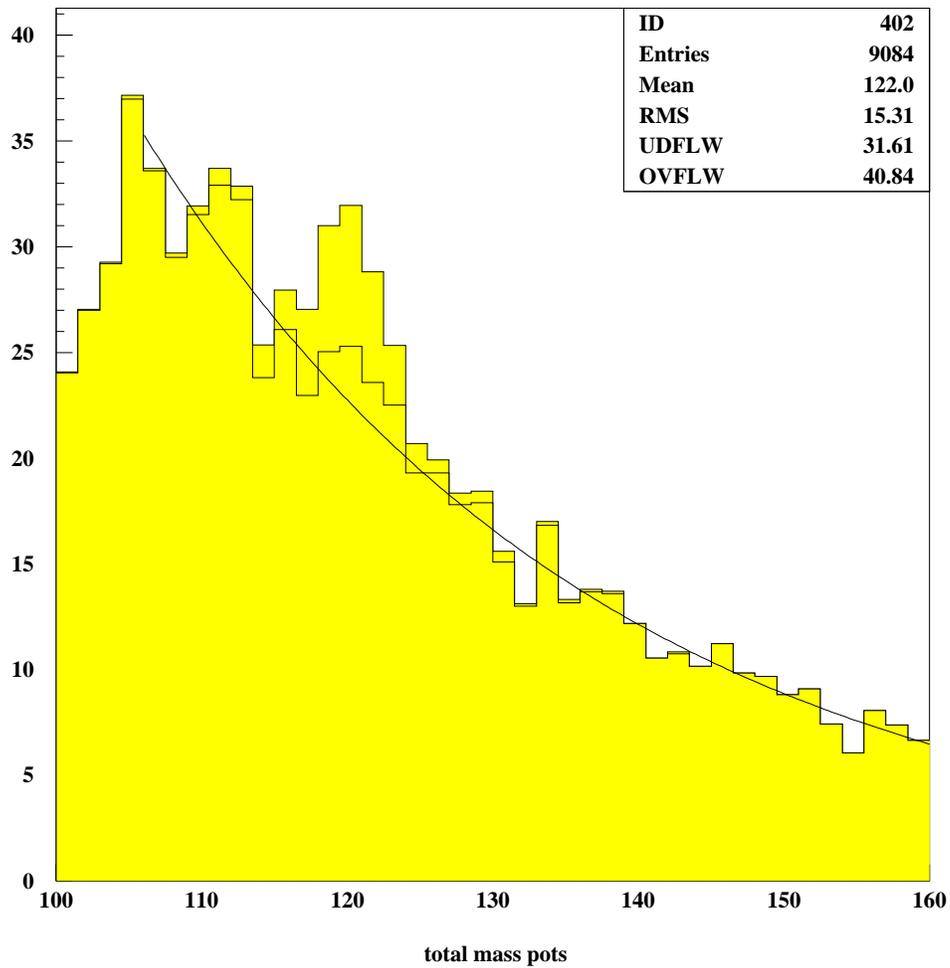
Tools

Monte-Carlo programs, Exclusive and Inclusive models, fast simulation of detectors

- **DIFFHIGGS** : with PYTHIA BPR (2001)
- **POMWIG V2.0** : Boonekamp-Kucs (2003)
- **GAP SURVIVAL** : BPR with A.Kupco (soon)

Signal/Background

Exemple: for $Higgs_{120}^{exclu.} \rightarrow b\bar{b}$ at LHC



Signal and background for 100 fb⁻¹

Details of background and signal for a 120 GeV Higgs
mass

$M(\text{GeV})$	(1)	(2)	(3)	(4)	(5)	(6)
117-118	2.8	0.2	13.9	0.1	1.9	61.
118-119	3.5	0.2	15.4	0.2	2.3	53.
119-120	4.6	0.3	13.0	0.2	3.0	57.
120-121	3.8	0.3	13.9	0.1	2.0	79.
121-122	3.7	0.2	13.3	0.3	3.0	64.
122-123	2.2	0.2	13.1	0.0	3.2	60.

- (1): QCD Exclusive Higgs (120 GeV)
- (2): QED Exclusive Higgs (120 GeV)
- (3): Exclusive $b\bar{b}$ background
- (4): Inclusive $b\bar{b}$ background ($xG < 0.95$)
- (5): Inclusive $b\bar{b}$ background ($xG < 0.9$)
- (6): Inclusive $b\bar{b}$ background (no cut on xG i.e. no cut on “hadronic activity”)

CONCLUSIONS

- Higgs bosons by Diffraction : Need for Correct Model Simulations, studies on S/B, Triggers

- Non-Factorizable Pomeron Models : Provide a hard/soft interface for both exclusive and inclusive production

- Inclusive production: Exp. constraint: Jets at TEV.

X-sect high at LHC, $b\bar{b}$ S/B: difficulty with remnants

- Exclusive production: Exp. constraint: Only a bound

$b\bar{b}$ S/B differ from Durham model

- Alternatives: Measure of Pomeron remnants, lower background for WW , $\tau\tau$