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On the effect of heterogeneity in stochastic interacting-particle systems

We study stochastic particle systems made up of heterogeneous units. We introduce a general framework suitable to analytically study this kind of systems and apply it to two particular models of interest in economy and epidemiology. We show that particle heterogeneity can enhance or decrease the size of the collective fluctuations depending on the system, and that it is possible to infer the degree and the form of the heterogeneity distribution in the system by measuring only global variables and their fluctuations. Our work shows that, in some cases, heterogeneity among the units composing a system can be fully taken into account without losing analytical tractability.