



**Conference on Long-Range Interacting Many-Body Systems:
from Atomic to Astrophysical Scales
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Venue: ICTP Leonardo da Vinci Building - Budinich Lecture Hall
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Title:

Nonadditivity in the quasi-equilibrium state of a short-range interacting system

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Abstract:

In equilibrium statistical mechanics, it is proven that short-range interacting systems are additive. On the other hand, out-of-equilibrium states may exhibit nonadditivity even though the interactions are short-ranged. In this talk, I focus on quasi-equilibrium states (also called metastable equilibrium or constrained equilibrium) of a certain short-range model and show that they indeed exhibit nonadditivity [1,2]. It is also shown that a quasi-equilibrium state is described by the equilibrium statistical mechanics of an effective Hamiltonian, which contains long-range interactions. Practically, we cannot distinguish whether the system is in thermal equilibrium or in quasi-equilibrium state as long as we observe the system in a finite timescale. This result thus indicates that we should be careful about the connection between the range of the interactions and the additivity.

[1] T. Mori, Phys. Rev. Lett. 111, 020601 (2013)

[2] T. Mori, J. Stat. Phys. 159, 172 (2015)