Discrete Mathematics Seminar

UNIVERSITY OF NOTRE DAME
Department of Mathematics

Speaker: **David Galvin**
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Tuesday, September 4, 2012
1:00 pm
117 Hayes Healy Hall

Title: Taxi walks and the hard-core distribution on Z^2

Abstract:
The *hard-core* distribution on a graph G is the probability distribution on the independent sets of G (sets of mutually non-adjacent vertices) in which each such set I has probability proportional to $\lambda^{|I|}$, for some $\lambda > 0$.

The hard-core distribution arose as a simple model of the occupation of space by a gas with massive particles, and is mainly of interest because it has the potential to exhibit a liquid-solid phase transition: for small λ a typical configuration should be a mostly uncorrelated sparse set of vertices, while for larger λ it should be a highly correlated dense subset of a maximum independent set.

I'll focus on the integer lattice $\mathbb{Z}^2$, where we strongly expect a liquid-solid transition point to exist. I'll discuss recent work with Blanca, Randall and Tetali, where we show that the solid phase can be better understood by introducing a new class of self-avoiding walks on $\mathbb{Z}^2$ that mimics the movement of taxi cabs around Manhattan.