随机数学日

2026 年 5 月 22 日

日程安排

5 月 22 日周五	报告人	报告题目
09:40 - 10:30	苏中根	Couplings, strong invariance principles with applications to random walks on infinite percolation clusters
10:30 - 10:40	休息	
10:40 - 11:30	谢晟捷	An exponential improvement for Ramsey lower bounds
14:30 - 15:20	王东	Local universality of a special solution of the DMPK equation and universal conductance fluctuations of quasi-1D wires
15:20 - 15:40	休息	
15:40 - 16:30	王汉超	The dual majorizing measure theorem for canonical processes
16:30 - 16:40	休息	
16:40 - 17:30	廖羽晨	The periodic KPZ fixed point

会议地点：中国科学技术大学东区二教 2405 教室

主办单位：中国科学技术大学数学科学学院

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报告题目与摘要

1. 报告人：苏中根　浙江大学

题目：Couplings, strong invariance principles with applications to random walks on infinite percolation clusters

摘要： This talk basically consists of two parts. First, I will briefly review some classical coupling methods and strong invariance principles for sums of independent random variables in probability theory. Then I will report a recent work on couplings between Brownian motions and random walks on the infinite cluster in the supercritical Bernoulli bond percolation on $\mathbb{Z}^d$. As a corollary, we recover the law of the iterated logarithm proved by Duminil-Copin (arXiv:0809.4380) and further identify the limit constant. This talk is mainly based on a joint work with **顾陈琳** and **徐睿哲** (PTRF, 2025 https://doi.org/10.1007/s00440-025-01403-7).

2. 报告人：谢晟捷　中国科学技术大学

题目：An exponential improvement for Ramsey lower bounds

摘要： We prove a new lower bound on the Ramsey number $r(\ell, C\ell)$ for any constant $C > 1$ and sufficiently large ℓ, showing that there exists $\varepsilon = \varepsilon(C) > 0$ such that

$$r(\ell, C\ell) \geq \left(p_C^{-1/2} + \varepsilon\right)^{\ell},$$

where $p_C \in (0, 1/2)$ is the unique solution to $C = \frac{\log p_C}{\log(1-p_C)}$. This provides the first exponential improvement over the classical lower bound obtained by Erdős in 1947.

3. 报告人：王东　中国科学院大学

题目：Local universality of a special solution of the DMPK equation and universal conductance fluctuations of quasi-1D wires

摘要： Quantum transport constitutes a fundamental area of research in mesoscopic physics, with the transport theory of quasi-one-dimensional wires being closely linked to random matrix theory. The Dorokhov–Mello–Pereyra–Kumar (DMPK) equation serves as a powerful framework for investigating quantum transport in quasi-1D wires. Although previous work based on this equation has led to the derivation of universal conductance fluctuations in agreement with experimental observations, these results have thus far been obtained through non-rigorous methods. In this talk, we present an asymptotic analysis of an explicit free-fermionic solution to the DMPK equation. We establish the local universality of this solution in the limit $N \to \infty$ and provide a rigorous proof of universal conductance fluctuations.

4. 报告人：王汉超　山东大学

题目：The dual majorizing measure theorem for canonical processes

摘要： We give a dual, separated-tree formulation of Latała's majorizing measure theorem for canonical processes with log-concave tails. Under the same assumptions as in Latała's characterization, we introduce parameterized separation trees and prove that the expected supremum is equivalent, up to constants, to the corresponding tree functional. We also develop a pointwise growth condition, inspired by the contraction principle, which leads to a deterministic polynomial-time algorithm for approximating the expected supremum when the index set is finite.

5. 报告人：廖羽晨　中国科学技术大学

题目：The periodic KPZ fixed point

摘要： The KPZ fixed point, first constructed by Matetski, Quastel and Remenik, is a universal scaling limit for a large family of random growth models, known as the Kardar-Parisi-Zhang (KPZ) universality class, in 1+1 dimension. In this talk, I will discuss the analogue of this object on periodic domains, which we call the periodic KPZ fixed point. We derive explicit formulas for the space-time joint distributions of this two-dimensional random field, starting from an arbitrary upper semi-continuous initial condition. The formula is obtained by taking scaling limits of formulas of the totally asymmetric simple exclusion process on a ring, under the relaxation time scale $t = O(L^{3/2})$ where L is the size of the ring. Based on joint work with **Jinho Baik** and **Zhipeng Liu** (https://arxiv.org/abs/2603.01964).