QUANTUM THERMODYNAMICS WITH BOHMIAN MECHANICS

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A persistent problem in formulating a consistent theory of thermodynamics in quantum mechanics (QM) is the unambiguous assignment of work and heat to an arbitrary process [1, 2]. In the orthodox formulation of quantum mechanics, there is no concept of single-valued energy (or any other quantity) until it's measured (observed). This division between system and observer has lead to a vast number of paradoxes for which QM seems to offer no clear answer [3]. A mathematical equivalent but conceptually different formulation of QM is Bohmian Mechanics (BM)[4, 5, 6]. The arbitrary division between system and observer does not exist in BM and one can unambiguously write down the familiar quantities of energy, work, heat, pressure, etc using the well established frameworks of statistical mechanics and stochastic thermodynamics [7, 8, 9, 10]. In this talk I'll discuss a simple example to illustrate the difficulties that arise in orthodox QM and how they can be resolved with BM. I'll present a quick introduction to BM and how the first and second law of thermodynamic can be formulated at the level of individual trajectories, in the same manner they are introduced in classical statistical mechanics.

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