Gap between jets, Letter of Interest
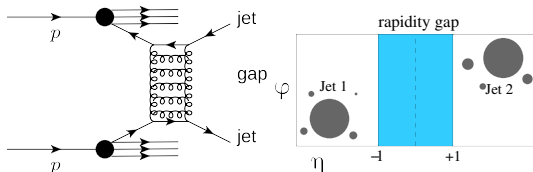
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Gap defined in terms of absence of charged particles with $p_T > 200$ MeV in $|\eta| < 1$.

- In collisions with t-channel color singlet exchange between partons, color-flow is neutralized → Rapidity interval void of particle production between jets (rapidity gap). Jets are produced back-to-back with very little additional jet activity.

- In high-energy limit of QCD ($\hat{s} \gg -\hat{t} \gg \Lambda_{QCD}^2$), color-singlet exchange corresponds to perturbative pomeron exchange (two-gluon ladder). Jet-gap-jet as a probe of Balitsky-Fadin-Kuraev-Lipatov (BFKL) evolution (resummation of $\alpha_s^n \log^n(\hat{s}/|\hat{t}|) \sim \mathcal{O}(1)$ terms).

- Dokshitzer-Gribov-Lipatov-Altarelli-Parisi (DGLAP) dynamics are strongly suppressed in jet-gap-jet events (Sudakov form factor for gap) → Clean probe of BFKL dynamics.

Recent results by the CMS Collaboration at 13 TeV (CMS-PAS-SMP-19-006)
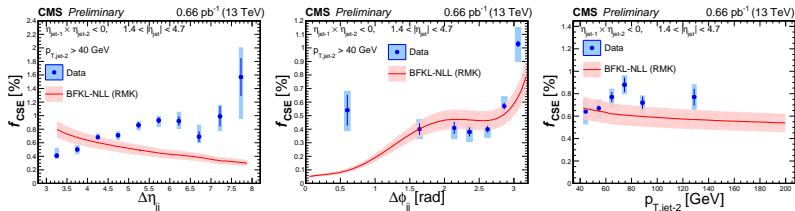
Calculations based on resummation of logs at NLL accuracy + LO impact factors (red curve) are not able to describe all features of data simultaneously.

For Snowmass 2021 process: Completion of NLO phenomenology analysis (resummation of logs at NLL accuracy + NLO impact factors) → Phenomenology study in light of recent CMS results at 7 and 13 TeV. Develop additional observables/strategies that could be implemented in future measurements.

More detailed presentations by Federico Deganutti (https://indico.fnal.gov/event/43959), and by CB (https://indico.fnal.gov/event/43786/.