Geometric statistics of stationary point processes

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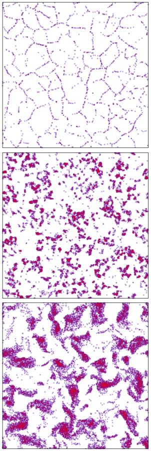
Scientific perimeter of the project

- De-correlation concept for general marked point processes — essential element of limit theory.
- Central Limit Theorems for general dependent interacting particle systems.
- Examples: sequential adsorption, ballistic deposition, majority dynamics, epidemic models — allowing for non-Poisson locations of particles and their dependent initial states.
- Variance asymptotic required for CLTs: volume-order under quasi-local perturbations and other asymptotic for various test statistics.
- Optimization of large particle systems: intensity-optimal and locally optimal, with applications in statistical physics, combinatorial optimization and communications.

A particular result: Limit theory for random independent particle systems



- We considers statistics of random particle system evolving over a fixed time and space domain, featuring dependent locations in $\mathbb{R}^d$ and general states (marks) and dynamic updating.
- For these models we consider a notion of de-correlation, seen as an "asymptotic independence" of the structure, arising whenever locations and states of the particles jointly possess this property.
- We establish the Central Limit theorems of their statistics as the spatial domain increases up to $\mathbb{R}^d$.

Publications

- B. Błaszczyszyn and Ch. Hirsch. Optimal stationary markings. *Stoch. Proc. Appl.*, 138:153–185, 2021. `http://arxiv.org/abs/2001.08074`.
- B. Błaszczyszyn, D. Yogeshwaran, and J. E. Yukich. Limit theory for asymptotically de-correlated dynamic spatial random models. working manuscript, 2021.
- M. Krishnapur and D. Yogeshwaran. Stationary random measures : Covariance asymptotics, variance bounds and central limit theorems. working manuscript, 2021.
- M. A. Klatt, G. Last, and D. Yogeshwaran. On the asymptotic variance of perturbed random measures. working manuscript, 2021.