

**Probability Meeting** to be named later  
Indian Statistical Institute, Bangalore, May 12 - May14th, 2017.  
All talks will be held in the auditorium, 2nd Floor, Main Building.

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Date : May 12th, 2017

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09:20-09:30		Welcome
09:30-10:10	Rongfeng Sun	<i>Scaling limit of the uniform prudent walk</i>
10:10-10:50	Daniel Kious	<i>Scaling limits for sub-ballistic biased random walks in positive random conductances</i>
10:50-11:20		Coffee Break
11:20-12:00	Vivek Borkar	<i>Concentration effects in stochastic approximation.</i>
12:00-12:40	Alberto Gandolfi	<i>Folding and generalized random cluster representation of discrete probabilities.</i>
12:40-14:30		Lunch
14:30-14:50	Himanshu Tyagi	<i>Minimum communication for testing against independence</i>
14:50-15:10	Ravishankar Krishnamurthi	<i>Voter model perturbations</i>
15:10-15:30		Coffee Break
15:30-15:50	Jianping Jiang	<i>Longest increasing subsequences in random walks</i>
15:50-16:10	Parthanil Roy	<i>Branching random walks with regularly varying displacements: past and future</i>
16:10-16:40		Snack Break
16:40-17:00	Atul Shekhar	<i>Cadlag Rough Path Theory: A Missing Step</i>
17:00-17:20	Manjunath Krishnapur	<i>A determinantal process in infinite dimensional space ?</i>

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09:30-10:10	Rajat Hazra	<i>The divisible sandpile model</i>
10:10-10:50	Arvind Ayyer	<i>The reverse juggling process</i>
10:50-11:20		Coffee Break
11:20-12:00	Adrian Röllin	<i>Rates in the normal approximation of the triangle count in the Erdős-Rényi random graph.</i>
12:00-12:40	Yogeshwaran D	<i>Random minimal spanning acycles.</i>
12:40-14:30		Lunch
14:30-14:50	Suresh Kumar	<i>Risk-sensitive control of reflecting diffusions</i>
14:50-15:10	Rahul Roy	<i>Howards law for binary and related random trees.</i>
15:10-15:30		Coffee Break
15:30-15:50	Gursharan Kaur	<i>Negatively Reinforced Urn Models</i>
15:50-16:10	Tulasi Ram Reddy	<i>A limiting field for vertex operators formed from Brownian loop soups</i>
16:10-16:40		Snack Break
16:40-17:00	Kartick Adhikari	<i>Fluctuations of eigenvalues of patterned random matrices.</i>
17:00-17:20	Ghurumurhan Ganesan	<i>Stability and Convergence in Poisson Valued Functionals.</i>

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Date : May 14th, 2017

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09:30-10:10	Daniel Stein	<i>Predictability in the Dynamical Evolution of Nonequilibrium Discrete Spin Dynamics.</i>
10:10-10:50	Charles Newman	<i>Exponential decay in the near-critical planar Ising model</i>
10:50-11:20		Coffee Break
11:20-12:00	Anyone	<i>Leads/solutions to problems posed</i>
12:00-12:40	Federico and Siva	<i>..to be named later..</i>
12:40-14:30		Lunch

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09:30-10:10 Rongfeng Sun      *Scaling limit of the uniform prudent walk*  
NUS, Singapore

**Abstract**

We study the 2-dimensional uniform prudent self-avoiding walk, which assigns equal probability to all nearest-neighbor self-avoiding paths of a fixed length that respect the prudent condition, namely, the path cannot take any step in the direction of a previously visited site. We prove that the 2-dimensional uniform prudent walk is ballistic and follows one of the 4 diagonals with equal probability. We also establish a functional central limit theorem for the fluctuations of the path around the diagonal. Joint work with Nicolas Pétrélis and Niccoló Torri.

10:10-10:50 Daniel Kious      *Scaling limits for sub-ballistic biased random walks*  
NYU, Shanghai      *in positive random conductances*

**Abstract**

In a joint-work with A. Fribergh, we consider biased random walks in positive random conductances on the  $d$ -dimensional lattice in the zero-speed regime and study their scaling limits. We obtain a functional Law of Large Numbers for the position of the walker, properly rescaled. Moreover, we state a functional Central Limit Theorem where an atypical process, called the Fractional Kinetics, appears in the limit.

11:20-12:00 Vivek Borkar      *Concentration effects in stochastic approximation.*  
IIT-B, Mumbai

**Abstract**

This talk will describe some recent results on concentration of suitably interpolated iterates of a Robbins-Monro scheme from a prescribed time onwards, using martingale concentration inequalities and a nonlinear variation of constants formula due to Alekseev. (Joint work with Gagan Thoppe, Akhil Shetty).

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12:00-12:40    Alberto Gandolfi    *Folding and generalized random cluster representation of discrete probabilities.*  
                  NYU, Abu Dhabi

**Abstract**

We describe the operation of folding of a discrete probability, and introduce a general random cluster representation method. We then show how combining these two operations leads to several results: some inequalities of BK type (including one for cluster disjoint realizations in a ferromagnetic Ising model); a reinterpretation of FKG; and a new criterion for the absence of phase transition in Ising like models, which seems to constitute a slight improvement on Dobrushin condition and disagreement percolation methods. Part of these results are from a collaboration with J. van den Berg.

14:30-14:50    Himanshu Tyagi    *Minimum communication for testing against independence*  
                  IISc Bangalore

**Abstract**

Two parties observing sequences from a given alphabet seek to ascertain if the sequences are generated from a given joint distribution or are they independent. How many bits of communication must they exchange? We give a general scheme to enable distributed testing against independence and characterize its communication requirements in terms of the maximal correlation coefficient. In the other direction, we provide a general lower bound for the minimum one-way communication required, which entails the hyper-contractivity ribbon of the joint distribution. Both bounds coincide for the binary symmetric as well as the jointly Gaussian distribution. In this self contained talk, we shall review the concepts of maximal correlation coefficient and hyper-contractivity which underlie our proofs and conclude with open problems. This is joint work with KR Sahasranand.

14:50-15:10 Ravishankar Krishnamurthi *Voter model perturbations*  
NYU, Shanghai

**Abstract**

Consider a discrete time one dimensional nearest neighbor voter model perturbation on  $\mathbb{Z}$  with  $q$  colors. At each site voter dynamics is chosen with probability  $pw$ . Under this dynamics each site updates its color by choosing a random neighbor with probability  $pw$  and adopting its color. In addition bulk and boundary nucleation of colors occur with probability  $pk$  and  $pb$  respectively ( $pw + pk + pb = 1$ ). At each time each site (bulk) nucleates a color randomly with probability  $pk$ . The boundary nucleation occurs with probability  $pb$ . Under this dynamics if the colors of neighbors of a site are different then the site updates to a random color. If the colors are the same then the site updates to the color of its neighbors. It is known that there is a unique invariant distribution if the probability of bulk nucleation is large enough. Moreover for any choice of bulk and boundary nucleation parameters limiting color distributions along subsequences are color permutation invariant. This model was studied using the dual process which is a branching coalescing random walk with killing. Similar questions can be asked about the continuum limit whose dual is the Brownian net with killing. Whether there is a unique invariant measure for all values of the parameters is an open question.

References:

1. Y. Mohylevskyy, C.M. Newman and K. Ravishankar, *Ergodicity and Percolation for Variants of One-dimensional Voter Models*, ALEA, 10, No 1, 485-504, 2013.
2. C.M. Newman, K. Ravishankar, E. Schertzer, *Perturbations of voter model in one dimension*, EJP, 22, No 34, 1-42, 2017.

15:30-15:50 Jianping Jiang *Longest increasing subsequences in random walks*  
NYU, Shanghai

**Abstract**

Let  $S_n$  be a one-dimensional random walk. We are interested in the longest increasing subsequences of  $S[0, n]$ . In this talk, we survey some known results and discuss some open questions.

15:50-16:10 Parthanil Roy *Branching random walks with regularly varying displacements: past and future*  
ISI, Bangalore

**Abstract**

This short talk will describe the history of branching random walks whose step sizes come from a distribution having regularly varying tails. Towards the end, some conjectures and open problems will be discussed with a view to potential future collaboration.

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16:40-17:00 Atul Shekhar  
*ISI, Bangalore*

*Cadlag Rough Path Theory: A Missing Step*

**Abstract**

The Cadlag version of rough path theory was developed in a recent work Friz-Shekhar (<https://arxiv.org/abs/1212>). The theory works well for handling Levy jump diffusions. For a technical reason however, we were not able to extend the theory to handle general cadlag semimartingales. This talk aims to give a precise statement of the corresponding problem and explain its applicability in rough path theory.

17:00:-17:20 Manjunath Krishnapur  
*IISc, Bangalore*

*A determinantal process in infinite dimensional space?*

**Abstract**

We raise a question about the possibility of constructing a natural determinantal process on the space of loops. If it exists, it would be a determinantal analogue of a Brownian loop soup.

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09:30-10:10 Rajat Hazra      *The divisible sandpile model*  
*ISI, Kolkata*

**Abstract**

The divisible sandpile model was introduced to model the continuum version of the Abelian Sandpile model by Levine and Peres (2009). The stability of such models depends on the behaviour of what is known as an "odometer". In a recent work Levine, Murugan, Peres and Ugurcan (2015) conjecture that the scaling limit of the odometer on a torus may be related to the continuum bilaplacian field. In a joint work with Alessandra Cipriani (University of Bath) and Wioletta Ruszel (TU, Delft) we show that in any dimension the rescaled odometer converges weakly (in an appropriate Sobolev space) to the continuum bilaplacian field on the unit torus. I will also describe some more recent extensions of the result and stability issues to the case when the initial configurations are from distributions which have power law tail behaviour.

10:10-10:50 Arvind Ayyer      *The reverse juggling process*  
*IISc, Bangalore*

**Abstract**

Motivated by recent work of Knutson on a Markov process on rectangular matrices of finite height and infinite width, we consider time-reversed variants of juggling processes studied earlier. We obtain explicit formulas for the stationary distribution of reverse juggling processes on finite intervals and on  $\mathbb{Z}$ . We also study multispecies variants of the reverse juggling process. We observe a seemingly-new phenomenon of partial mixing, where the stationary distribution is independent of the distribution of the location of starting jump. This is joint work with Svante Linusson.

11:20-12:00 Adrian Röllin      *Rates in the normal approximation of the triangle count in the Erdős-Rényi random graph.*  
*NUS, Singapore*

**Abstract**

We present new uniform rates of convergence of the number of triangles in the Erdős-Rényi random graph. The proof is based on a new variation of an interesting approach due to Tikhomirov (1980), which is a combination of Steins method and characteristic functions.



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12:00-12:40 Yogeshwaran D *Random minimal spanning acycles.*  
*ISI, Bangalore*

**Abstract**

We shall consider higher-dimensional generalization of spanning trees called hypertrees/spanning acycles. These are defined on simplicial complexes/hypergraphs. First, we establish some basic properties that lend credence to spanning acycles as a good analogue of spanning trees. Assigning weights to hyper-edges, we consider minimal spanning acycles. Next, we look at extensions of the Kruskals algorithm and Prims algorithm for generating minimal spanning acycles. Finally, we shall show point process convergence of extremal weights of minimal spanning acycles on randomly weighted hypergraphs/simplicial complexes. This is a joint work with Primož Skraba and Gagan Thoppe.

14:30:-14:50 Suresh Kumar *Risk-sensitive control of reflecting diffusions*  
*IIT-B, Mumbai*

**Abstract**

We discuss the existence of optimal risk-sensitive value when state dynamics is governed by RSDEs. We use a near monotone structural condition on the cost function. Also we discuss an example where near monotone condition is not always possible. This is a joint work with Sunil Kumar Gauttam and Chandan Pal.

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14:50-15:10 Rahul Roy  
*ISI, Delhi*

*Howard's law for binary and related random trees*

**Abstract**

The Horton-Strahler order of vertices of a rooted binary tree is given iteratively as follows:

- a) the order of an end-vertex of a leaf is 1,
- b) the order  $i$  of a vertex  $v$  is given by the orders  $j$  and  $k$  of the two neighbouring vertices in the two sub-branches of  $v$ , viz.,

$$i = \begin{cases} \max\{j, k\} & \text{if } j \neq k \\ j + 1 & \text{if } j = k. \end{cases}$$

Let  $N_i$  be the number of vertices of order  $i$ . For a uniformly chosen random binary tree on  $n$  vertices among the class of all such binary trees, Shreve (1966) observed empirically that the ratio  $\frac{N_i}{N_{i+1}}$  (suitably interpreted) converges to 4 as  $n \rightarrow \infty$ . This convergence to a constant is known as Horton's law. We discuss known results for the critical branching process tree (Burd, Waymire and Winn 2000) and present some conjectures for the random tree obtained from the space-time graphical representation of a system of 1-dimensional coalescing simple symmetric random walks.

15:30-15:50 Gursharan Kaur  
*ISI, Delhi*

*Negatively Reinforced Urn Models*

**Abstract**

In this work we consider general negatively reinforced urn models with finitely many colours. We will call an urn scheme negatively reinforced, if the selection probability for a colour is proportional to a weight function, which is decreasing. Under some assumptions on the weight function, we obtain almost sure convergence of the random configuration of the urn for a general replacement matrix  $\mathbb{R}$ . We also obtain central limit theorem for these urn models. This is the joint work with Antar Bandyopadhyay.

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15:50-16:10 Tulasi Ram Reddy *A limiting field for vertex operators formed from Brownian loop soups*  
NYU, Abu Dhabi

**Abstract**

We consider two vertex operators constructed using Brownian loop soups, called winding operator and layering operator. We study the limiting field arising from these operators when the intensity of the loop soups tends to infinity. In this talk I will explain the techniques/difficulties in showing the existence of the limiting field, which is conjectured to be the exponential of a Gaussian field. This is an ongoing work with F. Camia and A. Gandolfi.

16:40-17:00 Kartick Adhikari *Fluctuations of eigenvalues of patterned random matrices.*  
ISI, Kolkata

**Abstract**

In this talk, we present the fluctuation of linear statistics of eigenvalues of circulant, symmetric circulant, reverse circulant and Hankel matrices. We show that the linear spectral statistics of these matrices converges to the Gaussian distribution in total variation norm when the matrices are constructed using i.i.d. variables (with some assumption). The limiting variance of the linear spectral statistics for circulant, symmetric circulant and reverse circulant matrices will also be discussed. This is a joint work with Koushik Saha.

17:00-17:20 Ghurumurhan Ganesan *Stability and Convergence in Poisson Valued Functionals.*  
NYU, Abu Dhabi

**Abstract**

We consider the stability and convergence issues in functionals of Poisson processes restricted to finite boxes. Using a relatively simple localized stability criterion, we obtain exponential decay for commonly used functionals and illustrate our method by using examples from computational geometry. Our method is relatively simple to apply in contrast to commonly used regularity methods with the minor tradeoff we obtain subexponential decay for concentration around the mean. We demonstrate the advantage of our method using Poisson Voronoi Tessellation.

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09:30-10:10 Daniel Stein *Predictability in the Dynamical Evolution of  
NYU, Shanghai Nonequilibrium Discrete Spin Dynamics.*

**Abstract**

Consider a dynamical many-body Ising spin system with a random initial condition subsequently evolving through stochastic dynamics following a deep quench. What is the relative importance of the initial state ("nature") vs. The realization of the stochastic dynamics ("nurture") in determining the state of the system at a later time? We discuss this question and present old and new results for low-dimensional homogeneous systems, disordered systems in all dimensions, and several mean-field models. This is joint work with Charles Newman, Seema Nanda, Jon Machta, Jing Ye, and Reza Gheissari.

10:10-10:50 Charles Newman *Exponential decay in the near-critical planar Ising  
NYU, Shanghai model*

**Abstract**

This is joint work with Federico Camia and Jianping Jiang. Motivated by the issue of a mass gap for the scaling limit of the near-critical (small magnetic field) planar Ising model, we consider the issue of obtaining on the lattice ( $a\mathbb{Z}^2$ ), exponential decay bounds for the truncated two point function (the covariance of the basic spin variables at separated points), with a good dependence of the prefactor and of the exponential decay rate (the mass) on the lattice spacing  $a$ .

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11:20-12:00 Anyone

*.. Leads/solutions to problems posed*

**Abstract**

We invite anyone who has any leads/solutions to problems posed during the meeting to come and present them in this session. This talk will end at 12:00 or when there are no more leads/solutions.

12:00-12:40 Federico and Siva

*.. to be named later..*

*NYU, Abu Dhabi and ISI Bangalore*

**Abstract**

This talk will start at 12:00 or when the previous session ends. We decided to organise a meeting that will get Probability researchers in the region together and encourage collaborations. We will need to find a name for this effort and a place to host the next meeting