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# Light-front quark model analysis of the P(\pi^0, \eta, \eta') \to \gamma^* \gamma transition form factors

In the present work, we investigated
the P-> \gamma^* \gamma(P=\pi, \eta, \eta') transition form factors (TFF)
in the light-front quark model(LFQM) based on the QCD motivated
effective LF Hamiltonian.

In the previous work, we discussed the link between the chiral symmetry of
QCD and the numerical results of the LFQM, analyzing both the two-point
and three-point functions of a pseudo scalar meson from the perspective
of the vacuum fluctuation consistent with the chiral symmetry of QCD.
In this work, we start from the covariant Bethe-Saltpeter (BS) model used
in the previous works to pin down the zero mode for the P -> \gamma^*
\gamma TFFs and find that the meson-photon TFF is immune to the zero
mode. We confirm the self-consistent correspondence relation between
the covariant BS model and the LFQM that allow the substitution of the radial
and spin-orbit wave functions of the exactly solvable model by the more
phenomenologically accessible model wave functions that can be provided
by the LFQM analysis of meson mass spectra. Furthermore, we show not only
timelike but also spacelike TFF using the analytic continuation method of
changing Q^2-> -Q^2 in the form factor.

The \eta-\eta'mixing scheme is analyzed to obtain the optimum values of the
\eta(\eta')-\gamma TFFs and compared with the current available experimental data.
The present work rejuvenates our earlier analysis of the P -> \gamma^* \gamma
process solely based on the standard LF approach of the LFQM, in which we have
shown a good agreement with the low- and intermediate Q^2 data
(0 < Q^2 < 10GeV^2) measured decades ago from the CELLO and CLEO Collaborations.

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