Extracting the spin polarizabilities of the proton by measurement of Compton double-polarization observables

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The Compton double-polarization observable Σ_{2z} has been measured for the first time in the $\Delta(1232)$ resonance region using a circularly polarized photon beam incident on a longitudinally polarized proton target at the Mainz Microtron. This paper reports these results, together with the model-dependent extraction of four proton spin polarizabilities from fits to additional asymmetry data using either a dispersion relation calculation or a baryon chiral perturbation theory calculations with the weighted average of these two fits resulting in $\gamma_{E1E1} = -2.87 \pm 0.52$, $\gamma_{M1M1} = 2.70 \pm 0.43$, $\gamma_{E1M2} = -0.85 \pm 0.72$, and $\gamma_{M1E2} = 2.04 \pm 0.43$, in units of 10^{-4} fm^4.

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