Coherent ρ Production from Polarized Deuterium $^\diamond$

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We discuss the coherent leptoproduction of vector mesons from polarized deuterium as a tool to investigate the evolution of small size quark-gluon configurations. Kinematic regions are determined where the final state interaction of the initially produced quark-gluon wave packet contributes dominantly to the production cross section. Two methods for an investigation of color coherence effects, which are appropriate for future experiments at HERMES are suggested.

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$SU(3)$ Chiral Dynamics with Coupled Channels: Eta and Kaon Photoproduction $^\diamond$

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We identify the s-wave amplitudes of the $SU(3)$ chiral meson-baryon Lagrangian with a potential which is iterated in a Lippmann-Schwinger equation. The strangeness -1 resonance $\Lambda^*(1405)$ and the $S_{11}(1535)$ nucleon resonance emerge a quasi-bound states of anti-kaon/nucleon and kaon/Σ-hyperon. Our approach to meson photoproduction introduces no new parameters. By adjusting a few finite range parameters we are able to simultaneously describe a large amount of low energy data. These include the cross sections of K^-p elastic and inelastic scattering, the cross sections of eta meson and kaon photoproduction from nucleons as well as those of pion induced production of etas and kaons (16 different reaction channels altogether).

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Combining Lattice QCD Results with Regge Phenomenology in a Description of Quark Distribution Functions $^\diamond$

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The most striking feature of quark distribution functions transformed to the longitudinal distance representation is the recognizable separation of small and large longitudinal distances. While the former are responsible for the average properties of parton distributions, the latter can be shown to determine specifically their small-x behaviour. In this paper we demonstrate how the distribution at intermediate longitudinal distances can be approximated by taking into account constraints which follow from the general properties of parton densities, such as their support and behaviour at $x \to 1$. We show that the combined description of small, intermediate, and large longitudinal distances allows a good approximation of both shape and magnitude of parton distribution functions. As an application we have calculated low-virtuality C even and odd (valence) u and d quark parton densities of the nucleon and the C-even transversity distribution $h_1(x)$, combinig recent QCD sum rules and lattice QCD results with phenomenological information about their small-x behaviour.

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