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Free energy difference with Jarzynski equality: Interfaces in the lattice phi^4 theory

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Jarzynski equality allows the determination of the free energy difference between the initial and final macrostate of the out-of-equilibrium evolution of a thermodynamic system. This notion has recently been applied to out-of-equilibrium Markov chain Monte Carlo simulations of lattice field theories. The main goal of this talk is to illustrate this methodology.

In particular, we employ this method to study the lattice ϕ^4 theory, in three dimensions. We tune the parameters of the theory so that the $\mathbb{Z}_2$ symmetry is spontaneously broken, but close tot the critical line. In this setup, we study the free energy difference between the periodic and anti-periodic boundary conditions, which can be directly accessed thanks to the Jarzynski equality.

Depending on the geometry of the lattice, the free energy difference can be interpreted in terms of an effective string theory describing an interface between the two vacua with opposite spontaneous magnetization. We point out the deviations from the free boson behavior and even hints of deviations from the Nambu-Goto string prediction.

Special requests

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