Nucleon Spin Generalized Polarizabilities at HBχPT at $\mathcal{O}(p^4)$

Chung-Wen Kao[a] and Marc. Vanderhaeghen[b]

[a] *Department of Physics and Astronomy, University of Manchester, M139PL,UK*
[b] *Institut fuer Kernphysik, Johannes Gutenberg-Universitaet,D-55099 Mainz,Germany*

We calculate the spin-dependent amplitudes of virtual Compton scattering $\gamma^* + N \to \gamma + N$ in the framework of HBChPT at $(\mathcal{O}(p^4))$ and extract the seven spin-dependent generalized polarizabilities. We also verify the three constarints between these generalized polarizabilites explicitly.[1] It is first time to explicitly verify these relations because they relate the third order and the fourth order amplitudes. By applying these constraints we also make two predictions which would be confirmed by the $(\mathcal{O}(p^5))$ calculation. We also compare our results with previous $(\mathcal{O}(p^3))$[2] results and find the corections are large.

References

[1] D. Drechsel, G. Knoechlein, A. Yu. Korchin, A. Metz and S.Scherer, Phys. Rev **C57** (1998)941.
[2] T. R. Hemmert, B. R. Holstein, G. Knoechlein and D. Dreschel, Phys. Rev **C62** (2000)014013.