CENTRE
DE RECHERCHES
MATHÉMATIQUES

Théorie conforme des champs et systèmes quantiques à plusieurs corps
21 août – 9 septembre 2022

Conformal field theory and quantum many-body physics
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Quantum bounds and fluctuation dissipation theorem

In recent years, there has been intense attention on the constraints posed by quantum mechanics on the dynamics of the correlation at low temperatures, triggered by the postulation and derivation of quantum bounds on the transport coefficients or on the chaos rate. However, the physical meaning and the mechanism enforcing such bounds is still an open question. In this talk, I will discuss the quantum fluctuation-dissipation theorem (the KMS conditions) as the principle underlying bounds on correlation time scales. By restating the problem in a replicated space, I will show that the quantum bound to chaos is a direct consequence of the KMS condition, as applied to a particular pair of two-time correlation and response functions. Encouraged by this, I will describe how quantum fluctuation-dissipation relations act in general as a blurring of the time-dependence of correlations, which can imply bounds on their decay rates. Thinking in terms of fluctuation-dissipation opens a direct connection between bounds and other thermodynamic properties.