

## STANFORD PROBABILITY SEMINAR

**Amin Saberi**, Stanford

**Monday, 6 February 2006**

**4:15pm** (Refreshments at 4pm in the 1st Floor Lounge)

Sequoia Hall, Room 200

### **On the Spread of Viruses On Scale-free Networks**

**Abstract.** It has been observed that many networks, notably the Internet, have scale-free structures in the sense that the degree distributions of these networks have power-law tails. Motivated by these observations, there has been a great deal of study, both non-rigorous and rigorous, of the detailed structural properties of so-called preferential attachment models and other models with power-law degree distributions. However, thus far, there has been much less work on the impact of these structures on processes occurring on these networks.

In this talk, I will discuss processes which model the spread of viral infections on scale-free structures, and show how these processes differ markedly from epidemics on more conventional structures. In particular, I will analyze the contact process on random graphs generated according to the preferential attachment scheme and show that any virus with a positive rate of spread from a node to its neighbors has a non-vanishing chance of becoming epidemic.

Since there are also observations which indicate that the network of human sexual contacts follows a power-law degree distribution, this analysis is probably relevant both in the context of the spread of computer viruses on the Internet, and the spread of sexually transmitted diseases (STD).

Joint work with N. Berger, C. Borgs, and J. Chayes