

What the Soft Color Intercation model tells us

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Manchester Workshop 12/03

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¹presented by R. Peschanski

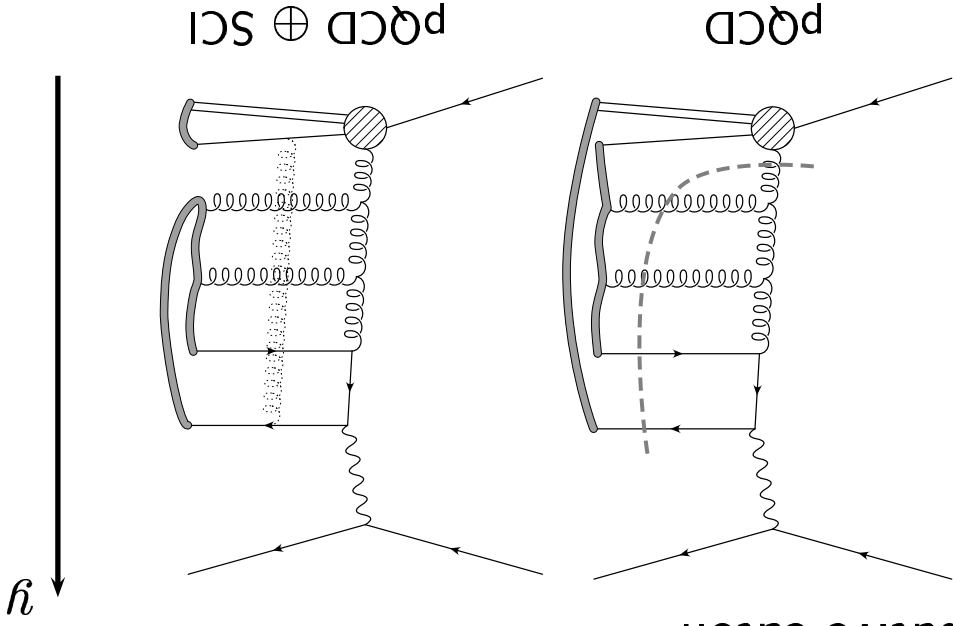
The Soft Colour Interaction model (SCI)

- Diffraction \leftrightarrow soft phenomena \rightarrow model soft physics

- Starting point: partonic final state described by pQCD **including parton showers**

- Model soft interactions below perturbative cutoff

Introduce SCI with negligible momentum transfer, which **change colour topology of the event** (given by pQCD) and thus the **Lund string configuration**:



SCI and hard diffraction at the Tevatron: W, Z, $b\bar{b}$, J/ψ

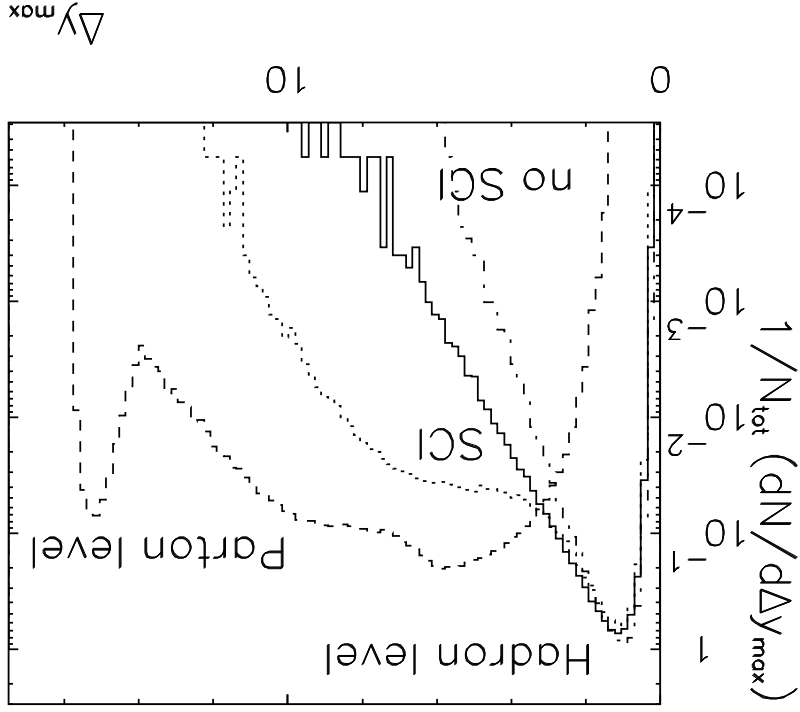
SCI/GAL reproduce well

measured gap fractions

$$R_{\text{hard}} = \frac{\sigma_{\text{hard}}^{\text{tot}}}{\int_1^{x_F^{\text{min}}} dx_F \frac{d\sigma_{\text{hard}}}{dx_F}}$$

R_{hard}	Exp. [%]	SCI	GAL
W	1.15 ± 0.55	1.2	0.8
$b\bar{b}$	0.62 ± 0.25	0.7	1.4
Z	$1.44^{+0.62}_{-0.54}$	1.0	0.5
J/ψ	1.45 ± 0.25	1.4	1.7

predictions



W production @ 1800 GeV.

[R. Enberg, G. Ingelman, N. Timneanu, Phys. Rev. D 64 (2001) 114015]

SCI and hard diffraction at the Tevatron: dijets in SD & DPE

SCI/GAL **reproduce well** single diffractive ratios for dijets with gaps or leading anti-protons.

Also in DPE (Double Pomeron Exchange)

the models give good ratios and cross-sections.

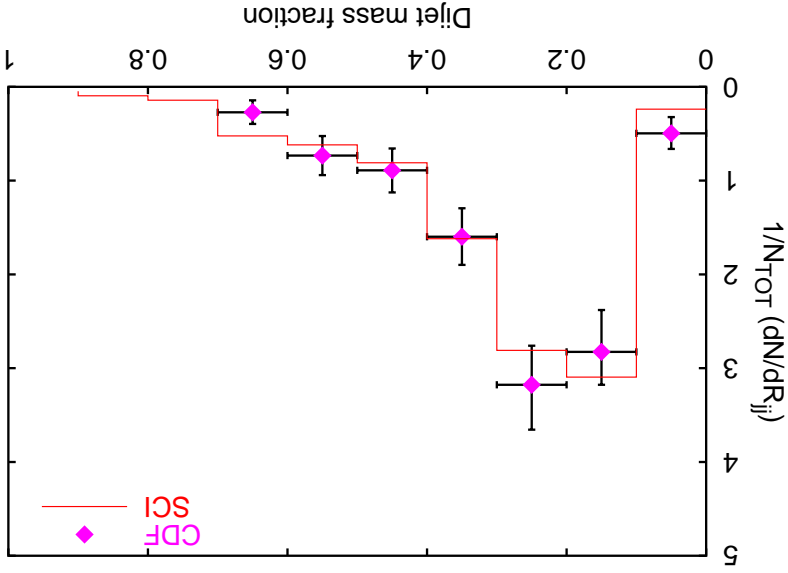
R_{SD}^{DPE} [%]	$\sigma_{DPE} [nb]$
CDF	0.80 ± 0.26
SCI	0.54 ± 0.05
GAL	0.44 ± 0.05

$1/N_{tot} (dN/dR_{ij})$	proton gap	proton gap
6 - 40	↓	↓
5 - 25		
43.6 ± 4.4 ± 21.6		

While reproducing the overall behaviour, the models have a strong dependence on remnant treatment.

CDF data well reproduced by SCI

Dijet mass fraction in DPE



[R. Enberg, G. Ingelman, N. Timneanu, Phys. Rev. D 64 (2001) 114015]

SCI results for diffractive Higgs

Diffractive criteria: **gap** ($2.4 < |\eta| < 5.9$) or **leading proton** ($x_F > 0.9$)
 'Diffractive central inelastic production'

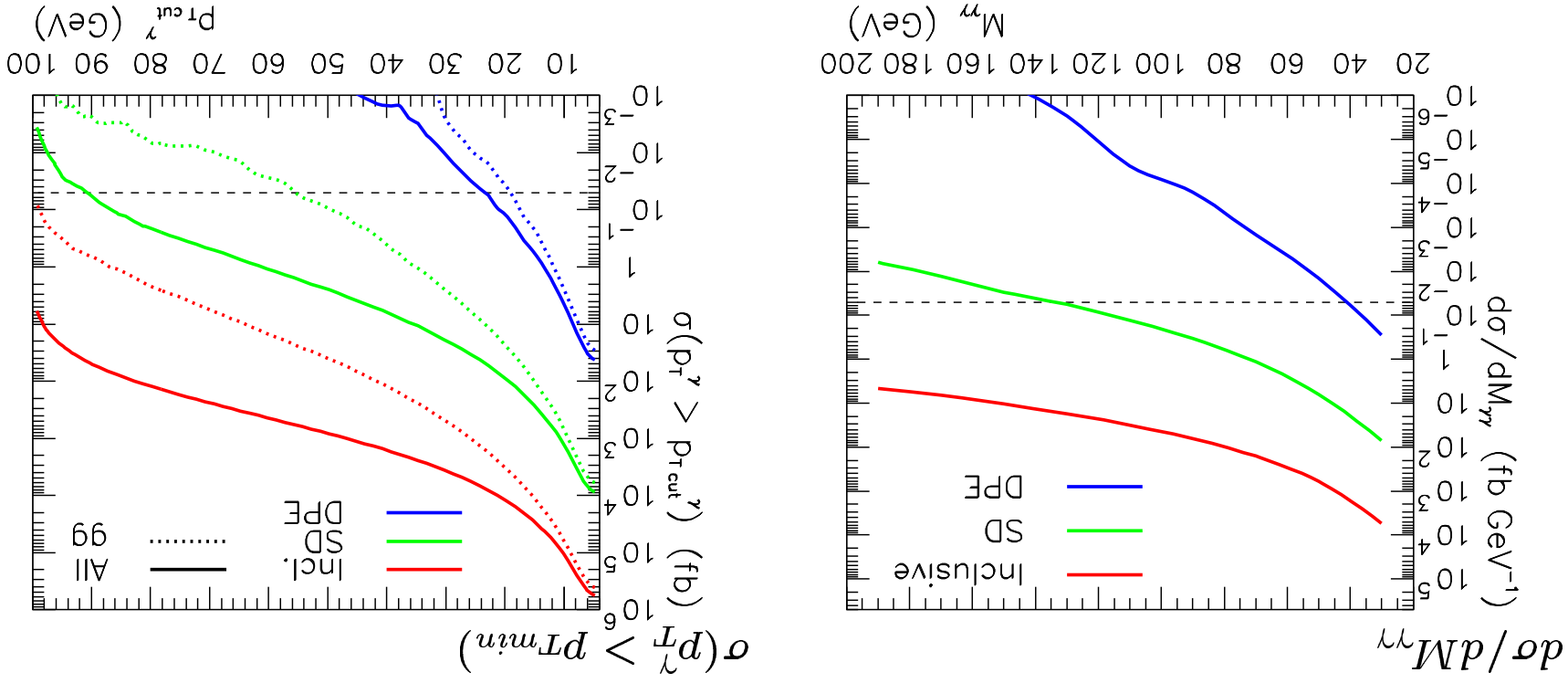
	Tevatron		LHC	
σ [fb] Higgs-total	600	27000		
SD				
σ [fb] leading-p	1.2	190		
σ [fb] gap	2.4	27		
# H + leading-p	24	5700		
\leftrightarrow # H $\leftrightarrow \gamma\gamma$	0.05	13		
DPE				
σ [fb] leading-p's	$1.2 \cdot 10^{-4}$	0.19		
σ [fb] gaps	$2.4 \cdot 10^{-3}$	$2.7 \cdot 10^{-4}$		
# H + leading-p's	0.0024	6		

large m_H + large x_F proton \rightarrow kinematical conflict \rightarrow reduced cross-section

[R. Enberg, G. Ingelman, A. KISSAVOS, N. TIMNEANU, Phys. Rev. Lett. 89 (2002) 081801]

DPE 2γ production from SCI

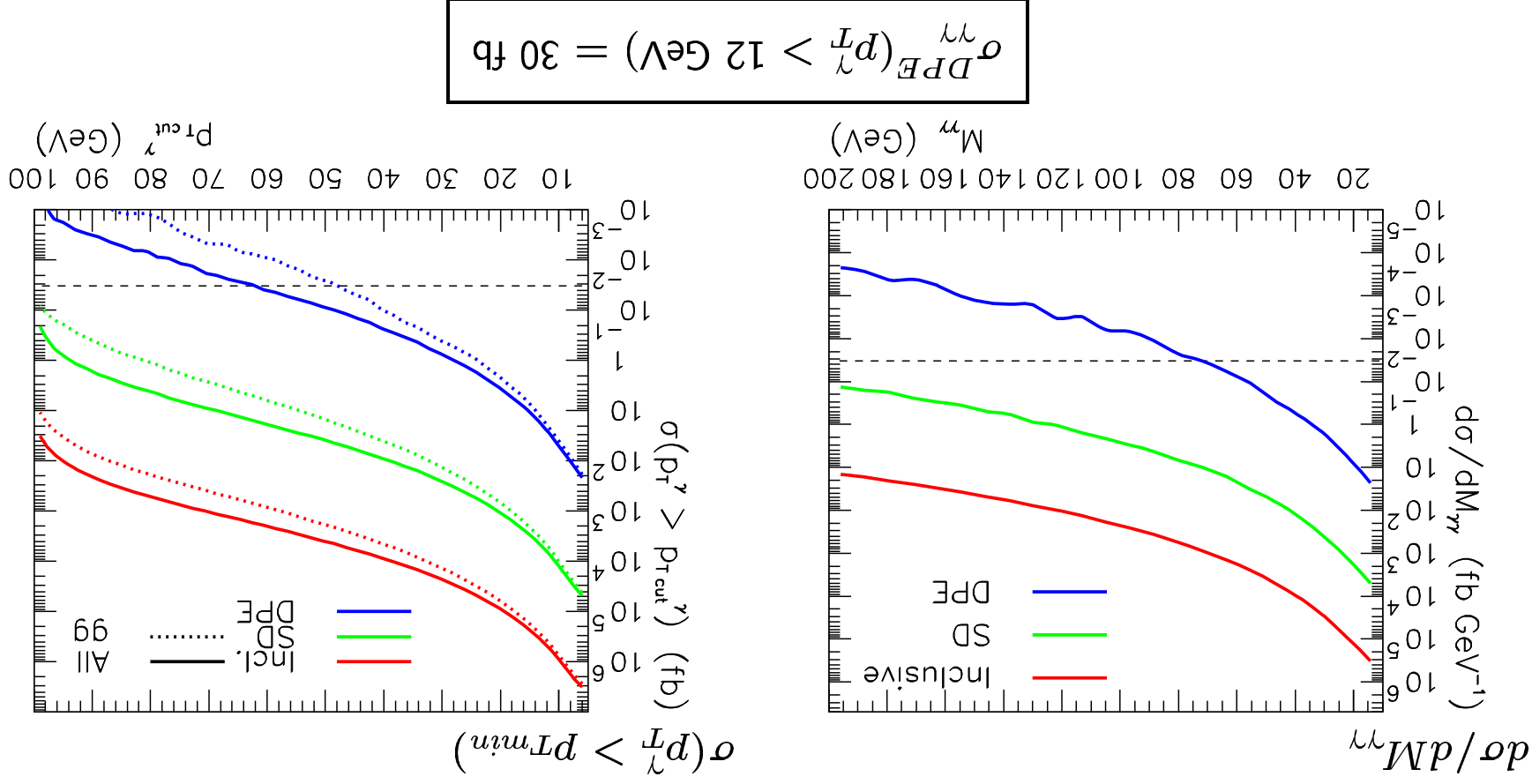
TEVATRON: (dashed line = 1 event in Run II)



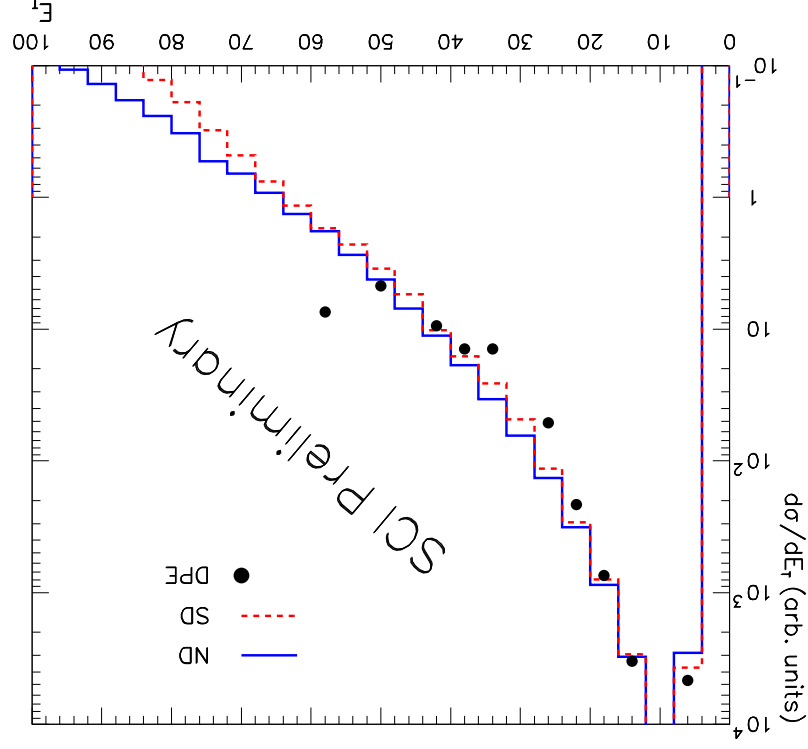
$$\sigma_{DPE}^{\gamma\gamma}(p_T^I > 12 \text{ GeV}) = 2 \text{ fb}$$

DPE 2γ production from SCI

LHC: (dashed line = 1 event in low luminosity run)



Dijets from SCI at Tevatron



Seems compatible with Run II data up to relatively large jet masses
(not so good statistics for DPE sample)