Mueller-Navelet jets at LHC: theory vs experiment

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February 18th, 2014

Outline

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Evident questions

- Absolute value of the cross section.
  Theory predicts cross section normalization (C_0)!!!

- Remove central jets from the experimental analysis.
  Theoretical calculations $\rightarrow$ we neglect terms suppressed $\sim \frac{1}{s}$
  Is it possible to remove central jets, with, say, $|y| < 2$?

- Any chance to lower the jet transverse momentum?
  Number of undetected hard gluons: $\langle n \rangle \sim \alpha_s Y, \quad Y = \log \frac{s\, x_{J_1} x_{J_2}}{k_{J_1} k_{J_2}}$

- Any chance to have data organized in bins of k_T?

Evident questions

- Asymmetric MN jets transverse momenta
  - e.g. $35 < k_{J_1} < 40$ & $45 < k_{J_2} < 60$.
  - Parton model (Born): $\frac{d\sigma^{Born}}{dk_{J_1}\, dk_{J_2}} \sim \alpha_S^2\ \delta\left(\vec{k}_{J_1} - \vec{k}_{J_2}\right)$

    Without the Born (which contributes a lot) we have

    $$\text{DGLAP} \rightarrow J_1\ J_2 + \text{one G}$$
    $$\text{BFKL} \rightarrow J_1\ J_2 + \text{many G}$$

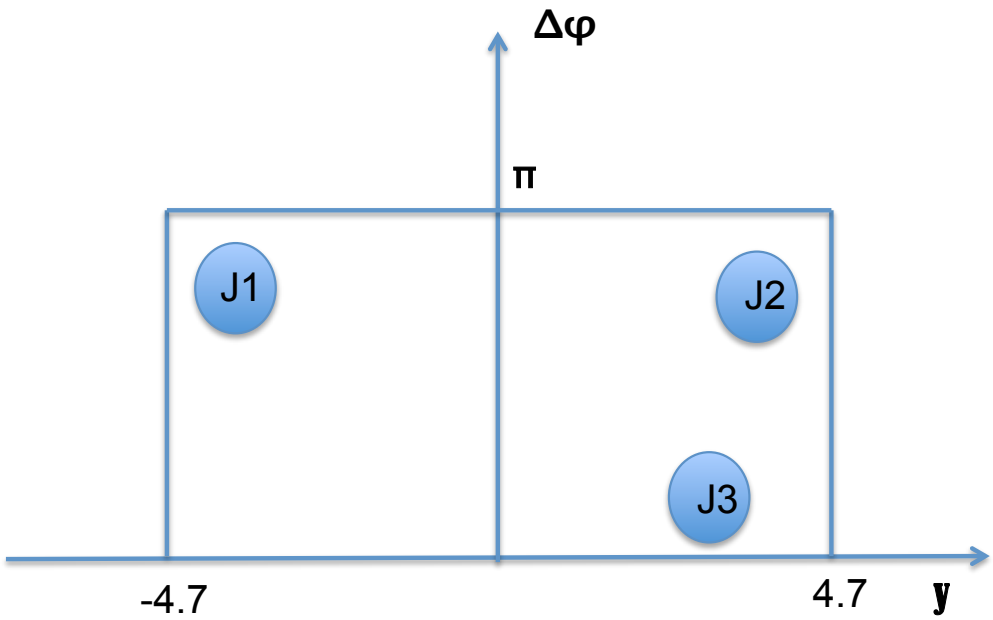
  - The number of events drops by a factor of ten, but stronger azimuthal angle decorrelation is expected.

Outline

MN jet selection

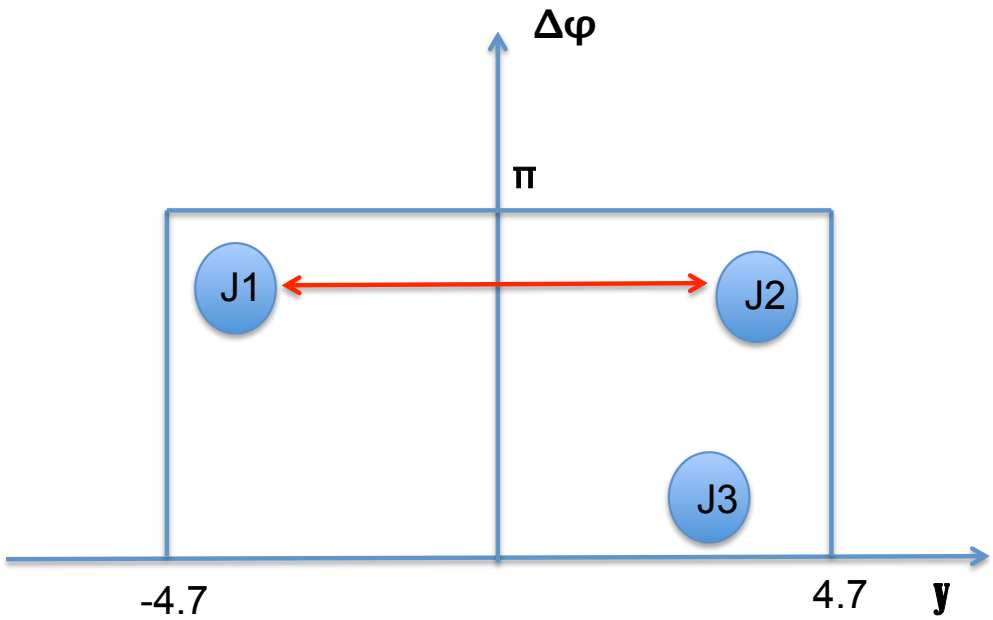
Experiment:
"The MN dijet is defined as the pair of jets with the largest rapidity separation in the event."

Consider a 3-jet event, with $y_{J_2} \sim y_{J_3}$



What are the MN jets in this case?

Experimental MN jet definition



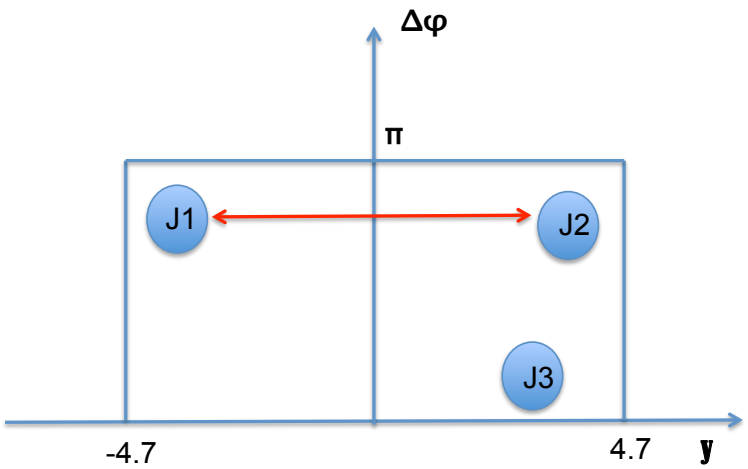
for this selection $\Delta\varphi = \Delta\varphi_{J_1 J_2} \sim 0$ and $\Delta y = y_{J_2} - y_{J_1}$.

Theoretical MN jet calculation:

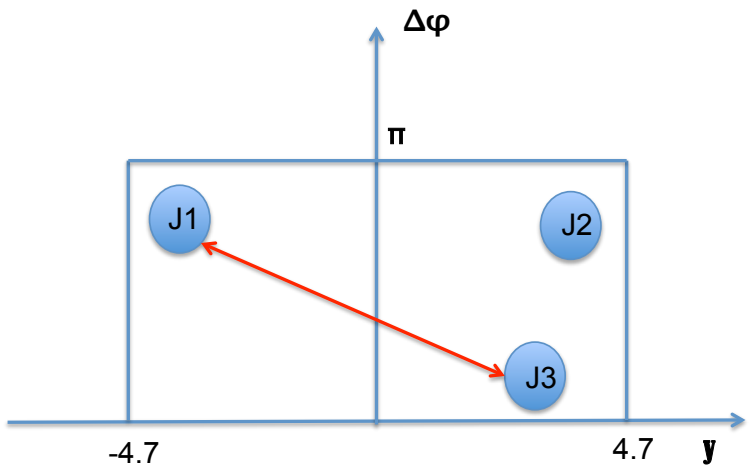
we have two partons in the kinematics $k_{J_2} \sim k_{J_3}$ and $y_{J_2} - y_{J_3} \sim 1$

one particle is a jet at given k_J and y_J and the other parton belongs to the inclusive system X.

This 3-jet event should be counted twice
to be put in two different experimental bins:



$$\Delta\varphi = \Delta\varphi_{J_1 J_2} \sim 0$$
$$\Delta y = y_{J_2} - y_{J_1}$$



$$\Delta\varphi = \Delta\varphi_{J_1 J_2} \sim \pi$$
$$\Delta y = y_{J_3} - y_{J_1}$$

How large is the impact of such 3-jet events?

Suggestion: Is it possible to redo experimental analysis?