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Gluon shadowing and LHC heavy-flavour data

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We use for the first time experimental data for the inclusive heavy quark (D0, J/Psi, B->J/Psi and Y(1S) mesons) production in proton-lead collisions at the LHC in order to improve our knowledge of the gluon momentum distribution inside heavy nuclei. We observe that the nuclear effects encoded in both most recent global fits of nuclear parton densities at next-to-leading order (nCTEQ15 and EPPS16) provide a good overall description of the LHC data. We interpret this as a hint that these effects are the dominant ones. In turn, we perform a Bayesian reweighting analysis for each particle data sample which show that each of the existing heavy quark(onium) data clearly point (with a statistical significance ranging from 7 to 11 sigma) to a shadowed gluon distribution at small x in the lead. Our analysis also corroborates the existence of gluon antishadowing. Overall, the inclusion of such heavy-flavour data in a global fit would significantly reduce the uncertainty on the gluon density down to $x \simeq 5 * 10^{-6}$ while keeping an agreement with the other data of the global fits. Our study accounts for the factorisation scale uncertainties which become the largest for the charm(onium) sector.

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