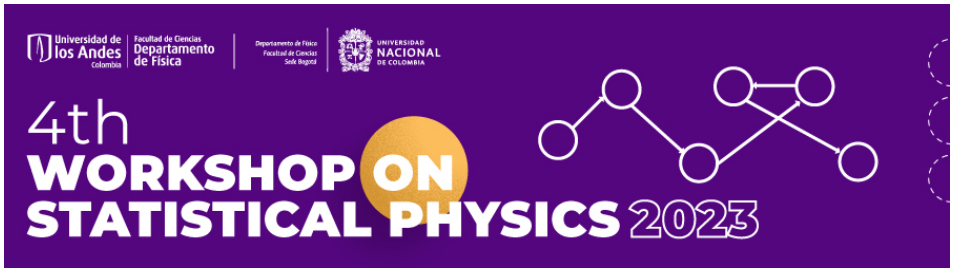

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Thermodynamics of Gambling Demons

viernes, 6 de octubre de 2023 14:10 (30 minutos)

More than 150 years ago, James Clerk Maxwell introduced a famous thought experiment, where a little intelligent being (the "demon") defies the second law of thermodynamics by controlling a tiny door between two chambers with gases at different temperatures. Maxwell's demon represented a cornerstone in the development thermodynamics of feedback control, and has attracted renewed attention recently motivated by experiments implementing it at the micro and nano-scales. In this talk, I will introduce a new concept of demon, lacking proper feedback control but just allowed to stop the process using a gambling strategy [1]. We demonstrate that such gambling demons can still bypass conventional thermodynamic bounds in unexpected ways. Indeed, the key quantity that limits its operation is no longer the amount of information retrieved about the system, but a new quantity measuring the asymmetry under time-reversal of the dynamics. We test experimentally the most important features of the gambling demon in a microelectronic system implementing single-electron box, and realize strategies leading to average work extraction above the free energy change.

[1] G. Manzano, D. Subero, O. Maillet, R. Fazio, JP. Pekola and É. Roldán, Thermodynamics of Gambling Demons, Phys. Rev. Lett. 126, 080603 (2021).

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