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Vertices of three reggeized gluons and the unitarity corrections to the propagator of reggeized gluons

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High energy QCD hadronic interactions in the Regge kinematics, when the transferred transverse momenta are much smaller than an energies of colliding particles, can be described by the interaction of gluons with reggeized ones ("reggeized gluons", reggeons). The description of these processes was firstly introduced in series of L.N. Lipatov's papers. Calculations of the amplitudes of different scattering processes in this approach reveal also a so-called multi-Regge structure of the amplitudes. Therefore, in order to analyze different scattering processes with multi-Regge kinematics, L.Lipatov proposed an effective action based on QCD properties at high energy.

We develop the effective action formalism, see \cite{1,2,3,4,5,6} , based on the reggeized gluons as the main degrees of freedom, which can be considered as a reformulation of the RFT (Regge field theory) calculus for the case of high-energy QCD. The perturbation theory is based on the knowledge of the classical solutions of equations of motion and loops contributions to effective action.

Our main goal in this study is to obtain unitarity corrections to amplitudes. The unitarity corrections to the propagator of reggeized gluons calculated in the framework of QCD RFT require a knowledge of the expressions for reggeon propagator and vertices of the interaction of three reggeons to one QCD loop precision. In the last paper \cite{6}, we calculated the vertex of interactions of $A_+ A_+ A_-$ Reggeon fields to this precision. We demonstrated, that all loop leading logarithmic order contributions to the vertex can be summed through the integro-differential equation similar to the BFKL one.

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