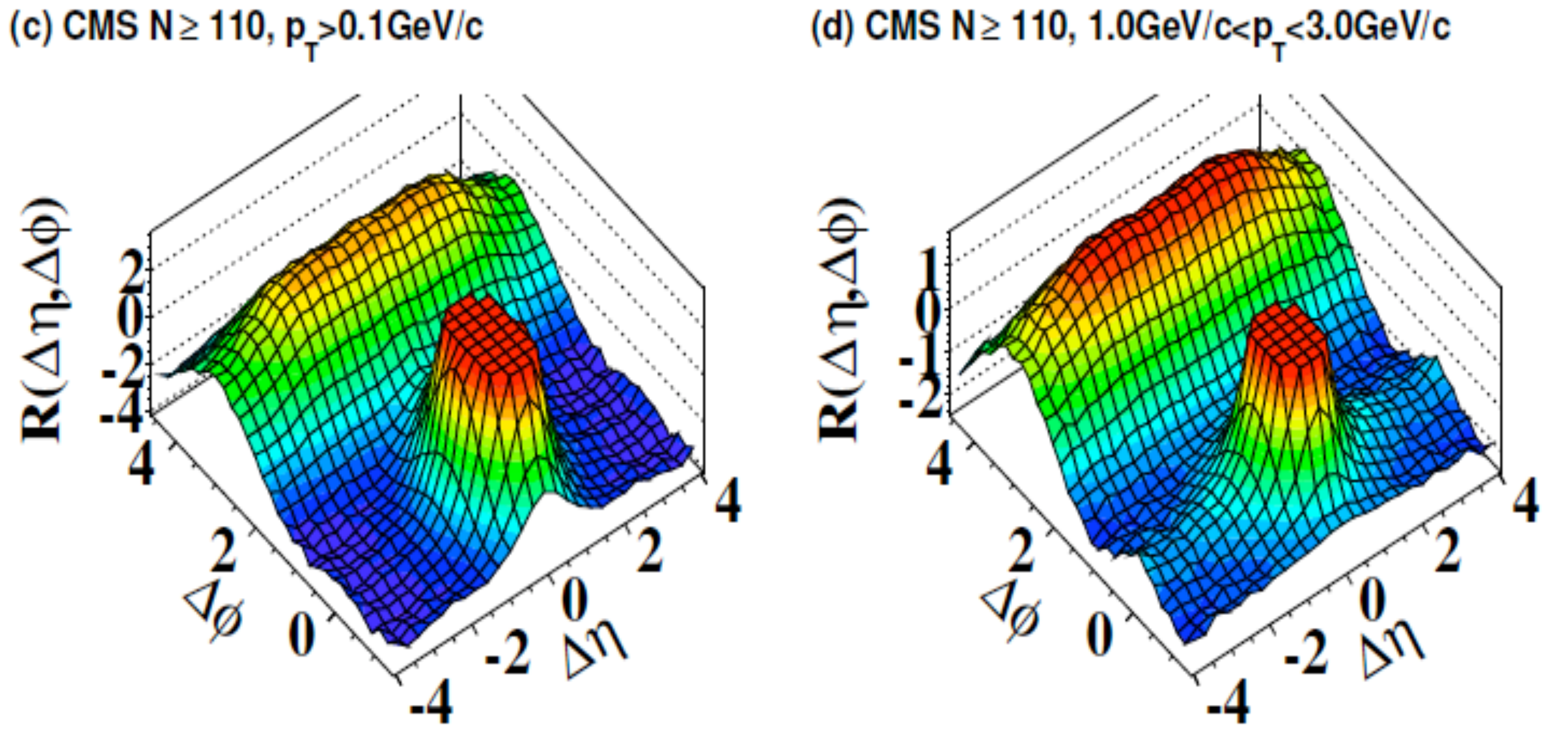
Ridge Effect: Saturation?



high multiplicity, 1GeV <p_t < 3 GeV, $\Delta\varphi \approx 0$ for $\Delta\eta \leq 4$

Saturation is a strong candidate:

High density: high multiplicity

Low pt: saturation momentum

$$x \approx 10^{-5}: \qquad Q_s \approx 1GeV$$

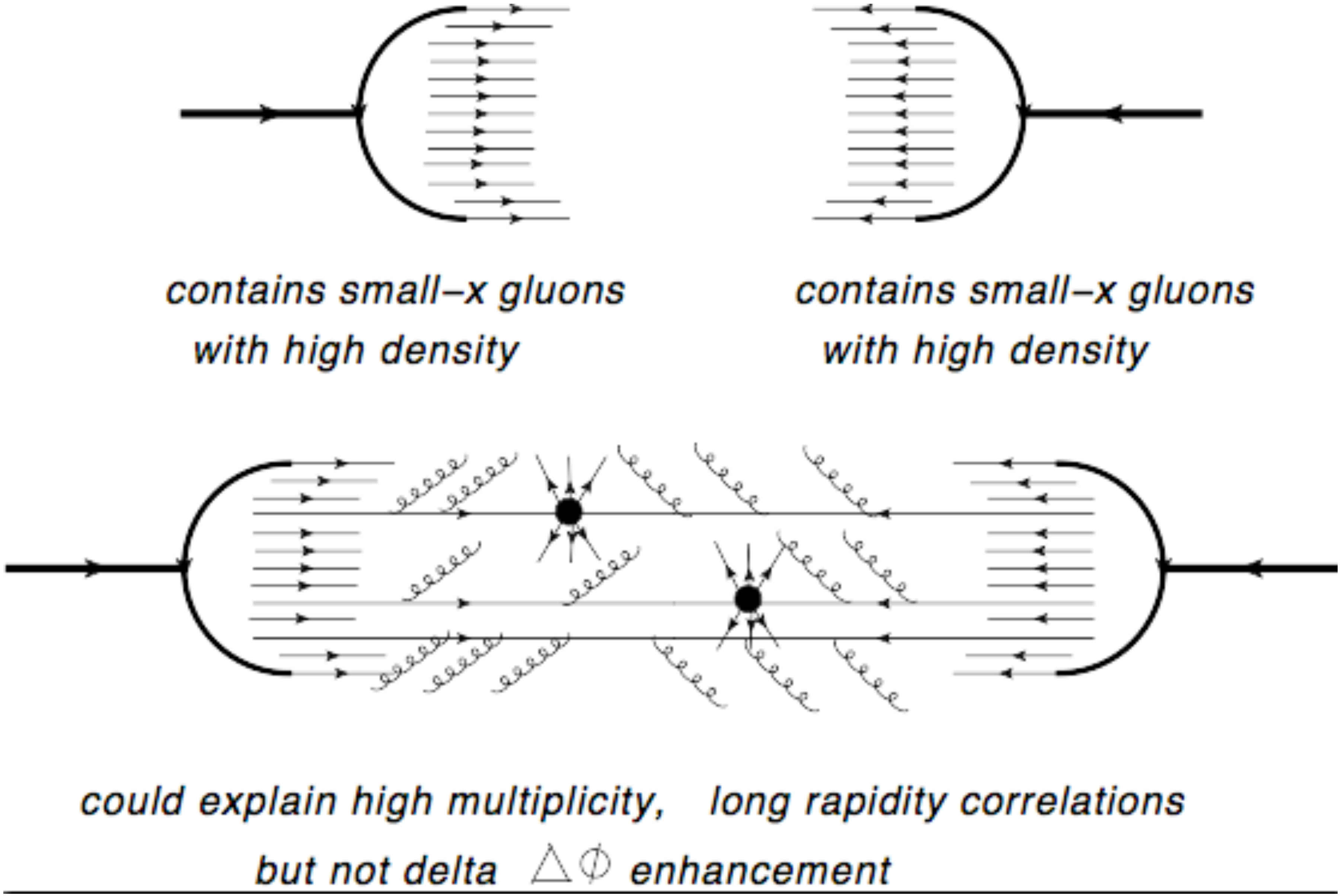
Azimuthal correlation: need extra ingredient: recombination

Azimuthal correlation:

(A.Dumitru et al, arXiv:1009.5295)

Previous parton picture not quite correct: need ‘interference’:

$$(A_1 + A_2)\cdot(A_1 + A_2)^* = |A_1|^2 + |A_2|^2 + A_1\cdot A_2^* + A_2\cdot A_1^*$$


contains small−x gluons
with high density
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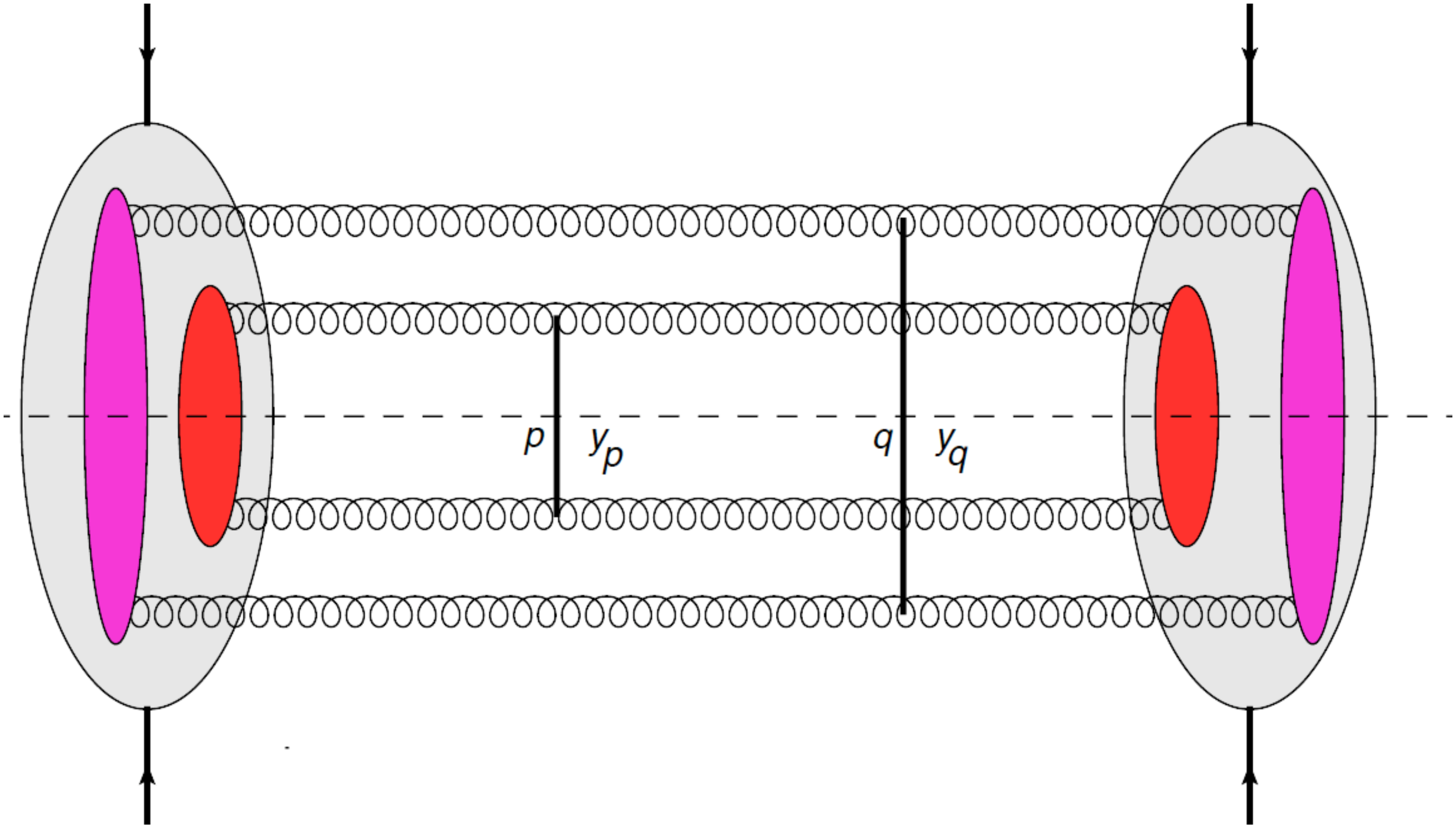
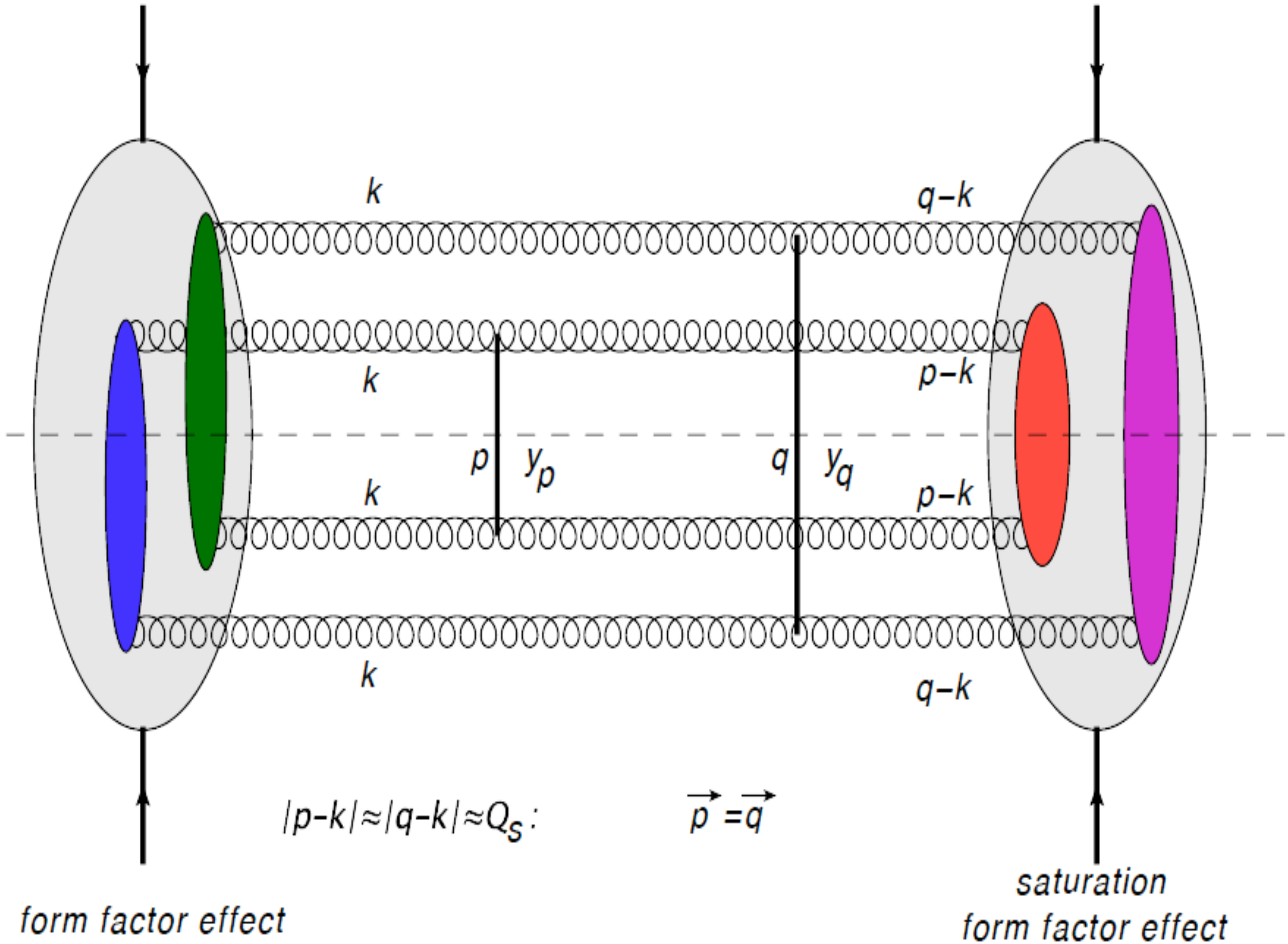
with high density
could explain high multiplicity,   long rapidity correlations
but not delta $\Delta\phi$ enhancement


p
y_p
q
y_q


k
q−k
k
p−k
p
y_p
q
y_q
k
p−k
k
q−k
$|p-k| \approx |q-k| \approx Q_S$:
$\vec{p} = \vec{q}$
form factor effect
saturation
form factor effect

Saturation at HERA:

First expectation: see flattening of xg(x,Q)

at $Q_{sat}^2(x) = Q_0^2 \cdot (\frac{x_0}{x})^\lambda$: not seen

Instead: geometric scaling

saturation models

constant ratio of $\frac{\sigma_{diff}^{\gamma^* p}}{\sigma_{tot}^{\gamma^* p}}$

Conclusion: saturation is an attractive interpretation,
but it is not proven