Speaker: Neri MERHAV (Technion, Israel)

Title: **Work and Entropy Production in Information-Driven Finite-State Engines**

Abstract

We consider a system model of a general finite–state machine that simultaneously interacts with three kinds of reservoirs: a heat reservoir, a work reservoir, and an information reservoir, the latter being taken to be a running digital tape whose symbols interact sequentially with the machine. As has been shown in earlier work, this finite–state machine can act as a demon (with memory), which creates a net flow of energy from the heat reservoir into the work reservoir (thus extracting useful work) at the price of increasing the entropy of the information reservoir. Under very few assumptions, we propose a simple derivation of a family of inequalities that relate the work extraction with the entropy production. These inequalities can be seen as either upper bounds on the extractable work or as lower bounds on the entropy production, depending on the point of view. Many of these bounds are relatively easy to calculate and they are tight in the sense that equality can be approached arbitrarily closely. In their basic forms, these inequalities are applicable to any finite number of cycles (and not only asymptotically), and for a general input information sequence (possibly correlated), which is not necessarily assumed even stationary. Several known results are obtained as special cases.