HONOURS SEMINAR

Kian Blanchette

$\sqrt{2+\sqrt{2}}$ Fast $\sqrt{2+\sqrt{2}}$ Furious

Friday, April 13, 2018
9:00 a.m.
Mathematics and Statistics Lounge
CW307.20

Abstract:

The self-avoiding walk (a random walk on a lattice which doesn't visit any vertex more than once) was introduced in 1953 by Nobel prize winning chemist Paul Flory as a model for growth of polymer chains. Despite being simple in concept, it can be extremely difficult to prove things rigorously. Take for instance c_n, the number of self-avoiding walks of length n. This quantity is unknown in all lattices as it is painfully difficult to enumerate recursively for large n. Instead, one can look at the growth rate of self-avoiding walks:

$$\mu = \lim_{n\to\infty} {c_n}^{1/n}.$$

Likewise, this growth rate has not been calculated rigorously in any lattice (but one), but has been estimated. In 1982, Bernard Nienhuis predicted that $\mu = \sqrt{2+\sqrt{2}}$ in the honeycomb lattice (tiling of the plane by hexagons) and this was proved by Hugo Duminil-Copin and Stanislav Smirnov in 2011 as a corollary to the work that earned Smirnov a Fields medal in 2010. In my talk I will present this proof.

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