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Nucleon resonance and electromagnetic meson production reaction

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Accurate determination of the N^* parameters is a crucial step toward the understanding of hadron structure and reaction in terms of QCD in the non-perturbative region. Now precise and extensive data of photo and electroproduction of mesons are available from the intensive experimental efforts, which make it possible to extract accurate parameters of the excited baryons N^*. In the past years, the $N\Delta$ transition has been studied using various theoretical approaches. It is now recognized that the meson cloud effects play an important role in understanding transition form factors. Above the $\Delta(1232)$ resonance, the meson production reaction becomes highly inelastic. In order to extract N^* parameters from the data it is challenging but necessary to establish an approach to take into account the coupled channel effects of the various meson production channels. In this talk I will briefly review theoretical approaches to analyze the meson production reactions beyond the delta region. In particular, the coupled channel model of EBAC and the resonance parameters in this approach will be discussed. Recent results on the N^* parameters from the analysis of single pion production reaction will be shown. A plan to extend the present EBAC analysis by incorporating the data of inelastic reactions in collaboration with experimentalists will be discussed.