Work Distributions on Quantum Fields

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We study the work cost of processes in quantum fields without the need of projective measurements, which are always ill-defined in quantum field theory. Inspired by interferometry schemes, we propose a work distribution that generalizes the two-point measurement scheme employed in quantum thermodynamics to the case of quantum fields and avoids the use of projective measurements . The distribution is calculated for local unitary processes performed on KMS (thermal) states of scalar fields. Crooks theorem and the Jarzynski equality are shown to be satisfied, and some features of the resulting distributions are studied as functions of temperature and the degree of spatio-temporal localization of the unitary operation. We show how the work fluctuations become much larger than the average as the process becomes more localized in both time and space.
Further details can be found in the preprint arXiv:1902.03258 .