



中国科学技术大学

University of Science and Technology of China

粒子系统及其相关领域青年学者研讨会 会议手册

2026.04.17 – 2026.04.19



1 会议信息

1.1 会议时间

2026 年 04 月 17 日报到, 04 月 18 日至 04 月 19 日学术报告, 04 月 19 日离会。

1.2 会议地点

中国科学技术大学第二教学楼 2205 教室

1.3 会议报告人 (按姓氏字母排序)

白天衣 (中科院数学与系统科学研究院)
蔡春浩 (中山大学)
常寅山 (四川大学)
洪杰梁 (南方科技大学)
黄璐静 (福建师范大学)
林琴 (法国索邦大学)

乔会杰 (东南大学)
唐鹏飞 (天津大学)
王敏 (武汉理工大学)
王雄 (中山大学)
肖惠 (中科院数学与系统科学研究院)
张树雄 (安徽师范大学)

1.4 会议主持人 (按姓氏字母排序)

陈早立 (中国科学技术大学)
廖羽晨 (中国科学技术大学)
申广君 (安徽师范大学)

王华明 (安徽师范大学)
王龙敏 (南开大学)
魏晓利 (哈尔滨工业大学)

1.5 组委会成员

陈昕昕、蒲飞、石权、孙雯

1.6 会议联系人

孙雯 wsun@ustc.edu.cn

校园地图



2 日程安排

4 月 17 日（周五）

报道、入住酒店

地点：悦雅江南春酒店（合肥中科大店）

4 月 18 日（周六）地点：二教 2205 教室

时间	报告人	报告题目	主持人
08:30-09:00	会议签到		
09:00-09:45	肖惠	Spinal decomposition, martingale convergence and the Seneta-Heyde scaling for matrix branching random walks	魏晓利
09:45-10:30	乔会杰	Asymptotic behaviors of small perturbation for path-dependent multivalued McKean-Vlasov stochastic differential equation	魏晓利
10:30-10:45	休息、自由讨论（2204 教室）		
10:45-11:30	黄璐静	The polynomial growth of effective resistances in 1D critical long-range percolation	王华明
11:30-12:15	唐鹏飞	Pairwise Negative Correlation for Uniform Spanning Subgraphs of the Complete Graph	王华明
12:15-14:00	午餐		
14:00-14:45	王雄	Learning Multi-type heterogeneous interacting particle systems	廖羽晨
14:45-15:30	洪杰梁	Rescaled SIR epidemic processes converge to super-Brownian motion in $d \geq 4$	廖羽晨
15:30-15:45	休息、自由讨论（2204 教室）		
15:45-16:30	林琴	Yaglom theorem for critical branching random walk on $\mathbb{Z}^d$	王龙敏
16:30-17:15	白天衣	Towards central limit theorem of critical branching random walks	王龙敏
18:30	晚餐		

4 月 19 日（周日）地点：二教 2205 教室

时间	报告人	报告题目	主持人
09:00-09:45	常寅山	伊辛模型的 Littlewood-Offord 问题	陈早立
09:45-10:30	蔡春浩	Branching Fractional Brownian Motion and Local Asymptotic Normality	陈早立
10:30-10:45	休息、自由讨论（2204 教室）		
10:45-11:30	王敏	Infinite divisibility of random variables with moments of Gamma type	申广君
11:30-12:15	张树雄	On the empty balls of branching random walks	申广君
12:15-14:00	午餐		

4 月 19 日（周日）离会。

3 报告摘要

肖惠: Spinal decomposition, martingale convergence and the Seneta-Heyde scaling for matrix branching random walks

时间: 04 月 18 日, 09:00-09:45

摘要: We consider a matrix branching random walk on the semi-group of nonnegative matrices, where we are able to derive, under general assumptions, an analogue of Biggins' martingale convergence theorem for the additive martingale W_n , a spinal decomposition theorem, convergence of the derivative martingale D_n , and finally, the Seneta-Heyde scaling stating that in the boundary case $c\sqrt{n}W_n \rightarrow D_\infty$ in probability, where D_∞ is the limit of the derivative martingale and c is a positive constant. As an important tool that is of interest in its own right, we provide explicit duality results for the renewal measure of centered Markov random walks, relating the renewal measure of the process, killed when the random walk component becomes negative, to the renewal measure of the ascending ladder process.

乔会杰: Asymptotic behaviors of small perturbation for path-dependent multi-valued McKean-Vlasov stochastic differential equations

时间: 04 月 18 日, 09:45-10:30

摘要: In this talk I will introduce the asymptotic behavior of path-dependent multivalued McKean-Vlasov stochastic differential equations perturbed by small noise. Specifically, we first establish a large deviation principle for such equations under non-Lipschitz coefficients by the weak convergence approach. Subsequently, we introduce an auxiliary equation and apply it to derive the moderate deviation principle.

黄璐静: The polynomial growth of effective resistances in one-dimensional critical long-range percolation

时间: 04 月 18 日, 10:45-11:30

摘要: We study the critical long-range percolation on $\mathbb{Z}$, where an edge connects i and j independently with probability $1 - \exp\{-\beta \int_i^{i+1} \int_j^{j+1} |u-v|^{-2} v\}$ for $|i-j| > 1$ for some fixed $\beta > 0$ and with probability 1 for $|i-j| = 1$. Viewing this as a random electric network where each edge has a unit conductance, we show that the effective resistances from 0 to $[-n, n]^c$ and from the interval $[-n, n]$ to $[-2n, 2n]^c$ (conditioned on no edge joining $[-n, n]$ and $[-2n, 2n]^c$) both grow like $n^{\delta(\beta)}$ for some $\delta(\beta) \in (0, 1)$. This is based on a joint work with Jian Ding and Zherui Fan.

唐鹏飞: Pairwise Negative Correlation for Uniform Spanning Subgraphs of the Complete Graph

时间: 04 月 18 日, 11:30-12:15

摘要: We investigate the negative correlation property for uniform probability measures on several families of spanning subgraphs of the complete graph K_n . Specifically, we consider the family of connected spanning subgraphs, forests with exactly k components, and connected spanning subgraphs with excess number k (where k is a fixed integer). We prove that, each of these measures exhibits pairwise negative correlation for sufficiently large n . The talk is based on joint work (arXiv:2603.10738) with Zibo Zhang.

王雄: Learning Multi-type heterogeneous interacting particle systems

时间: 04 月 18 日, 14:00-14:45

摘要: We propose a framework for the joint inference of network topology, multi-type interaction kernels, and latent type assignments in heterogeneous interacting particle systems from multi-trajectory data. This learning task is a challenging non-convex mixed-integer optimization problem, which we address through a novel three-stage approach. First, we leverage shared structure across agent interactions to recover a low-rank embedding of the system parameters via matrix sensing. Second, we identify discrete interaction types by clustering within the learned embedding. Third, we recover the network weight matrix and kernel coefficients through matrix factorization and a post-processing refinement. We provide theoretical guarantees with estimation error bounds under a Restricted Isometry Property (RIP) assumption and establish conditions for the exact recovery of interaction types based on cluster separability. Numerical experiments on synthetic datasets, including heterogeneous predator-prey systems, demonstrate that our method yields an accurate reconstruction of the underlying dynamics and is robust to noise.

洪杰梁: Rescaled SIR epidemic processes converge to super-Brownian motion in four or more dimensions

时间: 04 月 18 日, 14:45-15:30

摘要: In dimensions $d \geq 4$, by choosing a suitable scaling parameter, we show that the rescaled spatial SIR epidemic process converges to a super-Brownian motion with drift, thus complementing the previous results by Lalley (*Prob. Th. Rel. Fields*, **144** (2009), 429–469) and Lalley-Zheng (*Prob. Th. Rel. Fields*, **148** (2010), 527–566) on the convergence of SIR epidemics in $d \leq 3$. The scaling parameters we choose also agree with the corresponding asymptotics for the critical probability p_c of the range- R bond percolation on Z^d as $R \rightarrow \infty$.

林琴: Yaglom theorem for critical branching random walk on $\mathbb{Z}^d$

时间: 04 月 18 日, 15:45-16:30

摘要: We study the critical branching random walk on $\mathbb{Z}^d$ started from a distant point x and conditioned to hit some compact set K in $\mathbb{Z}^d$. We are interested in the occupation time in K and present its asymptotic behaviors in different dimensions. It is shown in this work that the occupation time is of order $\|x\|^{4-d}$ in dimensions $d \leq 3$, of order $\log \|x\|$ in dimension $d = 4$, and of order 1 in dimensions $d \geq 5$. The corresponding weak convergences are also established. These results answer a question raised by Le Gall and Merle (Elect. Comm. in Probab. 11 (2006), 252–265). This is a joint work with Xinxin Chen (Beijing Normal University), available at <https://arxiv.org/abs/2512.24047>.

白天衣: Towards central limit theorem of critical branching random walks

时间: 04 月 18 日, 16:30-17:15

摘要: We present recent progress on the central limit theorem for the range of a critical branching random walk (CBRW) in $\mathbb{Z}^d$ conditioned to be infinite. Law of large number for range of CBRW was given by Le Gall and Lin [1] in 2016, and we aim at strengthening the result to a central limit theorem, based on general theory for stationary process [2] and relation between height process of CBRW and random walk excursions. This talk is based on a joint work with Yueyun Hu.

参考文献:

- [1] Le Gall, J.-F., Lin, S.: The range of tree-indexed random walk. J. Inst. Math. Jussieu 15(2), 271–317 (2016).
- [2] Dedecker, J., Merlevède, F.: Necessary and sufficient conditions for the conditional central limit theorem. Ann. Probab. 30(3), 1044–1081 (2002).

常寅山: 伊辛模型的 Littlewood-Offord 问题

时间: 04 月 19 日, 09:00-09:45

摘要: 我们研究一般伊辛模型下的一维 Littlewood-Offord 问题。简言之, 在有界性假设下, 我们证明了自旋的某些线性组合的反集中现象。作为该方法的应用, 我们给出伊辛模型截断相关矩阵最小特征值的一个显式下界。

蔡春浩: Branching Fractional Brownian Motion and Local Asymptotic Normality

时间: 04 月 19 日, 09:45-10:30

摘要: In this talk, we will present the local asymptotic normality for discretely observed branching fractional Brownian motion, where inherited long memory induces non-Markovian dependence across genealogical lines. By combining an ancestor-conditioned Gaussian decomposition with a bulk/newborn edge analysis, we establish an observed conditional LAN expansion and derive the corresponding fixed-tree information limit.

王敏: Infinite divisibility of random variables with moments of Gamma type

时间: 04 月 19 日, 10:45-11:30

摘要: In this talk, we introduce a class of positive random variables with moments of Gamma type. We present some necessary conditions as well as some sufficient conditions for their existence. We will also explore various criteria for determining infinite divisibility through examples.

张树雄: On the empty balls of branching random walks

时间: 04 月 19 日, 11:30-12:15

摘要: Let R_n be the radius of the largest empty ball centered at the origin of a branching random walk started from a Poisson random measure at time n . In 2002, Revesz proved that for a 1-dimensional critical branching Wiener process, R_n/n converges in law. For $d = 2$ and $d > 2$, he conjectured that $R_n/\sqrt{n}$ and R_n will converge in law, respectively. Later, Hu partially confirmed the case of $d > 2$ in 2005. In this talk, we shall prove the case of $d = 2$ in a general setting.