Title: Taxi walks and the hard-core distribution on $\mathbb{Z}^2$

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 $\lambda$ a typical configuration should be a mostly uncorrelated sparse set of vertices, while for larger $\lambda$ 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.