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Frame dependence of transition form factors in light-front dynamics

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We calculate the transition form factor between vector and pseudoscalar quarkonia in both the timelike and the spacelike region using light-front dynamics. We investigate the frame dependence of the form factors for heavy quarkonia with light-front wave functions calculated from the valence Fock sector. This dependence could serve as a measure for the Lorentz symmetry violation arising from the Fock-space truncation. We suggest using frames with minimal longitudinal momentum transfer for calculations in the valence Fock sector, namely, the Drell-Yan frame for the spacelike region and a specific longitudinal frame for the timelike region; at $q^2 = 0$ these two frames give the same result. We also use the transition form factor in the timelike region to investigate the electromagnetic Dalitz decay $\psi_A \rightarrow \psi_B l^+ l^-$ ($l = e, \mu$) and predict the effective mass spectrum of the lepton pair.

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