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Gluon dominance model and multiparticle production

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The gluon dominance model is developed to describe multiparticle production of secondary particles at high energies in lepton and hadron interactions, including annihilation processes and heavy quarkonium decays. According to this model, the multiparticle process is divided into two stages. The first stage describes the development of a quark-gluon cascade as a Markov branching process in the region of perturbation QCD. For the second stage, the transformation of quarks and gluons into observable hadrons (hadronization), a phenomenological scheme is proposed. It is universal and based on an experiment. The gluon dominance model demonstrates good agreement with data over a wide energy region.
It testifies that in hadron interactions valence quarks remain in the leading particles, and gluons are the sources of secondary hadrons. Quantitative estimates of the model parameters confirm the fragmentation mechanism of hadronization in leptonic interactions and the recombination mechanism in hadronic ones. The model description of the experimental distributions on the number of neutral pions in proton interactions at 50 GeV beams in the high multiplicity region are presented for the first time. It is shown that the main contribution to this region is made by gluon fission.

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