



## Café com Física



24 de junho de 2024

10h30

Sala F-147 (IFSC-USP)

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### How to get the Mpemba effect in quantum systems

The peculiar phenomenon in which water can cool faster when warm is known as the Mpemba effect, named after the paper "Cool?" published by Erasto Mpemba and his teacher Denis Osborne in the 1960s. Today, the Mpemba effect is associated with an accelerated relaxation that is possible for special initial configurations the further they are from equilibrium. For quantum systems in contact with a reservoir, the Mpemba effect manifests whenever the degrees of freedom that slow the dynamics are suppressed, with key ingredients being the initial state and the spectral properties of the generator of the dynamics. In this talk, I will discuss the quantum Mpemba effect in thermalization processes described by a Davies map. The special structure of the Davies generator allows one to construct a unitary transformation that rotates the initial state to a configuration with slow modes eliminated and a higher non-equilibrium free energy. I will explore this idea in systems ranging from a single qubit to a spin chain and discuss the role of coherence and correlations.



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