Title: Thermodynamics of information

Abstract:  In the nineteenth century, J. C. Maxwell considered a hypothetical being that can observe and manipulate individual atoms and molecules, leading to apparent violation of the second law of thermodynamics.  Such a being was named Maxwell's demon and has been an issue of intense controversies; Nowadays, it is realized that information is the key concept to understand the role of the demon.  In this decade, thermodynamics of information has attracted renewed attention from both the theoretical and experimental viewpoints [1].  Theoretically, a modern formulation of the second law has been established, where information contents and thermodynamic quantities are treated on an equal footing.  Experimentally, Maxwell's demon has been realized by real experiments with various systems, trigerred by its first realization with colloidal particles [2].  In this seminar, I will talk about an introduction to thermodynamics of information and discuss both of the theoretical and experimental aspects of this topic.  I will also briefly talk about an application to biochemical information processing [3].
[1] J. M. R. Parrondo, J. M. Horowitz, T. Sagawa, Nature Physics 11, 131-139 (2015).
[2] S. Toyabe, T. Sagawa, et al., Nature Physics 6, 988–992 (2010).
[3] S. Ito and T. Sagawa, Nature Communications 6, 7498 (2015).