Large Population Limit for Interacting Particle Systems on Weighted Graphs

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When studying interacting particle systems, two distinct categories emerge: indistinguishable systems, where particle identity does not influence system dynamics, and non-exchangeable systems, where particle identity plays a significant role. One way to conceptualize these second systems is to see them as particle systems on weighted graphs. In this talk, we focus on the latter category. Recent developments in graph theory have raised renewed interest in understanding large population limits in these systems. Two main approaches have emerged: graph limits and mean-field limits. While mean-field limits were traditionally introduced for indistinguishable particles, they have been extended to the case of non-exchangeable particles recently. In this presentation, we introduce several models, mainly from the field of opinion dynamics, for which rigorous convergence results as N tends to infinity have been obtained. We also clarify the connection between the graph limit approach and the mean-field limit one. The works discussed draw from several papers, some co-authored with Nastassia Pouradier Duteil and David Poyato.