Finite temperature simulations of false vacuum decay in a spin-1 Bose gas

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Cold atomic gases have proven a valuable medium in which to study early universe phase transitions. Here, we make use of a two-dimensional, three-component spin-1 gas to model first-order false vacuum decay. We identify a metastable state within the phase structure of components and examine its evolution using the stochastic projected Gross-Pitaevskii equation. We explore the dependence of the rate of vacuum decay on density and temperature and compare our numerical findings with instanton predictions. We then investigate the consequences of introducing an optical box trap.

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