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Quantum Electrodynamics Interpolated Between Instant Form and Front Form ZIYUE LI, MURAT AN, CHUENG-RYONG JI, North Carolina State University — Among the three forms of relativistic dynamics proposed by Dirac in 1949, the front form of relativistic dynamics now known as the light-front dynamics (LFD) appears to have definite advantages over the instant form dynamics, when it deals with the hadronic processes where the relativistic effects are significant. In particular, LFD may save a substantial dynamical effort put in the instant form dynamics with respect to getting the QCD solutions that reflect the full Poincaré symmetries, due to the built-in boost invariance and simpler vacuum property. As an effort to understand how the familiar instant form dynamics (IFD) transforms to LFD, we interpolate the two forms of dynamics by introducing an interpolation angle that changes the ordinary time t to light front time $(t + z/c)/\sqrt{2}$. In this presentation, we report our derivation of the polarization vectors for photon and the helicity spinors for spin-1/2 fermion that interpolate between IFD and LFD and the application of our results to the lowest-order QED scattering amplitudes. Our analysis makes clear the distinction between the infinite momentum frame (IMF) and the LFD.

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