

Aspects of an autonomous symmetric Brownian motor

Wednesday, March 8, 2017 4:00 PM (45 minutes)

This study, done in collaboration with Alberto Imparato (organiser), concerns the symmetric Brownian motor proposed by Gomez-Marín and Sancho. The model is an autonomous heat engine with two coupled degrees of freedom moving in periodic potentials driven by two temperature biased heat reservoirs. For phase shifted sinusoidal potentials and a temperature bias the model exhibits a finite propagation velocity.

We extend the model to general periodic potentials and present analytic expressions in the strong coupling limit. We show that the model is related to the Büttiker-Landauer “Blow Torch” model and to the model of a single degree of freedom in a tilted periodic potential. We, moreover, analyse the model numerically both within a Langevin and a Fokker-Planck formulation for general coupling strength and determine the dependence of the velocity on coupling strength, temperature bias, and phase shift. We find that the optimal velocity is obtained already at moderate coupling strength. We finally evaluate and discuss the efficiency of the model.

Presenter: FOGEDBY, Hans (Aarhus University)