Two-quark correlations in the hard electromagnetic nucleon form factors

W. Schweiger

Institute of Theoretical Physics, University of Graz
Universitaetsplatz 5, Graz A-8010, Austria
e-mail: wolfgang.schweiger@uni-graz.at

Abstract

The, so called, "hard-scattering formalism" constitutes a suitable framework for the perturbative treatment of exclusive hadronic processes at large energies and momentum transfers. In this connection, diquarks represent a useful phenomenological device to model non-perturbative effects which are still observable in the kinematic range accessible by present-day experiments. We will show that a description of baryons as quark-diquark systems can be understood as an effective theory in the sense that the pure quark hard-scattering formalism is recovered in the limit of asymptotically large momentum transfers. Our arguments are based on a reformulation of the hard-scattering formalism in terms of quark-diquark degrees of freedom. Such a reformulation provides the exact form of photon- and gluon-diquark vertices and corresponding vertex functions (diquark-form factors) in the limit of asymptotically large momentum transfers - and thus also asymptotic constraints which should be fulfilled by phenomenological quark-diquark models for hard scattering. As an application of these considerations, we will present an analysis of the hard electromagnetic nucleon form factors with respect to their quark-diquark content. We will also sketch how the computational effort for hard exclusive baryonic reactions beyond electron-nucleon scattering may be considerably reduced by reformulating them in terms of quarks and diquarks.