



量子物理学・ナノサイエンス第 200 回セミナー

Two stories on kinetic roughening: non-equilibrium cluster diffusion and interface collisions

講師 : Dr. Olivier Pierre-Louis
Institut Lumière Matière
Université de Lyon 1, CNRS, France

日程 : 10 月 23 日 (月) 13:30–15:00

場所 : 本館 1 階 H156 物理学系輪講室

概 要

Kinetic roughening is the process by which interfaces develop a self-affine roughness in non-equilibrium systems. The interfaces can represent domain walls, the surface of a growing crystal, the edge of a bacterial colony, etc. We present two consequences of non-equilibrium kinetic roughening in two dimensions.

Our first story reports on the non-equilibrium diffusion of two-dimensional cluster. These clusters can represent e.g. an Ising droplet driven by a field, a monolayer island growing on a facet during crystal growth or dissolution, or an expanding bacterial colony. We find that the mean square displacement of the center of mass of clusters exhibit a transition from superdiffusive to subdiffusive diffusion during growth, with exponents controlled by the kinetic roughening of the cluster edge.

The second story focuses on the collision between growth fronts. We here aim to model e.g. the process by which grain boundaries form in graphene, or by which different expanding bacterial films collide. We claim that this process can be seen as non-trivial generalization of first passage processes. We show that the spatio-temporal roughness of the collision is controlled by the roughness accumulated before the collision. The distribution of times of collision, and the roughness of interface after collision are shown to obey dynamic scaling, and combine linearly the distributions of the two fronts before collision.

1. Non-equilibrium cluster diffusion during growth and evaporation in two dimensions (editor's suggestion), Y. Saito, M. Dufay, O. Pierre-Louis, Phys Rev. Lett. **108**, 245504 (2012)
2. Non-equilibrium interface collisions, F.A. Reis, O. Pierre-Louis, preprint (2016)

※英語によるセミナーとなります。 / Seminar will be given in English.

連絡教員 物理学系 竹内 一将 (内線 2298)