



THE UNIVERSITY OF  
**CHICAGO**

Department of Statistics

**FIRST YEAR PHD MINI SEMINARS**

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Department of Statistics  
The University of Chicago

**The Final Size of a Nearly Critical Epidemic and the  
First Passage Time of a Wiener Process to a Parabolic  
Barrier**

**FRIDAY, May 24, 2013, at 4:00 PM**  
110 Eckhart Hall, 5734 S. University Avenue

**ABSTRACT**

The distribution of the final size  $K$  in a general SIR epidemic model is considered when the critical parameter  $\lambda \approx 1$ . In particular, under the conditions that  $\lambda \approx 1 + a/n^{1/3}$ ,  $m \approx bn^{1/3}$ , where  $n$  is the initial number of susceptibles and  $m$  is the initial number of infected,  $K/n^{2/3}$  has a limit distribution when  $n \rightarrow \infty$ . It can be described as that of  $T$ , the first passage time of a Wiener process to a parabolic barrier  $b + at - t^2/2$ . In addition to a sketchy proof of this result, we will also touch on the connection between this epidemic model and random graphs.

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