

## Classical Limit of the Jarzynski Equality, A Study of the Jaynes-Cummings Model

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In this work, we performed a theoretical study about the validity of the Jarzynski Equality for the case of a two-level atom coupled to a quasi-resonant quartic oscillator. We believe that the investigated system can be reproduced experimentally through the interaction of an electromagnetic field, in a Kerr medium, with a Rydberg atom. The theoretical construction is based on the Jaynes-Cummings model in the Rotating Wave Approximation (RWA), including a quartic term and a dispersive one. The description of the interaction between radiation and matter is thus given in a quantized way. A work operator is introduced based on the modification of the Hamiltonian, given the dynamic evolution of the system, so that the exponential average of the work in the Jarzynski Equality is, essentially, an expected quantum value. The result obtained refers to the condition in which the Hamiltonian exhibits explicit dependence on time without commutation between them in different times.

Keywords: Jarzynski Equality. Jaynes-Cummings Model. Classical Limit.

### Tipo de Apresentação

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