Correlated lateral phase separations in stacked lipid membranes

Tokyo Metropolitan University, Tel Aviv University†
Takuma Hoshino†, Shigeyuki Komura, David Andelman†

Motivated by the experimental study of Tayebi et al. [1] on phase separation of stacked multi-component lipid bilayers, we propose a model composed of stacked two-dimensional Ising spins shown as Fig.1. We study both the static and dynamical features of the model using Monte Carlo simulations with Kawasaki exchange dynamics.

In this poster, we shall show that at thermodynamical equilibrium, due to strong inter-layer correlations, the system forms a continuous columnar structure for any finite interaction across different layers. The phase separation appears to be accelerated as the inter-layer interaction is increased due mainly to the larger temperature quenched depth, i.e., the relative difference in temperature with respect to the critical temperature. When the temperature quench ratio is fixed, however, the temporal growth exponent even decreases as the system behavior crosses-over from two to three dimensions.

Figure 1: (a) Schematic illustration of stacked binary membranes (b) Stacked 2D Ising model

References


†E-mail: hoshino-takuma@ed.tmu.ac.jp