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Analytic false-vacuum decay rate in the thin-wall approximation

We derive a closed-form false vacuum decay rate at one loop for a single real scalar field in the thin wall limit. We obtain the bounce solution, together with the Euclidean action, counter-terms and RG running, and we extract the functional determinant via the Gel'fand-Yaglom theorem. Our procedure is valid for a generic spacetime dimension D, and we provide an explicit finite renormalized decay rate in $D = 3, 4$.

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