## Bayesian inference for contact networks given epidemic data

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## Abstract

We first discuss exponential-family random graph models (ERGMs) for modeling the structure of social networks. We then explore an application of these models to the problem of inferring the structure of an underlying network of contacts given observed data on a disease epidemic. This talk builds on work by Britton and O'Neill, who proposed a Bayesian framework for estimating the parameters of a stochastic epidemic on a simple random (bernoulli, Erdos-Renyi) network using data consisting of recovery times of infected hosts. We discuss extensions of this basic model, including an SEIR (Susceptible-Exposed-Infectious-Recovered) epidemic model that is more realistic for certain types of diseases and more sophisticated ERGMs than the Erdos-Renyi network model. We illustrate these methods using freely available software for R.