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Applications of p_T - x_R Variables in Describing Inclusive Cross Sections at the LHC

Monday 12 July 2021 20:10 (2 minutes)

Abstract: Invariant inclusive single-particle/jet cross sections in p - p collisions can be factorized in terms of two separable p_T dependences, a $[p_T-\sqrt{s}]$ sector and an $[x_R-p_T-\sqrt{s}]$ sector. We have analyzed data from ATLAS, CMS and LHCb to explore various s -dependent attributes and other systematics of inclusive jet, photon and single particle productions. Approximate power laws in \sqrt{s} , p_T and x_R , are found when we boost the kinematics by $\sqrt{s} \rightarrow \infty$ for finite p_T , using the radial scaling variable, $x_R=(x_T^2+x_F^2)^{1/2}$. We show that the $A(\sqrt{s}, p_T)$ function, introduced in our earlier publication to describe the p_T dependence of the inclusive cross section[1], is directly related to the underlying hard parton-parton scattering for jet production, with little influence from soft physics. In addition to the A -function, we introduce the $F(\sqrt{s}, x_R)$ function that obeys radial scaling for inclusive jets and offers another test of the underlying parton physics. An application to heavy ion physics is given, where we use our variables to determine the transparency of cold nuclear matter to penetrating heavy mesons through the lead nucleus in pA collisions.

- This work has been published: <https://www.mdpi.com/2218-1997/7/6/196/pdf> in Universe | Special Issue : Analysis Techniques and Algorithms for QCD Studies (mdpi.com) [1] Taylor, F.E. Radial scaling in inclusive jet production at hadron colliders. Phys. Rev. D 2018, 97, 054016, doi:10.1103/physrevd.97.054016.

Preferred track

Jets & QCD at High Scales

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