

Challenges of the N* Program (Experiment)¹

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The first challenge faced to investigate the strong interaction from explored, where meson-cloud degrees of freedom dominate, to still unexplored distance scales, where the dressed-quark contributions are the dominating degrees of freedom, is to find an experiment that allows to measure observables that are probing this evolving nonperturbative QCD regime over the full range. Baryon spectroscopy can establish more sensitively, and in an almost model-independent way, nucleon excitation and non-resonant reaction amplitudes by complete measurements of pseudo-scalar meson photoproduction off nucleons. Elastic *and* transition form factors can then trace this evolution by measurements of elastic electron scattering *and* exclusive single-meson *and* double-pion electroproduction cross sections off the nucleon that will be extended to higher momentum transfers with the energy-upgraded CEBAF beam at JLab to study the dressed quark degrees of freedom, where their strong interaction is responsible for the ground and excited nucleon state formations.

After establishing unprecedented high-precision data, the immanent next challenge is a high-quality analysis to extract these relevant electrocoupling parameters for various resonances that then can be compared to state-of-the-art models and QCD-based calculations. Recent results will demonstrate the status of the analysis and an outlook will pinpoint further challenges including those to establish QCD-based results directly from the experimental data.

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