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Combination of Bayesian Statistics with Truncated Partial-Wave Analysis

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Within the strong interaction, the emergence of so-called baryon resonances, such as the nucleon resonance N(1535)1/2-, can be observed. These states can be predicted by the theory of quantum chromodynamics, for example by quark models. However, more resonances are theoretically predicted than have been experimentally found, which is known under the name of the missing-resonance problem. Partial wave analyses describe experimental data with a suitable statistical model in order to extract resonance parameter and explain and verify predicted resonances. Hereby, mathematical ambiguities are an inherent property. A truncated partial-wave analysis is a simpler model and allows among other things to study these mathematical ambiguities. In this project, Bayesian statistics is combined with truncated partial-wave analysis for the first time in order to study the structure of emerging ambiguities and their relevance in comparison to each. The experimental data of the six polarization observables $\sigma_0, \Sigma, T, E, F$ and G of η-photoproduction are used for the analysis. The final results are marginal distributions for the electromagnetic multipole parameters. In this presentation, an overview about the method and arising ambiguities will be given. In addition, first model-independent predictions for polarization observables, which have not yet been measured, will be shown.

Parallel Session

Hadron Spectroscopy

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