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Relativistic Coupled-Channels Quark Model for Baryon Ground and Resonant States

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We are investigating an approach towards a realistic description of baryon ground and resonant states in a unified framework. It consists of a relativistic constituent-quark model set up along a coupled-channels theory. Thereby it becomes possible to include for baryons beyond three-valence-quark configurations further degrees of freedom that are relevant for a realistic description notably of resonant states.
So far we have managed to consider explicit pionic effects by coupling to {QQQπ} channels. In particular, we have studied in a consistent approach the influence of pion dressing on the nucleon mass as well as the Delta resonance mass and hadronic decay width; all of these values are described in good agreement with experimental data. At the same time we have obtained a microscopic description of the strong form factors at the NNπ, NΔπ, and ΔΔπ interaction vertices. They compare reasonably well with parametrizations used in phenomenological models available from the literature.

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