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Baryon Spectroscopy from Two-Pion Producton Data

KENNETH HICKS, Ohio University

Reaction models for extraction of baryon parameters from measured observables have made significant advances recently and have shown the importance of coupled-channels effects when extracting the masses of resonance poles from experimental data. These coupled-channels effects are not small. For example, the transition magnetic moment which governs the Electromagnetic decay rate of the Delta resonance is off by 30% or more from predictions of the non-relativistic quark model, yet when coupled-channels effects of the nucleon's "pion cloud" are included, the decay rate is predicted correctly. Extraction of nucleon resonance poles using two-pion production data from Jefferson Lab is inextricably linked to the need for higher-precision (π,2π) reaction from J-PARC. The world database for (π,2π) data on the nucleon is paltry and a new experiment has been approved at J-PARC to remedy this situation. Together, new high-precision data from both JLab and J-PARC will work together to ensure that coupled-channels effects are properly constrained in the search for the spectrum of nucleon resonances.