The 3rd NYU Shanghai - Peking - Westlake Probability Conference

April 10, 2026 — April 12, 2026

Zhihua building
(School of Mathematical Sciences)

北京国际数学研究中心
BEIJING INTERNATIONAL CENTER FOR MATHEMATICAL RESEARCH

Description

The 3rd NYU Shanghai - Peking - Westlake probability conference to be held on April 10-12, 2026, at Peking University. This event aims at providing a platform for researchers in probability and related areas all over the world to interact with our probability community.

List of Speakers

- Zhenhao Cai (Weizmann Lnstitute of Science)
- Federico Camia (New York University Abu Dhabi)
- Hongbin Chen (New York University Shanghai)
- Ben Hambly (University of Oxford)
- Shuta Nakajima (Keio University)
- Leonardo T. Rolla (University of São Paulo)
- Rongfeng Sun (National University of Singapore)
- Mo Dick Wang (The University of Hong Kong)
- Congjun Wu (Westlake University)
- Shengquan Xiang (Peking University)

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Organizing Committee

- Guillaume Baverez (Peking University)
- Jian Ding (Peking University)
- Xinyi Li (Peking University)
- Xin Sun (Peking University)
- Wei Wu (NYU Shanghai)
- Zhennan Zhou (Westlake University)

Talk Schedule

	April 10	April 11	April 12
Venue (Zhihua Building)	**The Auditorium**	**Morning: The Auditorium** **Afternoon: DING Shisun Lecture Theater**	**The Auditorium**
09:30-10:00	Registration/ Photo/ Openning		
10:00-11:00	Rongfeng Sun	Shengquan Xiang	Shuta Nakajima
11:00-12:00	Ben Hambly	Mo Dick Wang	Zhenhao Cai
12:00-14:00	Lunch Break	Lunch Break	
14:00-15:00	Congjun Wu	Leonardo Rolla	
15:00-15:30	Tea Break	Tea Break	
15:30-16:30	Federico Camia	Hong-Bin Chen	
17:30-20:00	Banquet		

Title &Abstract

Brownian web, Brownian net, and their universality

Rongfeng Sun

Abstract:

The Brownian web is a collection of one-dimensional coalescing Brownian motions starting from every point in space and time, while the Brownian net is a generalization that also allows branching. In this talk, I will first review the basic properties of the Brownian web and Brownian net and how they arise in the scaling limit of various models. I will then discuss some recent results, including the universality of the Brownian net as the scaling limit of general branching-coalescing random walks (joint with Jan Swart and Jinjiong Yu), and how the Brownian web and Brownian net are used to construct a generalisation of the Brownian castle (joint with Giuseppe Cannizzaro and Martin Hairer).

Supercooled Stefan problems and particle systems with singular interactions

Ben Hambly

Abstract:

The supercooled Stefan problem is a free boundary problem describing the freezing of a supercooled liquid. It has a phase transition in that it can develop discontinuities in its solution as a feedback parameter is varied. We will discuss some particle systems which give a probabilistic representation through a McKean-Vlasov equation for solutions to this model on the positive half-line in one dimension. In previous work this has been through particle systems that interact through their hitting time of the origin. I will discuss a version where the particles interact through their local time at the origin. For the finite particle system this leads to an extension of an old theorem on the existence of reflected Brownian motion in the orthant. In the mean field limit we recover an alternative McKean-Vlasov representation of a version of the supercooled Stefan problem and discuss its long time behaviour.

Majorana and Kramers Positivity and quantum Monte-Carlo fermion sign problem

Congjun Wu

Abstract:

The sign problem is a major obstacle in quantum Monte Carlo simulations for many-body fermion systems. We examine this problem with a new perspective based on the Majorana reflection positivity and Majorana Kramers positivity. Two sufficient conditions are proven for the absence of the sign problem in interacting fermion systems. They provide a unified framework to describe all the interacting lattice fermion models that are previously known to be sign-problem free based on the auxiliary field quantum method Monte Carlo.

They also allow us to identify a few new sign-problem-free interacting fermion models, which is of great interest in the study of quantum many-body systems. A deep connection is revealed between two seemingly unrelated research directions – quantum Monte Carlo simulations and the Majorana positivity in mathematical physics. A few new sign-problem-free interacting fermion models are identified including, but not limited to, lattice fermion models with repulsive interactions but without particle-hole symmetry and interacting topological insulators with spin-flip terms.

On the logarithmic CFT structure of 2D critical percolation

Federico Camia

Abstract:

The large-scale behavior of two-dimensional critical percolation is expected to be described by a conformal field theory (CFT). Moreover, the latter is believed to be a log CFT, exhibiting logarithmic singularities together with the usual power-law divergences of CFT correlations functions.

Exponential mixing for the randomly forced NLS equation

Shengquan Xiang

Abstract:

In this talk, we discuss exponential mixing of the invariant mesure for randomly forced nonlinear Schrödinger equation, with damping and random noise localized in spatial space. This study emphasizes the crucial role of dispersive nonlinear smoothing and control properties. Based on the joint work with Yuxuan Chen, Zhifei Zhang and Jia-Cheng Zhao.

On the limiting distribution of partial sums of random multiplicative functions

Mo Dick Wong

Abstract:

In this talk, I will discuss the asymptotic behaviour of a random walk associated with a Steinhaus multiplicative function, i.e. the increments are completely multiplicative and uniformly distributed on the complex unit circle. This model is motivated by a conjecture of Helson on Hankel forms in harmonic analysis, and also offers insights into fundamental arithmetic objects such as Dirichlet characters. Building on Harper' s seminal work on the striking phenomenon of better-than-square-root cancellation, I will present a central limit theorem under nonstandard scaling, featuring a random variance that is closely related to the statistics of the Riemann Zeta function on the critical line. This is based on joint works with Ofir Gorodetsky.

On the One-Dimensional Contact Process with Enhancements

Leonardo T. Rolla

Abstract:

We study a one-dimensional contact process with two infection parameters, one for the infection rates at the boundaries of the infected region and the other one for the rates within that region. We prove that the critical value of each of these parameters is a continuous, strictly monotone function of the other parameter. We also show that if one of these parameters is equal to the critical value of the standard contact process and the other parameter is strictly larger, then the infection starting from a single point has a positive probability of surviving. This is in contrast with another result also obtained here, that the critical contact process on the half line with enhanced infection rate at finitely many sites dies out. Joint work with E. Andjel.

Large deviations for the spin-glass ground state energy

Hong-Bin Chen

Abstract:

We consider the Sherrington--Kirkpatrick spin glass model and its mixed-p spin generalizations. The ground state energy is the maximum of the Hamiltonian, or the free energy when the temperature is set to be zero. The limiting ground state energy is known to be given by a Parisi-type formula. We establish the (one-sided) large deviation of this quantity by computing explicitly the limiting cumulant generating function. We also obtain an explicit variational formula for the rate function. There is also recent interest in understanding the algorithmic aspect of the ground state energy, since it is a typical optimization problem in a complex landscape. In particular, we obtain a formula for the ground state energy that is similar to the algorithmic threshold for Lipschitz algorithms. This is based on a joint work with Alice Guionnet, Justin Ko, Bertrand Lacroix-A-Chez-Toine, and Jean-Christophe Mourrat.

Recent Progress on the Ising Perceptron

Shuta Nakajima

Abstract:

The Ising perceptron is a fundamental model in statistical learning and spin glass theory. In this talk, I will mainly discuss mathematical progress on this model. As a recent development, I will present recent rigorous results concerning the uniqueness of the replica symmetric saddle point.

Percolation of loop soups and Gaussian free fields

Zhenhao Cai

Abstract:

It was known since the early 2000s that the Ray-Knight type theorems can induce a deep connection between the loop soup model and the Gaussian free field. Nevertheless, since then, the study of the percolation of these two models has remained parallel. After a decade, the discovery of the metric graph (a.k.a. cable graph) perspective completely changed this situation and elevated the entire topic to a new level. This talk will introduce the main progress in the past five years, including a series of joint works with Jian Ding (Peking University).

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