The Spin Dependent Structure Functions of Nucleons in the Meson Cloud Model

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We calculate the spin dependent structure functions g_1 and g_2 of the proton and neutron. Our calculation uses the meson cloud model of nucleon structure, which has previously given a good description of the HERMES data on polarized sea quark distributions, and includes all the leading contributions to spin dependent effects in this model. We find good agreement between our calculations and the current experimental data for the structure functions. We include in our calculations kinematic terms, which mix transverse and longitudinal spin components, for hadrons of spin 1/2, 1 and 3/2, and which can give considerable contributions to the g_2 structure functions. We also consider the possible interference terms between baryons or mesons in different final states with the same quantum numbers, and show that most of these terms do not give leading contributions to the spin dependent structure functions.
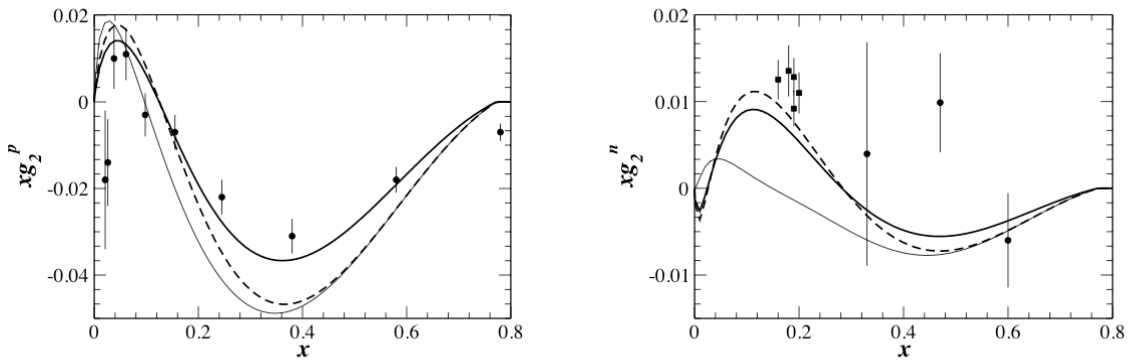
FIGURE 1. Spin dependent structure function g_2 of the proton (left) and neutron (right). The thin solid curve is the bag model calculation. The thick dashed curve is the bag model calculation plus contributions from the polarized gluon. The thick solid curve is the total result in the MCM calculations.