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Recent Progress in the Understanding of the Baryon Spectrum

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One of the primary approaches for understanding quark-gluon structure in baryons is to interpret the baryon spectrum in terms of the effective degrees of freedom. A significant amount of information about the light baryon spectrum comes from photoproduction experiments. Of particular interest are recent results on the photoproduction of vector mesons (ω, ρ and ϕ) and two-pion final states. It is anticipated that the resonances above 1.7 GeV c.m. energies, which have been predicted by the constituent quark model as well as Lattice QCD calculations but not yet confirmed experimentally, may predominantly couple to these final states. Therefore, it is essential to study these decay modes of excited baryons for discovering new resonances and understanding many known resonances that have been seen only in a few other decay modes. Recently published results on ω photoproduction off a proton from various collaborations and their interpretation will be presented. In addition, preliminary results on polarization observables for the same reaction using a transversely-polarized FROzen Spin butanol Target (FROST) at CLAS will be reported. The high-quality results are expected to provide further constraints to identify the N^* resonances that decay to $p\omega$ with minimal ambiguities. Furthermore, published results on $\pi^0\pi^0$ photoproduction from CBELSA/TAPS and preliminary results from the complimentary $\pi^+\pi^-$ photoproduction from the FROST experiment using a transversely-polarized target will be discussed. These results will give important information on the intermediate resonances that are involved in sequential decays to multipion-final states as well as on the decay modes of the resonances to ρ vector mesons. Many observables presented here are first-time measurements and will significantly augment the world database in these final states.

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