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IR fixed points and conformal window in $SU(3)$ gauge Theories

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We propose a novel RG method to specify the location of the IR fixed point in lattice gauge theories and apply it to the $SU(3)$ gauge theories with N_f fundamental fermions.

It is based on the scaling behavior of the propagator through the RG analysis with a finite IR cut-off, which we cannot remove in the conformal field theories in sharp contrast with the confining theories.

The method also enables us to estimate the anomalous mass dimension in the continuum limit at the IR fixed point. We perform the program for $N_f = 16, 12, 8$ and $N_f = 7$

and indeed identify the location of the IR fixed points in all cases. Our results are consistent with that the conformal window is $7 \leq N_f \leq 16$.

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