SPECIAL ICTS SEMINAR

Title : Modeling Maxwell's demon

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Date : Thursday, December 11, 2014

Time : 02:30 p.m.

Venue : ICTS Seminar Room, IISc Campus, Bangalore

Abstract : For more than a century, Maxwell's demon posed a tantalizing puzzle by defying the second law of thermodynamics. It was finally resolved by recognizing the thermodynamic role of information processing, through the works of Landauer, Penrose and Bennett. The resolution is neatly encoded in the "Landauer principle," which say that a minimum of k T ln(2) amount of heat need to be dissipated to erase one bit of information.

Recently, several models of Maxwell's demon have been proposed in an effort to understand the working of the Maxwell's demon better and possibly implement it in physical systems. I shall discuss one such model that has the distinction of having an exact analytical solution. The model can deliver work by lifting a mass against gravity by rectifying thermal fluctuations, while writing information to a memory register. I discuss the steady-state behavior of the model and construct its nonequilibrium phase diagram. In addition to the engine-like action described above, there exists a “Landauer eraser” region in the phase diagram where the model uses externally supplied work to remove information from the memory register.