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Nucleon structure functions and longitudinal spin asymmetries

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We have analysed the phenomenological dependence of the spin independent ($F_1^{p,n}$ and $F_2^{p,n}$) and the spin dependent ($g_1^{p,n}$) structure functions of the nucleon on the the Bjorken scaling variable x using the unpolarized distribution functions of the quarks $q(x)$ and the polarized distribution functions of the quarks $\Delta q(x)$ respectively. The chiral constituent quark model (χCQM), which is known to provide a satisfactory explanation of the proton spin crisis and related issues in the nonperturbative regime, has been used to compute explicitly the valence and sea quark flavor distribution functions of p and n. In light of the improved precision of the world data, the p and n longitudinal spin asymmetries ($A_1^p(x)$ and $A_1^n(x)$) have been calculated. The implication of the presence of the sea quarks has been discussed for ratio of polarized to unpolarized quark distribution functions for up and down quarks in the p and n $\frac{\Delta u^p(x)}{u^p(x)}$, $\frac{\Delta d^p(x)}{d^p(x)}$, $\frac{\Delta u^n(x)}{u^n(x)}$, and $\frac{\Delta d^n(x)}{d^n(x)}$.

Summary

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