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Investigating the Catalytic Effect on Metastable Vacuum Decay in String Theory

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In our study, we explore the influence of catalysis on the vacuum decay within the framework of type IIB string theory. This decay process involves the creation of a bubble that combines with an impurity, effectively acting as a catalyst. Although we show the 1-loop analysis at first, to calculate the life-time more accurately, we take use of variational perturbation method and go beyond the approximation. Our investigation also addresses the Trans-Planckian Censorship Conjecture.

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