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Understanding nucleon excitations in electromagnetic interactions

The search for "missing resonances,"first highlighted by Koniuk and Isgur in 1980, has shaped the field of baryon spectroscopy for more than four decades. It inspired worldwide experimental programs and new theoretical approaches to uncover the spectrum and structure of excited nucleon states.
This talk will review recent progress from meson photo- and electroproduction studies that have identified new resonances and advanced our understanding of the nature of well-known states. I will also discuss the essential role of baryon excitations in the hadronic phase transition of the early universe, and how electroexcitation experiments shed light on one of the central questions of QCD—the emergence of mass.
Finally, I will highlight novel approaches that probe baryon properties in exclusive deep-inelastic processes. These developments, enabled by large-acceptance spectrometers operating at high luminosities, open new windows into the effective degrees of freedom inside nucleons across distance scales.

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