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Phase Transition for Measure-valued SIR Epidemic Processes

We study a scaling limit of the long range SIR epidemic model in which infected individuals cannot be reinfected. The limit, which exists in up to 3 dimensions, has been studied by Lalley and Zheng and is reminiscent of a one-dimensional model proposed by Durrett and studied by Mueller and Tribe. It is a measure-valued process similar to super-Brownian motion with drift θ but with an additional killing term proportional to its local time. We show there is a non-trivial phase transition in θ for dimension 2 and 3, above which the process survives and below which it goes extinct, and prove that in one dimension there is always extinction. Moreover we show that in any dimension there is always extinction on compact sets. This is joint work with Steve Lalley and Xinghua Zheng.