

# Structure of spin-1 QCD systems using light-front Hamiltonian approach

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We investigate the structure of the spin-1 hadron system, particularly the  $\rho$ -meson, through the leading-twist momentum-dependent parton distribution functions. We employ the light-front wavefunctions generated from the Basis Light-Front Quantization approach to compute the quark and gluon distribution functions (PDFs), and the transverse momentum-dependent quark distribution functions (TMDs). To extract the wavefunctions, we truncate the Fock space to consider the states of the valence quark-antiquark and quark-antiquark-gluon. Our predictions follow the positivity bounds implied on the PDFs and TMDs of both the quark and the gluon. Further, we evolve the unpolarized and helicity PDFs to a higher scale in order to compare the moments of PDFs with the other theoretical approaches.

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