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Some subtleties of light-front quantization

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We give a survey of a few subtle mathematical points whose correct treatment is necessary for obtaining noncontradictory structure of the front form of the field theory and its physical predictions. First, we show that small imaginary parts in the exponents of the light-front (LF) two-point functions (convergence factors) are mandatory for their correct equal-LF time limit and for vanishing of the surface terms in the Poincare algebra. The same mechanism removes unwanted terms in the transformation law of the scalar LF field under some Poincare generators. We also demonstrate that contrary to recent claims the LF Hamiltonian approach does not fail in the vacuum sector and actually yields results in agreement with the Feynman diagram method. The non-vanishing LF vacuum bubbles found recently within the Hamiltonian LF perturbation theory are shown to not violate conservation of the LF momentum. Their presence and analytical form agrees with the LF evaluation of the corresponding Feynman diagrams.

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