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Motion through an oscillator chain: diffusion and linear response

Stephan De Bièvre
UFR de mathématiques
Université des Sciences et Technologies de Lille
Bâtiment M2
59655 Villeneuve dAscq
FRANCE
[Stephan.De-Bievre@math.univ-lille1.fr]

Abstract

We study the fully Hamiltonian motion of a particle through a chain of uncoupled monochromatic harmonic oscillators in thermal equilibrium. We show that, in contrast to what is commonly believed, such a monochromatic heat bath induces normal transport properties for the particle, namely diffusive behaviour in absence of a driving field and linear response to such a field, with a well-defined low-field mobility satisfying the Einstein relation.

Joint work with P. Parris, A. Silvius and P. Lafitte.