

The Effects of Individual-Level Behavioral Responses on SIS Epidemic Persistence

Matthew Wascher

Abstract:

The contact process (SIS epidemic model) has long been studied as a model for the spread of an infectious disease through a population. One important question concerns the long-term behavior of the epidemic--does it result in a long outbreak, or does the infection die out quickly? There is a large literature on the effects of the underlying population structure on this long-term behavior. However, the role of individual-level behavioral responses to the epidemic is less studied. In this talk, I will introduce the contact process, some key ideas used to analyze it, and a few notable results. I will then discuss my recent work on two modified versions of the contact process that include individual-level behavioral responses to the epidemic: the isolation model, in which individuals self-isolate, and the vigilance model, in which healthy individuals isolate their infected neighbors. We show that asymptotically on random graphs with a power law degree distribution, the isolation model has a long outbreak for all parameter values while the vigilance model can have a short or long outbreak depending on the choice of parameter values. This contrast demonstrates how different individual-level behaviors can substantially change the trajectory of an epidemic.

This is joint work with Shirshendu Chatterjee and David Sivakoff.