会议日程

第四届青年概率学者会议（福州）

2025 年 12 月 13 日（周六）			
报告时间	报告人	报告题目	主持人
08:20-09:00	李欣意	Non-existence of critical random fractals derived from Brownian motion	黄璐静
09:00-09:40	俞锦炯	The critical disordered pinning measure	
09:40-10:20	朱洁祥	Wasserstein convergence rates for empirical measures of ergodic Markov processes	
10:20-10:40	中场休息与交流		
10:40-11:20	林赵锋	Salem properties of Dvoretzky random coverings	李欣意
11:20-12:00	夏旭	Mosaic Structures and Their Applications in Schrödinger Operators	
12:00-13:30	午餐		
13:30-14:10	陈昕昕	Left tail of derivative martingale in branching Wiener process	陈舒凯
14:10-14:50	洪杰梁	Regularity of local times of super α-stable motion	
14:50-15:10	中场休息与交流		
15:10-15:50	侯浩杰	Law of iterated logarithm for supercritical symmetric branching Markov process	陈昕昕
15:50-16:30	张树雄	On the local extinction and persistence of critical branching random walks	

2025 年 12 月 14 日（周日）			
报告时间	报告人	报告题目	主持人
08:20-09:00	李增沪	TBD	王健
09:00-09:40	屈宝友	Multi-dimensional BSDEs with mean reflection	
09:40-10:20	徐伟	From super-Brownian motions to time-fractional super-Brownian motions	
10:20-10:40	中场休息与交流		
10:40-11:20	赵成	Tracking and Antidisturbance Ability of PID Controller	陈炳光
11:20-12:00	梁思玉	Selected Topics in Machine Learning for PDEs: Theory and Experiments	
12:00-14:00	午餐		
下午		自由讨论	

报告题目和摘要

（按报告时间排序）

报告专家：李欣意　　北京大学

报告题目：Non-existence of critical random fractals derived from Brownian motion

报告摘要：In this talk, we discuss various ``critical'' random fractals whose Hausdorff dimension is 0: the pioneer triple points of 2D Brownian motion, the pioneer double cut points of 2D and 3D Brownian motion, and the double points on the boundary of clusters of 2D Brownian loop soup with critical intensity. We develop a unified approach to establish the non-existence of all these fractals above, which answers open questions from Burdzy and Werner in 1996 and Qian and Werner in 2019. Based on a joint work with Yifan Gao (CityU HK), Runsheng Liu (PKU) and Wei Qian (CityU HK).

报告专家：俞锦炯　　华东师范大学

报告题目：The critical disordered pinning measure

报告摘要：We study a class of linear stochastic Volterra equations and stochastic heat equations, and show that their solutions, viewed as random measures, converge to a universal scaling limit. This limit, called the critical disordered pinning measure, also arises as the scaling limit of a class of critical disordered pinning point-to-point partition functions. This is joint work with Ran Wei.

报告专家：朱洁祥　　上海师范大学

报告题目：Wasserstein convergence rates for empirical measures of ergodic Markov processes

报告摘要：Quantitative convergence of empirical measures in Wasserstein distance is a fundamental problem in probability, dynamical systems, and numerical analysis. In this talk, I will present two recent results on convergence rates for empirical measures. The first concerns non-symmetric diffusion processes on compact weighted four-dimensional Riemannian manifolds, where we identify the leading term in the asymptotic expansion of the quadratic Wasserstein distance between the invariant and empirical measures. The second part deals with ergodic Markov processes on R^d. Under assumptions such as exponential contraction of the semigroup—either in Wasserstein distance or in variance, together with suitable moment conditions on the

invariant measure, we obtain quantitative convergence rates for the corresponding empirical measures. This part is based on a joint work with René L. Schilling, Jian Wang and Bingyao Wu.

报告专家：林赵峰　　国科大杭州高等研究院

报告题目：Salem properties of Dvoretzky random coverings

报告摘要：In this talk, we establish the Salem properties for the uncovered sets in the celebrated Dvoretzky random coverings of the unit circle. This talk is based on a joint work with Yukun Chen, Xiangdi Fu, and Yanqi Qiu.

报告专家：夏旭　　中科院应用数学研究所

报告题目：Mosaic Structures and Their Applications in Schrödinger Operators

报告摘要：This work investigates a class of one-dimensional Schrödinger operators characterized by potentials that integrate Mosaic structures — the embedding of zero-value sites—into underlying quasi-periodic or random sequences. These Mosaic models not only preserve the characteristic spectral features of their pristine counterparts, such as continuous spectrum or Anderson localization, but can also give rise to novel physical phenomena like mobility edges. Owing to their distinctive architecture, these models offer a unique combination of analytical tractability and computational efficiency, establishing a powerful theoretical framework for probing the spectral and dynamical properties of disordered and aperiodic systems. Furthermore, they show promising potential for experimental realization in artificial quantum systems, such as photonic crystals and cold atom setups.

报告专家：陈昕昕　　北京师范大学

报告题目：Left tail of derivative martingale in branching Wiener process

报告摘要：We establish a rather sharp two-side estimate for the tail probability of the derivative martingale limit in a branching random walk throughout the entire subcritical regime, confirming a conjecture by Lacoin, Rhodes, and Vargas (Duke Math. J.171(3):483–545, 2022.) for the special case of log-correlated Gaussian fields on trees. This is based on the joint work with Yichao Huang and Heng Ma.

报告专家：洪杰梁　　南方科技大学

报告题目：Regularity of local times of super α-stable motion

报告摘要：Let $\alpha \in (0, 2]$. We study the superprocess X on R^d with α-stable spatial motion and quadratic branching mechanism. When the local time, $L(t,x)$, of X exists in dimensions $d<2\alpha$, we prove a sufficient and necessary condition for the joint continuity of $L(t,x)$ in (t,x), thus completely characterizing the continuity properties of the local time. Besides, when $d=1$ and $\alpha \in (\frac{3}{2}, 2]$, we further show that the local time $L(t,x)$ is continuously differentiable in the spatial variable x, whose derivative is locally H\"older continuous with any index $\gamma\in (0, \alpha-\frac{3}{2})$.

报告专家：侯浩杰　　北京理工大学

报告题目：Law of iterated logarithm for supercritical symmetric branching Markov process

报告摘要：Let $\{(X_t)_{t\geq 0}, \mathbb{P}_x, x\in E\}$ be a supercritical symmetric branching Markov process on a locally compact metric measure space (E,μ) with spatially dependent local branching mechanism. Under some assumptions on the semigroup of the spatial motion, we first prove law of iterated logarithm type results for $\langle f, X_t\rangle$ under the second moment condition, where f is a linear combination of eigenfunctions of the mean semigroup $\{T_t, t\geq0\}$ of X. Then we prove law of iterated logarithm type results for $\langle f, X_t\rangle$ under the fourth moment condition, where $f\in T_r(L^2(E, \mu))$ for some $r>0$. Based on a joint work with Yan-Xia Ren (PKU) and Renming Song (UIUC).

报告专家：张树雄　　安徽师范大学

报告题目：On the local extinction and persistence of critical branching random walks

报告摘要：Consider a d-dimensional critical branching random walk\ {Z_k\}_{k\geq0} started from a Poisson random measure with Lebeguese intensity. In this work, we prove that for d=1, the branching random walk suffers strong local extinction . If d = 2, then the branching random walk suffers weak local extinction and under certain conditions it can not be strong local extinction. Contrary to previous work of Bramson, Cox and Greven (1993,AoP) who use the analytic method to show the local extinction property of low dimensional (d\leq2) branching Brownian motion, our proof uses probabilistic tools only. Moreover, for d\geq3, we show that the branching random walk is persistent, which weakens the assumption of Rapenne (2023,EJP).

报告专家：李增沪　　北京师范大学

报告题目：**TBD**

报告摘要：**TBD**

报告专家：屈宝友　　山东大学

报告题目：Multi-dimensional BSDEs with mean reflection

报告摘要：This talk focuses on the investigation of multi-dimensional mean reflected backward stochastic differential equations (BSDEs) in a possibly non-convex reflection domain, whose generator also depends on the marginal probability distributions of the solution (Y,Z). Our main idea is to decompose the mean reflected BSDE into a BSDE and a deterministic Skorokhod problem. Then, utilizing L^p-estimates for BSDEs and Skorokhod problems, we explore the solvability of L^p-solutions (p>1) through fixed-point argument and an approximation approach under both inward normal and oblique reflection scenarios. This is a joint work with Niu, Yue and Wang, Falei.

报告专家：徐　伟　　北京理工大学

报告题目：From super-Brownian motions to time-fractional super-Brownian motions

报告摘要：Consider a sequence of nearly critical interacting particle systems with chain-reaction and decay. Under some fast decay assumption, we show that the particle systems can be well approximated by a super-Brownian motion after a suitable time-spatial scaling. On the other hand, under some regular variation condition on the decay, we proved the weak convergence of the rescaled interacting particle systems to a novel non-Markovnian super-process, named as time-fractional super-Brownian motion, that can be fully characterized by the Fourier-Laplace functional given in the form of unique solution to a time-fractional F-KPP equation. In particular, the time-fractional super-Brownian motion on the real line is proved to be absolutely continuous with respect to Lebesgue measure. Moreover, the density process is the unique weak solution to a time-fractional parabolic semilinear SPDE driven by a Gaussian white noise.

报告专家：赵　成　　中国科学院数学与系统科学研究院

报告题目：Tracking and Antidisturbance Ability of PID Controller

报告摘要： In this talk, we are concerned with the tracking performance and antidisturbance ability of the widely used proportional-integral-derivative (PID) controllers in practice. To this end, we consider a basic class of nonlinear stochastic control systems subject to model uncertainties and external disturbances, and focus on the ability of the classical PID controller to track time-varying reference signals. First, we show that such control systems can be stabilized in the mean square sense under some suitable conditions, provided the PID gains are selected from a stability region. Besides, it is shown that the steady-state tracking error has an upper bound proportional to the sum of the varying rates of reference signals, the varying rates of external disturbances, and the intensity of random noises. Meanwhile, its proportional coefficient depends on the PID gains, which can be made arbitrarily small.

报告专家：梁思玉　　南京理工大学

报告题目：Selected Topics in Machine Learning for PDEs: Theory and Experiments

报告摘要：The numerical solution of partial differential equations (PDEs) is a central topic in applied mathematics. In recent years, machine learning–based approaches have emerged as powerful alternatives to traditional numerical methods. These approaches typically employ artificial neural networks (ANNs) trained with stochastic gradient descent (SGD) or related optimization algorithms. Although the idea of using neural networks to approximate PDE solutions dates back to the 1990s, it is only in the past decade, driven by the rapid development of deep learning, that such methods have received widespread attention.

This talk provides an overview of several representative approaches and their underlying mathematical foundations, including Physics-Informed Neural Networks (PINNs), deep BSDE methods, and various operator learning frameworks. We will also present some of our recent experimental results. The presentation is based on our paper arXiv:2408.13222.