Double Neutral Pion Photoproduction at Threshold

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We consider the chiral expansion of the threshold amplitude for the reaction $\gamma p \to \pi^0 \pi^0 p$ to order $\mathcal{O}(M_\pi^2)$. We substantiate a claim that this photoproduction channel is significantly enhanced close to threshold due to pion loops. A precise measurement of the corresponding cross sections is called for which allows to test chiral perturbation theory.

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IR-Renormalon Contribution to the Longitudinal Structure Function F_L.

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The available data on F_L suggest the existence of unexpected large higher twist contributions. We use the $1/N_f$ expansion to analyse the renormalon contribution to the coefficient function of the longitudinal structure function F_L^{p-n}. The renormalon ambiguity is calculated for all moments of the structure function thus allowing to estimate the contribution of "genuine" twist-4 corrections as a function of Bjorken-x. The predictions turn out to be in surprisingly good agreement with the experimental data.

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Effects of Color Coherence in Electroproduction of Vector Mesons off Deuteron ◇

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Diffractive electroproduction of vector mesons off the deuteron at $Q^2 \geq few\ GeV^2$ is discussed. A specific kinematical situation has been chosen where the scattering amplitude is dominated by rescattering from the hadronic system. Selecting specific configurations of the final two-nucleon system (deuteron state with large p_t, low momentum continuum pn state etc.) permits to suppress contributions from larger internucleon distances relevant for rescattering. This helps to enhance the sensitivity of the final state interaction to the properties of the hadronic wave packet produced in the hard scattering process. Since the nuclear part can be calculated reliably, the hard scattering part can be used to probe the localization of color in two-body wide angle exclusive processes. The color coherence phenomena in these reactions could reveal itself as a strong suppression of the rescattering contribution with increasing Q^2.

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