

Diffraction vector meson production at HERA using holographic light-front QCD

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We adopted the light-front holographic QCD approach for investigating diffractive vector meson production in electron-proton collisions at HERA. Specifically, our study focuses on Rho (ρ) and Phi (ϕ) vector meson production. Our findings involve developing holographic wave functions that capture the internal structure and dynamics of these vector mesons, incorporating non-perturbative QCD effects. These wave functions are then integrated into the diffractive QCD factorization framework, facilitating the prediction of essential observables like differential cross sections and angular distributions, crucial for experimental comparisons at HERA. Additionally, this holographic approach enables exploration of energy and momentum transfer dependencies in vector meson production, revealing insights into the interplay between perturbative and non-perturbative QCD effects, including gluon saturation, proton structure, and vector meson behavior in high-energy, small- x conditions.

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