

The Axial Form Factor of the Nucleon

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Abstract

The parity violation programs at MIT-Bates, Jefferson Lab and Mainz are presently focused on developing a better understanding of the sea-quark contributions to the vector matrix elements of nucleon structure. The success of these programs will allow significant precision semi-leptonic tests of the Standard Model such as that planned by the QWeak collaboration. In order to precisely determine the vector matrix elements, a good understanding of the nucleon's axial vector form factor, G_A , is also required. While the vector electroweak form factors provide information about the nucleon's charge and magnetism, G_A is related to the nucleon's spin. Its $Q^2 = 0$ value, g_A , is well known from nucleon and nuclear beta decay, and its precise determination is of interest for tests of CKM unitarity. Most information about the Q^2 dependence of G_A comes from quasi-elastic neutrino scattering and from pion electroproduction, and a recent re-analysis of the neutrino data have brought these two types of measurements into excellent agreement. However, these experiments are not sensitive to additional higher order corrections, such as nucleon anapole contributions, that are present in parity-violating electron scattering. In this talk I will attempt to review what is presently known about G_A and its various pieces including the higher order contributions, discuss the the various experimental sectors, and give an update on the determination of G_A through PV electron scattering.