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 consider statistics of random particle systems 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 $\mathbb{R}^d$. 

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