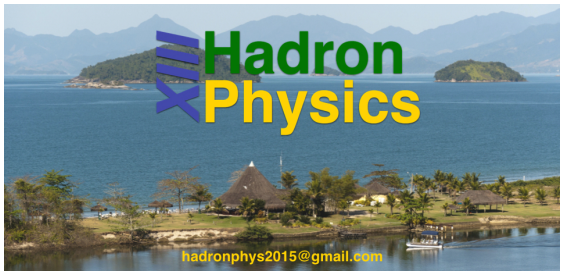

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One step beyond Glauber Model for ultra high energy hadronic collisions

The multiple scattering theory was first developed in late 50´s by Glauber, and then applied extensively in various areas to calculate high-energy scattering amplitude of composite particles [1]. According to Glauber-Velasco model [2], the (anti-)proton is expressed as a cluster of partons, which pass through each other, and interact through the collisions of partons. It's well known since early 60's that the pp (or p anti-p) elastic cross section increases with the incident energy (limited by the Froissart bound of $ln^2(\sqrt{s})$). This fact can now be understood in terms of QCD, as the number of partons also increase with the collision energy. This model has been successfully applied to a pp scattering data in TeV domain [3] by imposing unitary condition.

On the other hand, the Stochastic Vacuum Model [4] is a QCD-inspired model, proposed in mid-80's, which also well reproduced the available pp (and p anti-p) elastic scattering data from $\sqrt{s} \sim 20$ GeV to 7 TeV [5]. The above two models reflect the two complementary aspects of QCD, particle and field. Our main goal with this work is clarify the relation between Glauber-Velasco model and the Stochastic Vacuum Model in view of QCD. Both models agree that the proton does not behaves as a black disk, in the way that the probability of a inelastic interaction decreases smoothly as the impact parameter increases, reaching the value less than the black disk limit, 50%. This certainly reflects the vacuum property of QCD and the mechanism of confinement.

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Track Classification: Hadronic structure - reactions, production and decays