

國家理論科學研究中心數學組 (臺北辦公室)

IAMS / NCTS-TPE Applied Math Seminar

Speaker: Hong Qian (Department of Applied Mathematics, University of Washington)

Title: Thermodynamics of Markov Systems: Dissipation, Conservation, and Phase Transition

Abstract:

Individual-based population dynamics articulates stochastic behavior of individuals and considers deterministic equations at the population level as an emergent phenomenon. Using chemical species inside a small aqueous volume (a cell) as an example, we introduce Delbruck-Gillespie birth-and-death process for chemical reactions dynamics. Using this formalism, we (1) illustrate the relation between nonlinear saddle-node bifurcation and first- and second-order phase transition; (2) introduce a thermodynamic theory for entropy and entropy production and prove 1st and 2nd Laws-like theorems. To physics: we discuss the fundamental issue of "what is dissipation" and its relation to time reversibility in subsystems. To biology: we suggest the inter-basin-of-attraction stochastic dynamics as a possible mechanism for epigenetic variations at the cellular level.

Time: Dec. 26 (Fri.) 13:20 – 14:20

Venue: R202, Astro-Math Building (NTU Campus)

Organizer: Jenn-Nan Wang (NTU)

For more information, please refer to <http://www.cts.ntu.edu.tw/> or contact cts_tpe@math.cts.ntu.edu.tw.