

Finite temperature master equation

Renan Cunha de Oliveira
Universidade Federal de Santa Catarina

DOI: <https://doi.org/10.5196/physicae.proceedings.XIYRM.38>

Resumo

We study the behavior of two weakly coupled quantum systems, described by a separable density operator. One of them is a single oscillator, representing a microscopic system, while the other is a set of oscillators, which perform the role of a reservoir in thermal equilibrium. From the Liouville-Von Neumann equation for the reduced density operator, we devise the master equation that governs the evolution of the microscopic system, incorporating the effects of temperature via Thermofield Dynamics formalism and suitably redefining the vacuum of the macroscopic system. As applications, we study an oscillator interacting with a set of boson oscillators at finite temperature, usually employed in quantum mechanics to describe a Brownian particle; and investigate the behavior of an oscillator in the presence of a heat bath consisting of a set of fermion oscillators.