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Towards a Comprehensive Model of Two-Pion Photoproduction at CLAS

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The photoproduction of π+π− pairs at forward angles has traditionally been attributed to Pomeron exchange. However, recent analyses of CLAS data at photon energies below 4 GeV reveal that for |t|⊠0.5 ~GeV^2, this mechanism alone fails to fully describe the observed angular moments. To address this, we develop a new theoretical model incorporating both two-pion and pion-nucleon resonant contributions within the Regge framework. The model accounts for the dominant ρ(770) resonance as well as subleading contributions from scalar and tensor mesons such as f0(500), f0(980), f0(1370), and f2(1270), which influence the S- and D-wave components. Additionally, deviations from s-channel helicity conservation at high |t| suggest the relevance of nontrivial partial wave dynamics. After fitting free parameters to CLAS data, the model successfully reproduces the low moments of the angular distribution and provides insights into the underlying production mechanisms. Further investigation of the t-dependence of Regge residues offers a deeper understanding of subdominant exchange contributions.

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