Constraints on the $s - \bar{s}$ asymmetry of the proton in chiral effective theory

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We compute the $s - \bar{s}$ asymmetry in the proton in chiral effective theory, using phenomenological constraints based upon existing data. Unlike previous meson cloud model calculations, which accounted for kaon loop contributions with on-shell intermediate states alone, this work includes off-shell terms and contact interactions, which impact the shape of the $s - \bar{s}$ difference. Using a regularization procedure that preserves chiral symmetry and Lorentz invariance, we find that existing data limit the integrated value of the first moment of the asymmetry to the range $-0.07 \times 10^{-3} \leq \langle x(s - \bar{s}) \rangle \leq 1.12 \times 10^{-3}$ at a scale of $Q^2 = 1$ GeV^2. In contrast to some suggestions in the literature, the magnitude of this correction is too small to account for the NuTeV anomaly.