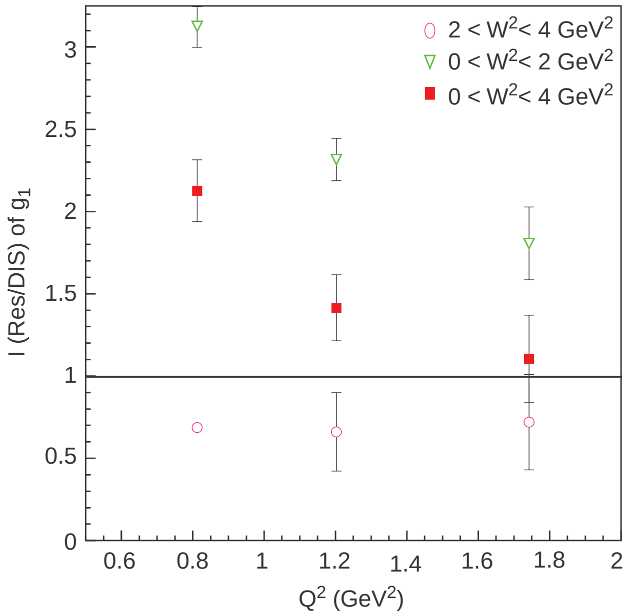

Fig. 33. Ratio of the integrated strength of the g_1^p data in Fig. 32 to that of the global parameterization from Ref. [116]. Both the data and the QCD parameterization are integrated for each Q^2 over the x regions corresponding to the indicated W^2 regions (with the elastic contribution included).

the spin-averaged and the spin-dependent scattering process suggests that the helicity-$\frac{1}{2}$ and helicity-$\frac{3}{2}$ photoabsorption cross sections exhibit quark–hadron duality separately.

4.3.2. Experiments with polarized ^{2}H and ^{3}He targets

The absence of free neutron targets means that the neutron spin structure function g_1^n is usually obtained from polarized lepton scattering off either polarized deuterium or polarized ^{3}He targets. In the former case, since the deuteron has spin 1, the spins of the bound proton and neutron are predominantly aligned, with a small ($\approx$ 5%) probability (due to the nuclear tensor force) of finding the nucleons in a relative *D*-state with spins antialigned. In the case of a spin-$\frac{1}{2}$ ^{3}He nucleus, the protons pair off with opposite spins with $\approx$ 90% probability, leaving the neutron to carry most of the polarization of the nucleus [118].

The extraction of the free neutron structure function g_1^n from either the g_1^d or $g_1^{^3\mathrm{He}}$ data requires corrections to be made for the neutron depolarization, as well as for other nuclear effects such as nuclear binding and Fermi motion. These have been studied extensively in Refs. [119,120], and are found to be important mostly at large x. They have also been calculated recently for the structure functions in the resonance region, at low and intermediate values of Q^2 [121]. For the low moments of g_1^n the magnitude of the correction is relatively small, however.

The first experiment measuring the deuteron spin structure function g_1^d in the nucleon resonance region was the SLAC experiment E143 [107,108], utilizing a polarized ND_3 target. As in the proton case, the $Q^2 \approx 1.2\,\mathrm{GeV}^2$ data showed a clear negative contribution in the region of the N–Δ transition, and a positive contribution for $W^2 > 2\,\mathrm{GeV}^2$. The measured g_1^d structure function amounts to about half of the g_1^p structure function, leading to an almost null, but slightly negative, contribution of g_1^n. This is essentially the same behavior as that found in the DIS data at higher W and Q^2. The overall strength (integrated over