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Infinite populations of interacting entities as complex systems: multi-scale Markov dynamics

In many applications, one deals with systems of entities characterized by a trait x belonging to a topological space X. It is believed that a given entity with trait x interacts mostly (even entirely) with those entities whose traits belong to a neighborhood of x. Such interactions form the local structure of the system. The main aim of the talk is to explain how the local structure determines the global behavior of the whole infinite system. In particular, this applies to the Markov evolution of the system's states defined as probability measures on the corresponding configuration spaces. In view of the mentioned complexity, this evolution is considered in different scales that opens the possibility to get a deeper insight into its properties. This approach will be demonstrated in a number of models.