

## **Total cost of operating an information engine**

*Jaegon Um, KIAS*

We study a two-level system controlled in a discrete feedback loop, modeling both the system and the controller in terms of stochastic Markov processes. We find that the extracted work, which is known to be bounded from above by the mutual information acquired during measurement, has to be compensated by an additional energy supply during the measurement process itself, which is bounded by the same mutual information from below. Our results confirm that the total cost of operating an information engine is in full agreement with the conventional second law of thermodynamics. We also consider the efficiency of the information engine as a function of the cycle time and discuss the operating condition for maximal power generation. Moreover, we find that the entropy production of our information engine is maximal for maximal efficiency, in sharp contrast to conventional reversible heat engines.