Point form relativistic Hamiltonian dynamics and pion charge radius

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The analytic expressions for the mean square radius of a π-meson are obtained by means of various model wave functions within the Poincare covariant quark model based on of the point form relativistic Hamiltonian dynamics.

The paper shows that the correspondence between experimental and theoretical values of a π-meson can be achieved by introducing a quark form-factor. Moreover, the momentum given to the quark is not equal to the one given to the π-meson.

The values of the mean square radius of a quark for various model wave functions are obtained by means of the dipole dependence of the quark form-factor on the transferred momentum.

Spin effects of the W-production in hadron-hadron collisions

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The spin crisis induced a number of new experiment and theoretical activities to investigate in more details the spin structure of the nucleon. However, now the question of how the spin of the nucleon is composed of its elementary constituents remains open. Purely inclusive measurements determining the longitudinal spin structure functions $g_1(x, Q^2)$ for nucleons and deuteron are unfortunately restricted to probe only certain combinations of the polarized parton contributions to the nucleon spin. A

full analysis would require additional inputs from other measurements to separate the different components.

In this paper we are concerned with experiments which may provide direct measurements of new independent combination of the quark densities in polarized nucleon. We will focus on inclusive single W-boson production in hadron-hadron interactions with one longitudinally polarized beam $N + \vec{N} \to W^{\pm} + X \to l^{\pm} + X$, when in the final state only charged lepton is detected.

In our presentation we get formulas, which connect the polarized quark densities in the region of small x with the observable single asymmetries of this process, combination of unpolarized quarks densities and polarized quark densities in the region where they are well defined. The equations allow to determine the low-x behavior of polarized u- and d-quark and antiquark distributions in nucleon.

Static electrical polarizability of a π meson in a composite scalar quark model in the quasi-potential approach

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In the present paper in a formalism of a single-time approximation we obtain the quasi-potenzial equation for a "positively - frequency" wave function of a neutral system of two scalar charged particles of an equal mass in an external electromagnetic field in the second order on this field. Because of sectional equation the shift of levels of an energy of a system in an external field is defined. The calculation of an electrical polarizability for a pi meson in composite scalar quark model with Coulomb and with oscillating potentials is produced. The theoretical analysis of numerical estimations of static polarizabilities of a composite system is carried out.