



Contribution ID: 69

Type: **not specified**

Life-time of Metastable Vacuum in String Theory and Trans-Planckian Censorship Conjecture

Tuesday 4 July 2023 17:15 (15 minutes)

We investigate the catalytic effect on the decay of a metastable vacuum in type IIB string theory. The decay bubble forms a bound state with an impurity, acting as a catalyst due to the non-linear DBI action. The vacuum's lifetime is calculated beyond the WKB approximation, and it satisfies the Trans-Planckian Censorship Conjecture (TCC) if the string scale is sufficiently smaller than the Planck scale.

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Session Classification: Parallel