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Effects produced by multi-parton interactions and color reconnection in small systems

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Multi-parton interactions (MPI) and color reconnection (CR) have raised special interest due to the fact that they can produce QGP-like effects in small systems, specifically, flow-like patterns. Now we will show that the same mechanisms produce an explicit dependence of the p_{T} spectra with the number of constituent quarks. In addition, a Cronin-like peak, at intermediate transverse momentum ($2 < p_{\mathrm{T}} < 10$ GeV/c), and a sort of binary scaling, at higher p_{T}, are also observed in events with large number of MPI in pp collisions. While those effects have been revealed in pA collisions at RHIC and at LHC. In pp collisions, the last two effects have not been reported. This suggests that if MPI and CR are the mechanisms which originate the observed effects, then, the conditions for jet quenching would not be satisfied in small systems.

In addition, we will discuss the experimental challenges to select on MPI. Specifically, the limitations and the biases of the event multiplicity, when, it is calculated in certain kinematic regions. We will show that such a selection can be improved using new approaches based on event shapes. Among the findings we will report that the multiplicity selection bias may affect the average \pt at high multiplicity, producing the so-called second rise of $\langle p_{\mathrm{T}} \rangle$ as reported by the ALICE Collaboration. Also, it will be argued that the average expansion velocity extracted from the analysis of the p_{T} spectra can be increased by the same kind of bias. Results for pp collisions at $\sqrt{s}$ = 7 and 13 TeV, and comparisons with the available experimental data will be presented.

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