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Significance of gluon density for soft and hard processes at LHC

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We study the role of the non-perturbative input to the transverse momentum dependent (TMD) gluon density in hard processes at the LHC.

We derive the input TMD gluon distribution at a low scale $\mu_0^2 \sim 1\text{-GeV}^2$ from a fit of inclusive hadron spectra measured at low transverse momenta in pp collisions at the LHC and demonstrate that the best description of these spectra for larger hadron transverse momenta can be achieved by matching the derived TMD gluon distribution with the exact solution of the Balitsky-Fadin-Kuraev-Lipatov (BFKL) equation obtained at low x and small gluon transverse momenta outside the saturation region, see for example [1].

Then, we

extend the input TMD gluon density to higher μ^2 numerically using the Catani-Ciafoloni-Fiorani-Marchesini (CCFM) gluon evolution equation.

Special attention

is paid to phenomenological applications of the obtained

TMD gluon density to some LHC processes, which are sensitive to the gluon content of a proton [2].

References.

[1] Yu.V.Kovchegov, Phys. Rev. D61, 074018 (2000).

[2] A.A.Grinyuk, A.V.Lipatov, G.I.Lykasov, N.P.Zotov, Phys. Rev. D93, 014035 (2016).

Summary

The new unintegrated gluon density (MD2015) is proposed. Its application to the analysis of the DIS and inelastic p-p processes at the LHC energies allows us to describe rather satisfactorily the charm and beauty contribution to the proton structure function F2 and the longitudinal structure function FL, and many observables on the soft and hard p-p reactions.

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