Probing correlations of partons in Pomeron (near nucleon edge) in Multi Parton Interactions (MPI)

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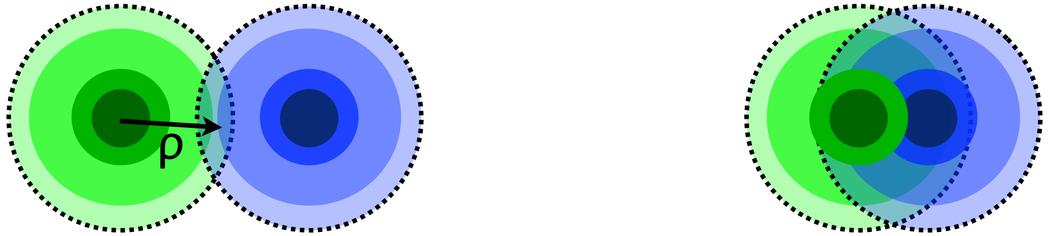
Inelastic diffraction probes interactions at large impact parameters (interaction is black for small b)



Peripheral pp

dominant source of diffraction

Large ρ + strong transverse localization of gluons

⇓

Suppression of hard processes in diffraction, b ~ 1 fm

Central pp

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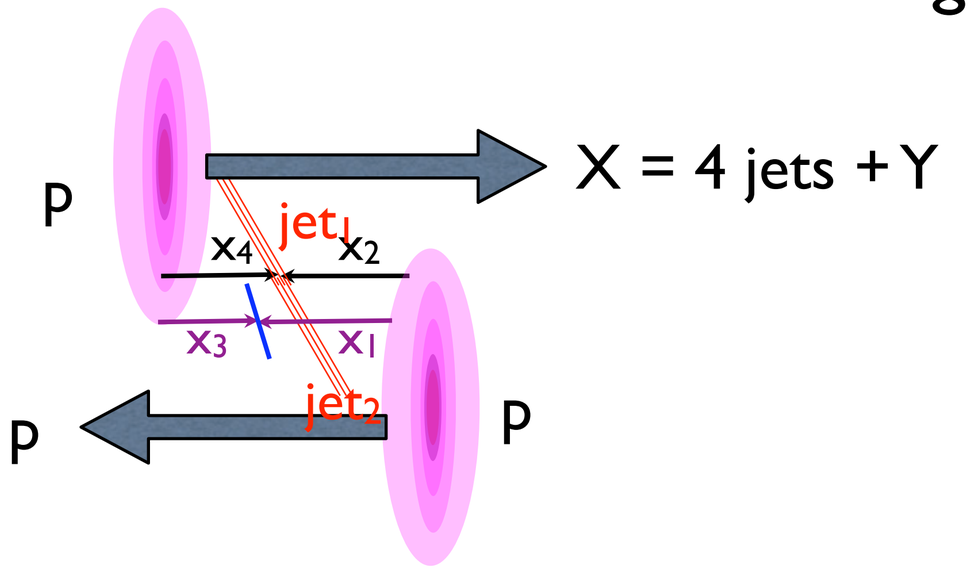
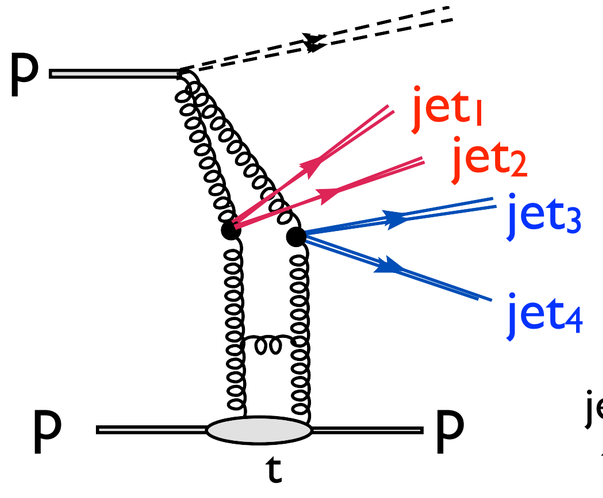
Measurements of dijet production is clearly insufficient for understanding of parton structure of the "Pomeron" - vacuum channel /diffractive interactions

Natural next step - is to study 4 jet production in single and double diffraction and singling out multiparton interactions (MS 09)

Single diffraction: $pp \rightarrow p + 4\ jets + Y$





$x_1 + x_2 = x_{Pom}$

jets very close to the rapidity gap

Questions

- Is there a peak near $(x_1+x_2)/\ x_{Pom})=1$?

Background from $2 \rightarrow 4$ is smaller for this kinematics

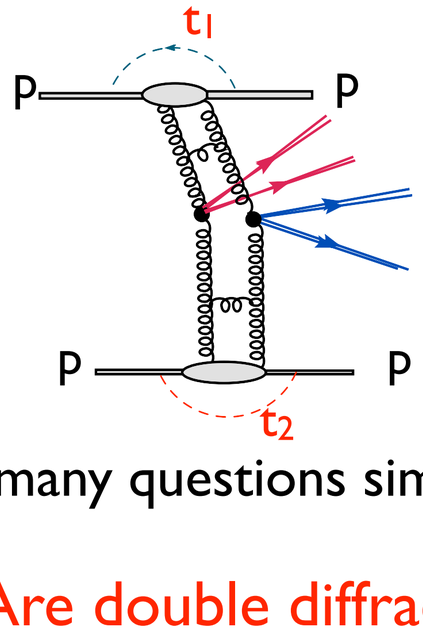
(compare to very forward two pion production in pp (MS & Vogelsang)

- Is distribution in x_1 and x_2 a product of single Pomeron pdfs?

- Does dependence on the cross section on x_1, x_2 distributions: changes with increase of -t (up to few GeV^2). Could large t correspond to nearly pQCD regime for the Pomeron exchange?? perturbative
  → harder distribution over $(x_1+x_2)/ x_{Pom}$

- Dependence of cross section on x_3 and x_4 (x's of proton which breaks up). Is it the same as in generic MPI - are parton distribution near nucleon edge have the same shape? The same question was not addressed even in the single (dijet) hard diffraction - how good is factorization into product of Pomeron and nucleon pdfs. Also, absorption could be different for different x.

Double diffraction $pp \to p\,p + X$ X=4 jets +Y; 4 jets



Most spectacular "exclusive" channel is $pp \to p\,p + 4$ jets

many questions similar to the $pp \to p + X$ case (factorization, ...)

Are double diffractive PDFs the same as single diffractive ones?

t_1,t_2 dependence of $\dfrac{\sigma(pp \to pp + 4\,jets)}{\sigma(pp \to pp + 4\,jets + Y}$

Conclusion: diffractive processes with MPI provide new effective tools for studying Pomeron, and parton fluctuations near nucleon edge.

Studying global fluctuations of small x gluon field requires different tools - may be relevant for high multiplicity CMS data) MS, Phys. Rev. D 84, 011501(R) (2011). [arXiv:1105.2285 [hep-ph]]