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Light-Front Wave Functions From LaMET

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Light-front wave functions play a fundamental role in the light-front quantization approach to QCD and hadron structure. However, a naive implementation of the light-front quantization suffers from various subtleties including the well-known zero-mode problem such as the associated rapidity divergences as well as breaking of spatial rotational symmetry. In the talk, I will show that the light-front quantization should be viewed as an effective theory in which small k^+ modes have been effectively "integrated out", with an infinite number of renormalization constants. Instead of solving light-front quantized field theories directly, we make the large momentum expansion of the equal-time Euclidean correlation functions in instant quantization as an effective way to systematically calculate light-front correlations, including the light-front wave function amplitudes. This large-momentum effective theory accomplishes an effective light-front quantization through lattice QCD calculations. We demonstrate our approach using an example of a pseudo-scalar meson wave function.

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