Recent Advances in Probability and Stochastics
Progrès récents en probabilité et en stochastique
(Org: **Michael Kozdron** (University of Regina) and/et **Gregory Lawler** (University of Chicago))

KASUN FERNANDO AKURUGODAGE, University of Toronto
Higher order asymptotics for Large Deviations

For sequences of weakly dependent random variables, we obtain higher order asymptotics for the Large Deviation Principle in the form of an asymptotic expansion. We apply our results to Diophantine iid sequences, finite state Markov chains, strongly ergodic Markov chains and ergodic sums of smooth expanding maps & subshifts of finite type. In addition, we obtain similar expansions for stochastic processes, and establish them for additive functionals of processes generated from SDEs satisfying the Hörmander condition. This is joint work with Pratima Hebbar.

CHRISTIAN BENES, City University of New York, Brooklyn College
Rates of Convergence for the Simple Random Walk Green's Function

For a given domain $D \subsetneq \mathbb{C}$, one would expect the simple random walk Green's function on $D \cap \frac{1}{n}\mathbb{Z}^2$ to converge at a rate that depends on the regularity of the domain. In the particular case $D_\alpha = \mathbb{D} \setminus \{re^{i\theta} \in \mathbb{C} : r \geq 0, |\theta| \leq \alpha/2\}$, where $\mathbb{D}$ is the unit disk centered at the origin, we find upper bounds for the rate of convergence that suggest that this is indeed the case.

ARNO BERGER, University of Alberta
Best Kantorovich and Levy approximations on the real line

Finding best purely atomic approximations of a given probability measure on the real line is an important basic problem that has been studied widely. In this talk, new necessary and sufficient conditions are presented that characterize best approximations relative to the classical Kantorovich (or Wasserstein) and Levy probability metrics, given any number of atoms, and allowing for additional constraints regarding the locations or weights of atoms. Wherever possible, the precise asymptotics (as the number of atoms goes to infinity) of the approximation error is identified for the important special cases of best uniform (i.e., all atoms having equal weight) and best (i.e., unconstrained) approximations, respectively. When compared to similar results known for other probability metrics, the results for Levy approximations, in particular, are more complete and require fewer assumptions.

LARISSA RICHARDS, University of Toronto
The polynomial rate of convergence of critical interfaces.

We will analyze a general framework for establishing a rate of convergence of the critical interfaces of various critical lattice models to SLE. Following the work of S. Smirnov and A. Kemppainen and the work of F. Viklund, assuming a polynomial rate of convergence of the driving functions we can obtain a polynomial rate of convergence provided the random curve satisfies some mild conditions. We will check the required condition and discuss the implementation for certain models.

YINON SPINKA, University of British Columbia
A short proof of the discontinuity of phase transition in the planar random-cluster model with $q > 4$

We give a short proof of the discontinuity of phase transition for the random-cluster model on the square lattice with parameter $q > 4$. This result was recently shown by Duminil-Copin et al via the so-called Bethe ansatz for the six-vertex model. Our proof also exploits the connection to the six-vertex model, but does not rely on the Bethe ansatz. Our argument is soft and only uses very basic properties of the random-cluster model.

Joint work with Gourab Ray.

SARAI HERNANDEZ TORRES, University of British Columbia
Scaling limits of uniform spanning trees in three dimensions

Wilson's algorithm allows efficient sampling of the uniform spanning tree (UST) by using loop-erased random walks. This connection gives a tractable method to study the UST. The strategy has been fruitful for scaling limits of the UST in the planar case and in high dimensions. However, three-dimensional scaling limits are far from understood. In this talk, I will discuss recent advances on this problem. I will show that rescaled subtrees of the UST in three dimensions converge to a limiting object.

This work is part of ongoing joint work with Omer Angel, David Croydon, and Daisuke Shiraishi.