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On the problem of defining initial conditions for relativistic quark-gluon strings for hadronization modeling

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The process of hadronization remains one of the most intriguing problems in high energy hadron physics. As it is not yet possible to construct the theory of hadron production from parton states, different models are used. The most successful (and most fundamental) approach is to use the relativistic string model to describe the QCD field stretched between partons. However, there are enough hints from experimental measurements that existing models are incomplete and cannot explain the full spectrum of phenomena that occur in high energy collisions.

One approach for the improvement of the string models is to generalize the considered class of string movements and to include angular momentum conservation during the string fragmentation process along with the 4-momentum conservation.

It turns out though, that defining the initial conditions for the quark-gluon string is a significant problem on its own. It appears that a very wide class of functions cannot be used to describe the initial velocity and shape of the string as they do not satisfy Virasoro conditions for the open string with free ends.

In this talk, the special method to define initial data of the string is considered, the Final-Order Eigenfunction Expansion (FOEE) method. It uses the orthogonality property of the eigenfunctions of the Sturm problem to satisfy the large number of conditions imposed on the functions of the initial data by Virasoro expressions and conservation laws. It is shown, that the very non-trivial restrictions on the defined strings can be derrived using this method and it is also explained how these string modifications can influence the vector mesons and baryons production.

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