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The proton GPDs from photoproduction of quarkonia-photon pairs.

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Content

In this talk we discuss the phenomenological studies of the generalized parton distributions (GPDs) from the exclusive photoproduction channels, and argue that the photoproduction of charmonia-photon pairs, such as $\eta_c\gamma$ and $\chi_c\gamma$, can be used as a complementary tool for analysis of the GPDs. We calculated the coefficient functions for η_c and for all possible spins and helicity projections of χ_c mesons in the leading order in the strong coupling α_s. We estimated numerically the cross-sections and the expected counting rates, and found that studies of this channel are experimentally feasible. We found that the dominant contribution is controlled by the leading-twist, chiral-even GPDs of gluons H^g. The ratio of cross-sections for different charmonia polarizations can be used as a sensitive probe of relations between the long-distance matrix elements of different quarkonia which are expected in the heavy quark mass limit. The numerical estimates suggest that the χ_{c1}, χ_{c2} mesons should be produced predominantly with the same polarization as the incoming photon. We also analyzed the angular distribution of χ_c mesons in electroproduction experiments and found that for some helicity components there should be sizable angular asymmetries, which can be used as complementary observables. Finally, we also discuss the potential of $J/\psi\gamma$ production for studies of the GPDs. Due to C-partity constraints, this process is mostly sensitive to the contributions of the (valence) light quarks.

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