

Relativistic quark model and weak excitation of
nucleon

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Quark model, based on the relativistic wave equation [1], is considered in connection with neutrino (or antineutrino) excitation of a nucleon N to a nucleon resonance N^* and lepton l : $\nu + N \rightarrow l + N^*$. The current-current theory of weak interactions is used to calculate matrix elements for these processes. In order to obtain the agreement with the existing experimental data, one should introduce an axial-vector quark form-factor. Thus, the idea that the origin of weak and electromagnetic hadronic form-factors is in the inner motion of pointlike quarks inside hadrons turned out to be incorrect one.

The situation is similar in the other existing relativistic quark models: in Ref. [2] an ad hoc form-factor is introduced even for the electromagnetic interactions, and in Ref. [3] the quark form-factor is introduced via VMD hypothesis. The pointlike structure of quarks is also difficult to be explained from the field-theoretic point of view.

References:

- 1) M. Blagojević, Prog.Theor.Phys. 54 (1975), 460.
- 2) R.P. Feynman et al., Phys.Rev. D3 (1971), 2706.
- 3) V.F. Dushenko et al., Preprint ITP-75-76E (1975).