

QCD phenomenology with massive gluons: some recent developments

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At high energies the soft and the semihard components of the scattering amplitude are closely related, and it becomes important to distinguish between semihard gluons, which participate in hard parton-parton scattering, and soft gluons, emitted in any given parton-parton QCD radiation process. A class of models based on QCD incorporate soft and semihard processes in the treatment of high-energy hadronic interactions using a formulation compatible with analyticity and unitarity constraints. In this talk we present a QCD-based model in which the coupling α_s is constrained by the value of the so called "dynamical gluon mass", whose existence is strongly supported by recent QCD lattice simulations. This frozen coupling, obtained by means of the pinch technique in order to derive a gauge invariant Schwinger-Dyson equation for the gluon propagator, has been adopted in many phenomenological studies. More specifically, we discuss some recent applications of the model to hadron-hadron collisions, gap survival probability calculations, and soft gluon resummation techniques. These results indicate a smooth transition from nonperturbative to perturbative behaviour of the QCD.