October 29, 2018
KAP 414
2:00 P.M. – 3:00 P.M.

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"Weakly Interacting Particle Systems on Graphs: From Dense to Sparse"

Abstract: We consider the asymptotic behaviors of weakly interacting (mean-field) particle systems on graphs, which could be dense or sparse, random or deterministic. The system consists of a large number of nodes in which the state of each node is governed by a stochastic process that has a mean-field type interaction with the neighboring nodes.

In the dense graph case, the limiting system is given by the classic McKean—Vlasov equation. Law of large numbers, propagation of chaos, and central limit theorems have been established and are the same as those in the complete graph case. In the sparse case, we obtain an autonomous characterization of the local dynamics of the neighborhood of a typical node for the limiting system, when the limiting graph is a D-regular tree or a Galton—Watson tree. The proofs rely on a certain Markov random field structure of the dynamics on countably infinite graphs, which may be of independent interest.

Based on the joint work with Daniel Lacker and Kavita Ramanan.