Analyzing the excited baryons with electromagnetic probes.

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The excited-baryon-analysis program using electromagnetic probes by the Jülich-Athens/GA-Washington/DC Collaboration will be presented. The program's analysis is based on a dynamical coupled-channels approach developed recently by the Collaboration [1,2], where the basic symmetries, such as the two-body unitarity, analyticity, and gauge invariance, are respected. In particular, gauge invariance is enforced as dictated by the generalized Ward-Takahashi identity. The whole approach is anchored in the field-theoretic formalism of Haberzettl [3]. The first quantitative application of the approach has been carried out with success in the description of both the neutral and charged pion photoproduction off nucleons up to $\sqrt{s} \sim 1.65$ GeV [4].

[1] H. Haberzettl, K. Nakayama, and S. Krewald, Phys. Rev. C **74**, 045202 (2006).

[2] H. Haberzettl, F. Huang, and K. Nakayama, Phys. Rev. C **83**, 065502 (2011).

[3] H. Haberzettl, Phys. Rev. C **56**, 2041 (1997).

[4] F. Huang, M. Döring, H. Haberzettl, J. Haidenbauer, C. Hanhart, S. Krewald, U.-G. Meißner, and K. Nakayama, arXiv:1110.3833[nucl-th].