Southern California Probability Symposium
December 11, 2021

https://uci.zoom.us/meeting/register/tJYuduihpzwrHtBKLLZ8Yz0ejLVg6PC2HFFF

SCHEDULE

9:30-10:00. VIRTUAL COFFEE HALF HOUR
10:00-10:50 DMITRII OSTROVSKII (USC)
11:00-11:50 BRETT KOLESNIK (UCSD)
12:00-1:00 LUNCH BREAK/BREAKOUT ROOMS
1:00-1:50 DAVID JEKEL (UCSD)
2:00-2:50 ADAM WATERBURY (UCSB)
3:00-3:30 COFFEE BREAK/BREAKOUT ROOMS
3:30-4:30 DAVAR KHOSHNEVISAN (UNIVERSITY OF UTAH)

Speaker: Dmitrii Ostrovskii
Title: TBA
Abstract:

Speaker: Brett Kolesnik
Title: Random Coxeter tournaments
Abstract: Moon (1963) found the set of sequences that can be realized as mean score sequences of random tournaments on the complete graph. In this talk, we will first discuss our work with David Aldous (Berkeley), which uses Strassen's coupling theorem to obtain a short probabilistic proof of Moon's theorem. More recently, with Mario Sanchez (Cornell), we have defined a notion of tournaments for the Coxeter generalization of graphs, answering a question of Richard Stanley. As it turns out, Coxeter tournaments have cooperative and solitaire games, as well as the usual competitive ones. An analogue of Moon's theorem can be proved geometrically, but it is less clear what a probabilistic proof would look like in the Coxeter setting. This and other related open problems will be discussed.

Speaker: David Jekel
Title: Transport of measure in random matrix theory
Abstract: A random self-adjoint matrix is a random element of $M_N(\mathbb{C})_{sa}$ (self-adjoint $N \times N$ complex matrices). Wigner showed that a natural choice of Gaussian random matrix has an eigenvalue distribution approaching a semicircle as $N \to \infty$. Voiculescu's theory of asymptotic freeness extended this result by describing the large-N behavior of the interaction of independent random self-adjoint matrices in terms of certain operators on a Hilbert space, representing "non-commuting random variables" from a "non-commutative probability space." In this talk, we adapt the theory of transport of measure–how to pushforward one probability measure to another by a function–to certain distributions of random matrix tuples, known as free Gibbs laws. Transport was used to great effect by Guionnet and Figalli for a single matrix, and Guionnet and Shlyakhtenko used transport in the multi-matrix setting to show isomorphism of the non-commutative probability spaces associated to the Gaussian random matrices and the free Gibbs laws at the $N = \infty$ limit. We present further recent progress in this area, including transport maps at the $N = \infty$ limit that arise naturally from the classical transport maps for finite N, triangular transport, and a framework for transport theory in terms of a non-commutative Wasserstein manifold. This is based in part on joint work with Wuchen Li and Dimitri Shlyakhtenko.

Speaker: Adam Waterbury
Title: Asymptotics and Approximation of Quasi-Stationary Distributions
Abstract: Stochastic dynamical systems with absorbing states are used to model systems arising from ecology, biology, chemical kinetics, and other fields. Despite the fact that these systems are eventually absorbed, they often persist for long periods of time prior to absorption. Quasi-stationary distributions (QSD) are the fundamental mathematical objects used to characterize the stability and long-term behavior of such systems prior to absorption. In the first part of this talk, I will consider a collection of Markov chains that model the evolution of multi-type biological populations. The state space of the chains is the positive orthant, with absorption at the boundary of the orthant, which represents the extinction of different population types. The main results discussed in this part of the talk show that, as the size of the system increases, the behavior of the associated QSD can be characterized in terms of an underlying continuous-time dynamical system. The proofs of these results rely on uniform large deviation results for small noise stochastic dynamical systems and methods from the theory of dynamical systems. In the second part of this talk, I will introduce two stochastic approximation schemes that can be used to estimate the QSD of a finite-state Markov chain with absorbing states. Both methods are described in terms of a collection of particles evolving via interacting chains in which the interaction is given in terms of the total time occupation measure of all particles in the system and has the impact of reinforcing certain types of transitions. Under the key assumption that the ratio between the number of particles in the system and time goes to zero, I will discuss the asymptotic behavior of these approximation methods as time and the number of particles in the system simultaneously become large. This talk is based on joint work with Prof. Amarjit Budhiraja and Prof. Nicolas Fraiman.

Speaker: Davar Khoshnevisan
Title: Dissipation in Parabolic SPDEs: Oscillation and decay of the solution
Abstract: We consider a family of semilinear stochastic heat equations on the torus, driven by space-time white noise. The primary goal of this talk is to present a theorem that states the oscillation function of the logarithm of the solution of the SPDE has slowly varying decay in time. As a consequence of this fact, we can readily deduce that in the case of the parabolic Anderson model driven by space-time white noise, the entire path decays in time almost surely at a precise exponential rate. This is based on joint work with Kunwoo Kim and Carl Mueller.