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Generalized parton distributions and spin structures of light mesons from basis light-front quantization

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We present the generalized parton distributions (GPDs) of the pion and the kaon in both momentum and position spaces within the basis light-front quantization framework. We obtain these GPDs for the valence quarks from the eigenvectors of a light-front effective Hamiltonian in the valence Fock sector consisting of the holographic quantum chromodynamics (QCD) confinement potential, a complementary longitudinal confinement potential, and the color-singlet Nambu-Jona-Lasinio interactions. We calculate the generalized form factors of the pion and the kaon from the moments of the GPDs. Combining the tensor form factors with the electromagnetic form factors, we then evaluate the impact parameter dependent probability density of transversely polarized quarks inside the pion and the kaon. The present numerical results for the generalized form factors, and tensor charges, as well as those for the probability densities and the transverse shift of the polarized densities, are consistent with lattice QCD simulations and the chiral quark models.

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