Axial exchange currents and the spin content of the nucleon in a nonrelativistic chiral quark model

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Within the context of a nonrelativistic chiral quark model (χQM) where chiral symmetry is introduced via a non-linear sigma model[1], we evaluate the axial form factors $g_A(0)$, $g_A^8(0)$ and $g_A^0(0)$ related to the quark spin content of the nucleon[2]. Our calculation includes one-body (impulse approximation) and two-body (exchange currents) axial operators whose contributions satisfy Partial Conservation of Axial Current (PCAC) exactly. While $g_A(0)$ is dominated by the impulse contribution we find big corrections due to exchange currents effects in the evaluation of the other two quantities, $g_A^8(0)$ and $g_A^0(0)$. The results are in good agreement with experiment. Besides the use of PCAC allows us to obtain phenomenological couplings of the η and η' mesons to nucleons that are in good agreement with other determinations[3].

References

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