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Ground and excited nucleon structure within continuum QCD approaches[1]

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The task of mapping and explaining the spectrum of nucleon and delta resonances, and the structure of these states in terms of quarks and gluons is a longstanding challenge in hadron physics, which is likely to persist for another decade or more. We review the progress made in this topic using a Schwinger functional method which combines Dyson-Schwinger equations with covariant bound-state equations for conventional hadrons, namely Bethe-Salpeter and Faddeev equations. This framework provides a non-perturbative, Poincar-covariant continuum formulation of Quantum Chromodynamics (QCD) which is able to extract novel insight on baryon properties since the physics at the hadron level is directly related with the underlying quark-gluon substructure, via convolution of Green functions. Since the approach provides access to all momentum scales, it is particularly suited to study N* elastic and transition form factors as well as their associated generalized parton distributions; therefore, examples of the calculation of this kind of observables shall be discussed.

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