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Review on Linear Divergence

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Large-momentum effective theory provides a way to extract the parton physics from lattice data based on first-principle calculation. In applying large-momentum effective theory, renormalization of
the Euclidean correlators in lattice regularization is a challenge due to
linear divergences in the self-energy of Wilson lines. We will give a review on different renormalization methods to deal with linear divergences, including RI/MOM and ratio scheme. In these renormalization methods, people divide the bare hadron matrix element by another matrix element. Then we will talk about the self-renormalization method proposed recently, including a detailed numerical test on the linear divergence factors in the previous methods. Our test shows that the linear divergence can be eliminated in the ratio scheme. Moreover, we find a large non-perturbative effect in the RI/MOM and
ratio scheme, suggesting favor of the hybrid renormalization procedure proposed recently. Finally, we will talk about the hybrid renormalization method.

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