Bayesian inference of the resonance content of $p(\gamma, K^+)\Lambda$

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A thorough knowledge of the nucleon-resonance (N^*) content of open-strangeness production reactions could dramatically improve our understanding of the nucleon's structure. We present a Bayesian analysis of the world's $p(\gamma, K^+)\Lambda$ data. From the proposed selection of 11 resonances, we find [1] that the following nucleon resonances have the highest probability of contributing to the reaction: $S_{11}(1535)$, $S_{11}(1650)$, $F_{15}(1680)$, $P_{13}(1720)$, $D_{13}(1900)$, $P_{13}(1900)$, $P_{11}(1900)$, and $F_{15}(2000)$. We adopt a Regge-plus-resonance framework [2,3] featuring consistent couplings [4] for nucleon resonances up to spin $J = 5/2$. We evaluate all possible combinations of 11 candidate resonances. The best model is selected from the 2048 model variants by calculating the Bayesian evidence values against the world's $p(\gamma, K^+)\Lambda$ data.

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