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Quantum crossover of the switching rate of a modulated oscillator VITTORIO PEANO, Michigan State University, LINGZHEN GUO, MICHAEL MARTHALER, Karlsruhe Institute of Technology, MARK DYKMAN, Michigan State University, GERD SCHOEN, Karlsruhe Institute of Technology — Experiments with Josephson bifurcation amplifiers have reached the regime where switching between coexisting stable vibrational states is due to quantum fluctuations. In switching the oscillator goes over the effective dynamical barrier that separates the states. It was found earlier that, for small damping, the barrier height calculated for $T \to 0$ is smaller than for $T = 0$. Respectively, the switching rates calculated in these two limits are exponentially different, the effect of fragility. If other parameters are fixed, both barrier heights are proportional to the number of bound quantum states localized mostly in the basin of attraction of the corresponding stable state. Here we show that for large but finite values of the number of states the $T = 0$ solution is stabilized. For some temperature T_c there occurs a sharp crossover to the finite-temperature regime. Our analytical results are corroborated by numerical results.

[1] Vijay et al., Rev. Sci. Instr. (2009)
[2] M. Dykman et al., JETP (1988)
[3] M. Marthaler et al, PRA (2005)

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