Multiplicity dependent charged particle jet production in pp collisions at $\sqrt{s} = 13$ TeV

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Motivation
- Jet structure and production provide constraints to pQCD calculations.
- Investigate the splitting function of partons in vacuum: close to original collimation information.
- Study correlation between jet production and event activity.
- Possible extension to semi-inclusive hadron-jet or gamma-jet correlations to constrain jet quenching [1].

Analysis details
- Data: pp collisions at $\sqrt{s} = 13$ TeV
- Simulation: PYTHIA8 Monash2013 & POWHEG
- Minimum bias events (MB trigger) \( |p_T| < 10 \text{ cm} \)
- The charged tracks measured by ITS + TPC \( |\eta| < 0.9, 0 < \phi < 2\pi \)
- Jet reconstruction: Anti-\(k_T\) algorithm, background: \(k_T\) algorithm \( p_T > 1.0 \text{ GeV/c} \) \( |\eta| < 0.9\) Jet radii \( R = 0.2, 0.4 \)

Results
- Inclusive charged jet cross section
- Multiplicity dependent jet production

Cross section ratio from data and simulation
- Jet cross section ratio from data shows no centrality dependence while simulation indicates centrality ordering
- Inclusive jet cross section can be reproduced by POWHEG calculation but not the centrality dependent cross section ratio in pp collisions
Open question: Multiplicity differences or UE subtraction effect?

Conclusion
- First measurement of charged jet cross section in different multiplicity intervals has been performed in pp collisions at $\sqrt{s} = 13$ TeV with ALICE
- Jet production yield is higher for high multiplicity environment compared to inclusive jet yield
- Multiplicity dependent jet production yield ratio with respect to inclusive one has no significant jet $p_T$ dependence
- Jet cross section ratio for different radii has weak multiplicity dependence in data, while multiplicity ordering was observed in simulation

Reference:
[2] https://cds.cern.ch/record/216017