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Vacuum Bubble tunneling

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We study the vacuum decay and the bubble nucleation in the anti-de Sitter black holes. In the bubble nucleation spacetime, the interior and the exterior of the bubble wall are described by two anti-de Sitter black hole spacetimes with different cosmological constants. We calculate the Euclidean action of the bubble nucleation spacetime and give the numerical results of the tunneling rates for different cases. It is shown that the black hole can act as a source of inhomogeneities and catalyze the vacuum decay and the bubble nucleation in the anti-de Sitter spacetime. For the RNAdS black holes, the tunneling rate to the final RNAdS black hole with the minimum critical mass is the highest among all the possible tunneling channels.

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