

IR renormalon in a compactified spacetime: the case of the QCD(adj.) on $R^3 \times S^1$

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An interesting possibility that the ambiguity in perturbation theory caused by the IR renormalon is cancelled by the instability associated with a semi-classical object called bion has been suggested in the context of the resurgence program of asymptotically-free quantum field theories. To reinforce this picture on the IR renormalon, the understanding of the IR renormalon in a compactified space such as $R^{D-1} \times S^1$ seems to be a basic premise. In this talk, I report our recent analysis on the IR renormalon in the gluon condensate in the $SU(N)$ QCD(adj.) on $R^3 \times S^1$ with the Z_N twisted boundary conditions. In the large N limit within the so-called large β_0 approximation, we find that the vacuum polarization of the W-boson, which acquires the twisted momentum from the boundary conditions, gives rise to the renormalon ambiguity that is identical to that in the system in the un-compactified space, R^4 . This situation is completely different from that in the 2D CP^{N-1} model on $R^1 \times S^1$ (the analyses on the latter will be presented by Dr. Takaura and Mr. Morikawa).

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