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# String fusion mechanism and studies of correlations.

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As quantum chromodynamics (QCD) does not work in non-perturbative regime that dominates in hadron collisions, one could use the approach of quark–gluon (color) string model to quantitatively describe soft processes of multi-particle production. For instance, study the mechanism of string fragmentation and particles sources interaction by looking at different correlations between produced particles is a promising way to reveal intriguing features of the initial stages of hadron collisions. For example, in the study of forward–backward correlations (FBCs) one can distinguish two regimes of short- and long-range correlations that have different nature. In this work, we continue to develop Monte-Carlo model of interacting quark-gluon strings of finite length in rapidity space [1]. It takes into account, event-by-event, the string fusion phenomenon caused by string overlap in the transverse plane. It is this process of fusion that modifies string fragmentation characteristics and changes the mean values of multiplicities and transverse momenta of produced particles. Moreover, model predictions are not invariant under translations in rapidity. It is due to the fact that strings ends positions are found from PDFs for valence and sea quarks pulling string in opposite directions and, therefore, fluctuate significantly. In this approach, it is interesting to estimate effects of string fusion at different rapidities, thus we calculated correlation coefficients $b_{corr}[N_F, N_B]$ and $b_{corr}[N_F, PT_B]$ [2] for multiplicities and mean transverse momenta defined for particles found in regions separated in rapidity. We compare results with Monte-Carlo event generators and with ALICE data [3] on p+p collisions at $\sqrt{s_{NN}}$ = 0.9, 2.76 and 7 TeV. Results are discussed.

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