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*Disease spread on contact networks*

Contact network models realistic paths of disease transmission in a population. Network epidemic models describe the spread of diseases on contact networks. Many population dynamics models approximating the intrinsically stochastic disease spread processes have been developed and studied since the introduction of a network SIS model by Pastor-Satorras and Vespignani (2001). But these models have their limitations in modeling the neighboring structure of the network, and thus generally over estimate the exponential growth rate of the epidemic. The basic reproduction number derived from these models are thus not realistic. In this talk, a network SIS model that captures the neighborhood structure of the underlying network is introduced. This model precisely predicts both the growth rate and the equilibrium of the mean dynamics of the corresponding stochastic process. The basic reproduction number can then be computed from this new model.