2017 Southern California Probability Symposium Abstracts

Roman Vershynin - (UCI)

Deviations of random matrices and applications

Uniform laws of large numbers provide theoretical foundations for statistical learning theory. This lecture will focus on quantitative uniform laws of large numbers for random matrices. A range of illustrations will be given in high dimensional geometry and data science.

James-Michael Leahy - (USC)

On the Navier-Stokes equation with rough transport noise.

In this talk, we present some results on the existence of weak-solutions of the Navier-Stokes equation perturbed by transport-type rough path noise with periodic boundary conditions in dimensions two and three. The noise is smooth and divergence free in space, but rough in time. We will also discuss the problem of uniqueness in two dimensions. The proof of these results makes use of the theory of unbounded rough drivers developed by M. Gubinelli et al.
As a consequence of our results, we obtain a pathwise interpretation of the stochastic Navier-Stokes equation with Brownian and fractional Brownian transport-type noise. A Wong-Zakai theorem and support theorem follow as an immediate corollary. This is joint work with Martina Hofmanov\'a and Torstein Nilssen.

Jean-Dominique Deuschel - (Technische Universitat, Berlin)

Harnack inequality for degenerate balanced random random walks.

We consider an i.i.d. balanced environment $\omega(x,e)=\omega(x,-e)$, genuinely d dimensional on the lattice and show that there exist a positive constant C and a random radius $R(\omega)$ with streched exponential tail such that every non negative
ω harmonic function u on the ball B_{2r} of radius $2r>R(\omega)$,
we have $\max_{B_r} u <= C \min_{B_r} u$.
Our proof relies on a quantitative quenched invariance principle
for the corresponding random walk in balanced random environment and
a careful analysis of the directed percolation cluster.
This result extends Martins Barlow's Harnack's inequality for i.i.d.
bond percolation to the directed case.
This is joint work with N.Berger M. Cohen and X. Guo.

Reza Aghajani - (UCSD)
Asymptotic analysis of multi-class queues with random order of service

The random order of service (ROS) is a natural scheduling policy for systems where no ordering of customers can or should be established. Queueing models under ROS have been used to study molecular interactions of intracellular components in biology. However, these models often assume exponential distributions for processing and patience times, which is not realistic especially when operations such as binding, folding, transcription and translation are involved. We study a multi-class queueing model operating under ROS with reneging and generally distributed processing and patience times. We use measure-valued processes to describe the dynamic evolution of the network, and establish a fluid approximation for this representation. Obtaining a fluid limit for this network requires a multi-scale analysis of its fast and slow components, and to establish an averaging principle in the context of measure-valued process. In addition, under slightly more restrictive assumptions on the patience time distribution, we introduce a reduced, function-valued fluid model that is described by a system of non-linear Partial Differential Equations (PDEs). These PDEs, however, are non-standard and the analysis of their existence, uniqueness and stability properties requires new techniques.

Gerard Ben Arous - (NYU)
Complexity of the spiked tensor model