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Spinors and Polarization Vectors Interpolated Between Instant Form and Front Form ZIYUE LI, MURAT AN, CHUENG-RYONG JI, North Carolina State University — As an effort to understand how the familiar instant form dynamics (IFD) transforms to light-front dynamics (LFD), we interpolate spinors and polarization vectors between these two forms of relativistic Hamiltonian dynamics by introducing an interpolation angle. We report our derivation of the helicity spinors for spin-1/2 fermion and the polarization vectors for photon that interpolate between IFD and LFD and the application of our results to the lowest-order QED scattering amplitudes. The spin orientation of the interpolating helicity spinors is derived and the Melosh transformation is generalized to any interpolation angle. We also find the Coulomb gauge in IFD and the light-front gauge in LFD are naturally linked by the unified general physical gauge that interpolates between these two forms of dynamics. The calculation of the lowest-order scattering processes for an arbitrary interpolation angle shows a universal J-shaped correlation independent of the specific scattering kinematics.

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