Computing and explaining parton distributions within hadrons

Abstract

98% of the luminous matter owes itself to dynamical quark mass generation. The corresponding quark mass function evolves from a small value when quarks are close to each other to a large value of the order of a few hundred MeV when they traverse distances of hadronic size. This running of the mass function reflects itself in several physical observables such as form factors and parton distribution functions inside hadrons. This study can be carried out naturally through QCD’s fundamental field equations, namely, Dyson-Schwinger equations to predict a host of hadronic observables. I present the development of a consistent analysis based upon a symmetry preserving Dyson-Schwinger and Bethe-Salpeter equations to compute elastic and transition form factors of pion and heavy quarkonia. Their evolution under the probing momentum of the photons is governed by the parton distribution amplitude, hence providing us with a unifying tool to study the problem.