

Cluster expansions for Gibbs point processes
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Gibbs point processes form an important class of models in statistical mechanics, stochastic geometry and spatial statistics. A notorious difficulty is that many quantities cannot be computed explicitly; for example, the intensity measure of a Gibbs point process is a highly non-trivial function of the intensity of the underlying Poisson point process. As a partial way out, physicists and mathematical physicists have long worked with perturbation series, called cluster expansions. The expansions work well for weakly interacting systems, the intuition is that the Gibbs measure is approximately Poisson.

The talk presents some recent results on cluster expansions for pairwise repulsive interactions and explains connections with generating functions of trees, branching processes, Boolean percolation, and diagrammatic expansions of second-order U-statistics. Based on the preprint [arXiv:1807.10725](https://arxiv.org/abs/1807.10725) [math.PR].