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Taming large logarithms and the scale invariant instanton

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Computing the false vacuum decay rate for the classically scale invariant scalar theory is particularly relevant for assessing the stability of the Standard Model. This proves particularly challenging as the classical scale invariance introduces an additional non-normisable zero-mode that cannot be treated through standard methods. We show how the Green's function method can be employed to compute the effect of quantum fluctuations, and how it can be improved via renormalisation group to keep under control the large logarithms that haunt the effective action. Finally, a self-consistent evaluation procedure allows us to identify the optimal renormalisation scale that minimises the large logarithms.

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