

The proton structure: Interplay between partonic and hadronic degrees of freedom

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The \bar{d} - u asymmetry observed in the proton sea is difficult to understand from a strict perturbative QCD point of view. We show that by also taking into account hadronic (baryon-meson) fluctuations of the proton, this problem has a natural solution and quantitative agreement with data is presented.

An outstanding problem going back several decades is the so-called 'proton spin puzzle'. This relates to the fact that data shows that the fraction $\Delta\Sigma$ of the proton's spin carried by its constituent quarks is quite small compared to what is predicted by the otherwise successful SU(6) quark-model of hadrons. We present our Hadron-Cloud Model taking into account hadronic and partonic degrees of freedom, relativistic effects and allow for SU(6) symmetry-breaking. With this we obtain good agreement with the polarized structure functions of both the proton and that of the neutron. The measured integrals of the polarized structure functions (and the related Bjorken sum-rule) are also reproduced. This yields a value of $\Delta\Sigma$ consistent with data.

Primary author: GHADERI, Hazhar (Uppsala University)

Co-authors: EKSTEDT, Andreas (Uppsala University); INGELMAN, Gunnar (Uppsala University); LEUPOLD, Stefan (Uppsala University)

Presenter: GHADERI, Hazhar (Uppsala University)

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