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PION LIGHT-FRONT WAVE FUNCTION FROM LATTICE RESULTS

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In this work, we study the pion valence wave function by starting with an analytic parametrisations of the vertex function and
running quark mass fitted to lattice-QCD results. We also investigate the pion electromagnetic structure of the pion, which is a
pseudoscalar meson composed of a quark-antiquark bound state, i.e., $|u\,\bar{d}>$ with total spin zero and negative parity.
Our proposal is to obtain a wave function from the Lattice-QCD results,
which describes the internal structure of the pion. In particular we calculate observables like
the electromagnetic form factor and mean square radius.
We compute the wave function by using a model with a running constituent quark mass.
Specifically, we performed the calculations in the Light-Front formalism with a Bethe-Salpeter (BS) amplitude model with constituent quarks,
which forms the pion composite state. The calculations will be compared with other models in the literature, which present different form for the pion light-front wave function. We take care of the Dirac matrix spinor structure of the BS amplitude.
In a first approximation, we disregarded the Dirac structure, and make
the first estimates for the wave function. Due to presence of poles also in the quark mass function, we approximated it by a constant of $\Sigma^2 = 0.300\ GeV^2$,
but this was only as a first step in our study of the wave function. For this purpose, we analyzed the poles of the Bethe-Salpeter amplitude in the momentum, which are integrated via Cauchy's theorem to eliminate te relative light-front time between the quarks, and in this way we derived the valence wave function.

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