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sQED Interpolated between the Instant Form Dynamics and the Light-front Dynamics ZIYUE LI, North Carolina State University, ALFREDO SUZUKI, Instituto de Física Teórica-UNESP Universidade Estadual Paulista, CHUENG-RYONG JI, North Carolina State University — We present the electromagnetic gauge field interpolation between the instant form and the front form of the relativistic Hamiltonian dynamics and calculate the scattering amplitude in case of the electromagnetic gauge field theory with the scalar fermion fields known as the sQED theory. We find that the Coulomb gauge in the instant form dynamics (IFD) and the light-front gauge in the front form dynamics, or the light-front dynamics (LFD), are naturally linked by the unified general physical gauge that interpolates between these two forms of dynamics. We derive the spin-1 polarization vector for the photon that can be generally applicable for any interpolation angle. Corresponding photon propagator for an arbitrary interpolation angle is also found. The calculation of the lowest-order scattering processes for an arbitrary interpolation angle in sQED shows the same J-shape correlation that was found in the simpler scalar field theory. We discuss the singular behavior of this correlation in conjunction with the zero mode issue in the LFD.

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