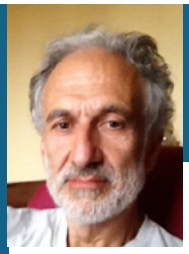
INTERNATIONAL SOLVAY INSTITUTES BRUSSELS

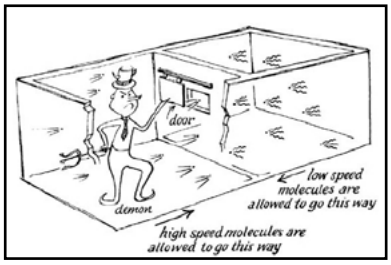
SOLVAY COLLOQUIUM



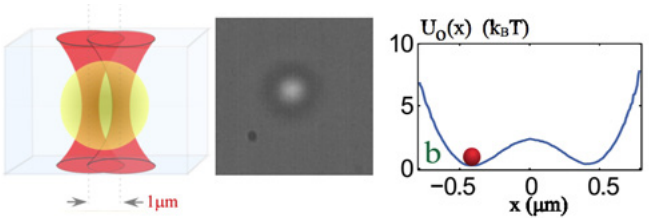
Professor Sergio Ciliberto
ENS, Lyon, France

The Maxwell demon and Landuer's principle: from gedanken to real experiments

During this talk we will recall the connections between information and thermodynamics. We will then discuss a specific example of the measure of the Landauer's bound. Rolf Landauer argued that the erasure of information is a dissipative process. A minimal quantity of heat, proportional to the thermal energy, is necessarily produced when a classical bit



of information is deleted. A direct consequence of this logically irreversible transformation is that the entropy of the environment increases unavoidably by a finite amount. We experimentally show the existence of the Landauer bound in a generic model of a one-bit memory. Using a system of a single colloidal particle trapped in a modulated double-well potential, we establish that the mean dissipated heat saturates at the Landauer bound in the limit of long erasure cycles. This result demonstrates the intimate link between information theory and thermodynamics. For a memory erasure procedure, which is a logically irreversible operation, a detailed Jarzynski Equality is verified, retrieving the Landauer limit independently of the work done on the system.



Tuesday 25 April 2017 at 4.00 P.M.

COFFEE AND TEA WILL BE SERVED AT 3.45 P.M.
IN FRONT OF THE SOLVAY ROOM

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