HEAT TRANSPORT IN LONG-RANGE INTERACTING NONLINEAR LATTICES

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ABSTRACT

Nonlinear low-dimensional assemblies of classical coupled oscillators have been extensively studied as paradigmatic models of heat transport since many years. While for short-range forces there is currently a detailed understanding of the dynamical mechanisms leading to the establishment of the Fourier law or to its breakdown, the case of long-range interacting systems has received less attention. I will analyze the basic mechanisms underlying heat transport processes in such systems. After a general overview, I will focus on the case of a ϕ^4 chain with long-range interactions decaying as a power α of the intersite distance. Depending on α, both diffusive and superdiffusive transport regimes are identified by means of a dynamical scaling analysis of energy structure factors and excess energy correlations. An effective simplified model of transport based on Lévy flights describes successfully the numerical results. Final considerations will be drawn about possible hydrodynamic universality classes.

REFERENCES

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