

Light-front approach to nucleon structure

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The light front is a three-dimensional hypersurface tangential to the light cone. The field theory quantized on the light front provides unique advantages in describing the structure of relativistic bound states. In this work we solve the structure of the nucleon in a nonperturbative approach based on the Hamiltonian formalism of the light-front field theory. The input Hamiltonian includes an effective confining interaction and a one-gluon exchange interaction between the three valence quarks. The resulting three-body light-front wave functions are subsequently employed to calculate the observables characterizing the nucleon's three-dimensional structure: the form factors, the parton distribution functions, the generalized parton distribution functions and the transverse-momentum-dependent distributions. Finally I will report our recent progress in the calculation including one dynamical gluon. I will show the preliminary results on the gluon distribution in the nucleon.

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