E.2 Elastic Contribution to the Moments

The elastic contribution to the spin structure moments at $x = 1$ can be evaluated with the following two relations [220]:

$$\begin{aligned} g_1^{el}(x, Q^2) &= \frac{1}{2} G_M(Q^2) \frac{G_E(Q^2) + \tau G_M(Q^2)}{1+\tau} \delta(x-1) \\ g_2^{el}(x, Q^2) &= \frac{\tau}{2} G_M(Q^2) \frac{G_E(Q^2) - G_M(Q^2)}{1+\tau} \delta(x-1) \end{aligned} \tag{E.8}$$

So we have:

$$\begin{aligned} \Gamma_1^{el}(Q^2) &= \frac{1}{2} G_M(Q^2) \frac{G_E(Q^2) + \tau G_M(Q^2)}{1+\tau} \\ \Gamma_2^{el}(Q^2) &= \frac{\tau}{2} G_M(Q^2) \frac{G_E(Q^2) - G_M(Q^2)}{1+\tau} \end{aligned} \tag{E.9}$$

All higher moments of the structure functions will have identical elastic contributions since the delta function picks out only the contribution at $x = 1$ From Eq. 4.8 we can see that the elastic contribution to the extended GDH sum is:

$$\begin{aligned} I_A^{el}(Q^2) &= \frac{16\pi^2\alpha}{Q^2} \left[\Gamma_1^{el}(Q^2) - \frac{1}{\tau} \Gamma_2^{el}(Q^2) \right] \\ &= \frac{16\pi^2\alpha}{Q^2} \frac{G_M^2}{2} \end{aligned} \tag{E.10}$$

and finally, the elastic contribution to the d_2 matrix element is

$$d_2^{el}(Q^2) = 2\Gamma_1^{el}(Q^2) + 3\Gamma_2^{el}(Q^2) \tag{E.11}$$

E.2.1 Estimate of Q.E. Contribution

We can make a first order estimate of the ^{3}He quasielastic reaction portion of the moments using the impulse approximation. We assume that the quasielastic contribution is the incoherent sum of elastic contributions of the proton and neutron as given in section E.2. These elastic portions are then combined using the effective polarization formulae of equation A.9. Although admittedly crude, this method reproduces the trend of our data surprisingly well. See for example figure E.1.

The MAID model calculates only nucleon response in the resonance region. In order to compare this phenomenological model directly to our ^{3}He data, we have added an estimate of the quasielastic region following the above procedure.