From Asymmetries to structure function and virtual photon asymmetries

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The kinematics of parallel and near-perpendicular asymmetries are different for SANE HMS resonance region, though their W, Q^2, x_{Bj}, and ν are almost same. So relation between (A_{180}, A_{80}) and (g_1, g_2) and also (A_1, A_2) should be carefully examined. First, (A_{180}, A_{80}) and (g_1, g_2) have the following relation:

$$A_{180} = \frac{-D'_{180}}{F_{1,180}}[-\frac{E_{180} + E'_{180} cos\theta_{180}}{E_{180} - E'_{180}} g_1 + \frac{Q^2_{180}}{(E_{180} - E'_{180})^2} g_2],$$

$$A_{80} = \frac{-D'_{80}}{F_{1,80}}[-\frac{E_{80} cos80^\circ + E'_{80}(sin\theta_{80} cos\phi_{80} sin80^\circ + cos\theta_{80} cos80^\circ)}{E_{80} - E'_{80}} g_1 + \frac{2E_{80}E'_{80}(sin\theta_{80} cos\phi_{80} sin80^\circ + cos\theta_{80} cos80^\circ - cos80^\circ)}{(E_{80} - E'_{80})^2} g_2]$$

Second, (g_1, g_2) and (A_1, A_2), with average F_1 and γ, have the following:

$$g_1 = \frac{F_1}{1+\gamma^2}(A_1 + \gamma A_2),$$

$$g_2 = \frac{F_1}{1+\gamma^2}(-A_1 + \frac{A_2}{\gamma})$$

Above equations can be inverted as 2x2 matrices to get reverse relation. But the usual relation between (A_{180}, A_{80}) and (A_1, A_2) becomes ambiguous. It seems not good to use the following:

$$A_\parallel = D(A_1 + \eta A_2),$$

$$A_\perp = d(A_2 - \zeta A_1)$$