Schedule 日程安排

♢ **29th July (Tuesday)** ⇝ **Gewu Building, 315**		
Chair	Xiao Xiong (熊枭)	
08:25-08:30	**Opening**	
Chair	Lijun Bo (薄立军)	
08:30-09:00	Yu Miao (苗雨)	Large deviation inequalities for the nonlinear unbalanced urn model
09:00-09:30	Bangxian Han (韩邦先)	On the geometry of Wasserstein barycenter
09:30-10:00	Qingshan Yang (杨青山)	Asymptotic properties of a class of fractional Poisson approximation processes
10:00-10:30	**Break**	
Chair	Jianhai Bao (鲍建海)	
10:30-11:00	Xiliang Fan (范锡良)	Distribution dependent SDEs with multiplicative fractional noise
11:00-11:30	Xing Huang (黄兴)	Exponential ergodicity in relative entropy for multiplicative SDEs under partially dissipative conditions
11:30-12:00	Lingyan Cheng (成灵妍)	Strong solution and large deviation principles for the multi-valued McKean-Vlasov SDEs with jumps
12:00-13:00	**Lunch**	

♢ **29th July (Tuesday)** ⇝ **Gewu Building, 315**

Chair	Yiming Jiang (江一鸣)	
13:30-14:00	Deng Zhang (张登)	Stochastic Zakharov systems in dimensions three and four
14:00-14:30	Lujing Huang (黄璐静)	The effective resistance and random walk in one-dimensional critical long-range percolation
14:30-15:00	Ruinan Li (李瑞囡)	A large deviation principle for nonlinear stochastic wave equation driven by rough noise
15:00-15:30	**Break**	
Chair	Guoli Zhou (周国立)	
15:30-16:00	Fangjun Xu (徐方军)	Limit theorems for functionals of linear processes in critical regions
16:00-16:30	Dangzheng Liu (刘党政)	Method of polynomial moments in Random Matrix Theory
16:30-17:00	Jinpeng Liu (刘金鹏)	Some results of Poisson's equation for Markov chains
17:00-20:00	**Dinner**	

♢ **30th July (Wednesday)** ⇝ **Gewu Building, 315**		
Chair	Guangjun Shen (申广君)	
08:30-09:00	Jing Wu (巫静)	On viscosity and distribution solutions of PDEs with Neumann conditions
09:00-09:30	Lijuan Cheng (程丽娟)	Covariant Riesz transform on differential forms
09:30-10:00	Tongqing Li (李童庆)	Optimal production control with carbon trading and sticky price: Nash and social solutions
10:00-10:30	**Break**	
Chair	Hui Jiang (蒋辉)	
10:30-11:00	Huijie Qiao (乔会杰)	Asymptotic behaviors of multiscale McKean-Vlasov stochastic systems
11:00-11:30	Yajuan Pan (潘雅娟)	Asymptotic theory for explosive fractional Ornstein-Uhlenbeck processes
11:30-12:00	Fengwu Zhu (朱凤梧)	General large deviations and functional iterated logarithm law for multivalued McKean-Vlasov SDEs
12:00-13:00	**Lunch**	

Titles and abstracts 报告题目与摘要

Covariant Riesz transform on differential forms

Lijuan Cheng *Hangzhou Normal University*

Abstract: In this talk, we establish sufficient conditions for the L^p-boundedness ($p > 1$) of the covariant Riesz transform on differential forms over weighted non-compact Riemannian manifolds. For $1 < p \leqslant 2$, we prove a local L^p-boundedness under two key geometric assumptions: the curvature-dimension condition and a lower Weitzenböck curvature bound. For $p > 2$, additional curvature derivative constraints are required by probabilistic methods. As an application, we derive the Calderón-Zygmund inequality for all $p > 1$ in this setting.

Strong solution and large deviation principles for the multi-valued McKean-Vlasov SDEs with jumps

Lingyan Cheng *Nanjing University of Science and Technology*

Abstract: In this talk, we present a comprehensive analysis of multi-valued McKean-Vlasov stochastic differential equations (MMVSDEs) driven by Lévy noise under non-Lipschitz coefficients. Firstly, we rigorously establish the existence and uniqueness of strong solutions for this class of equations, based on the well-posedness of strong solutions for MMVSDEs under Lipschitz conditions. Subsequently, we investigate the asymptotic behavior of small perturbations for the system. Utilizing the weak convergence approach, we derive Freidlin-Wentzell type large deviation principles (LDPs) and moderate deviation principles (MDPs) for MMVSDEs. This talk is based on the joint work with Caihong Gu, Wei Liu, and Fengwu Zhu.

Distribution dependent SDEs with multiplicative fractional noise

Xiliang Fan *Anhui Normal University*

Abstract: The well-posedness is investigated for distribution dependent stochastic differential equations driven by fractional Brownian motion with Hurst parameter $H \in (\frac{\sqrt{5}-1}{2}, 1)$ and distribution dependent multiplicative noise. To this aim, we introduce a Hölder space of probability measure paths which is a complete metric space under a new metric. Our arguments rely on a mix of contraction mapping principle on the Hölder space and fractional calculus tools.

The effective resistance and random walk in one-dimensional critical long-range percolation

Lujing Huang *Fujian Normal University*

Abstract: We study the critical long-range percolation on $\mathbb{Z}$, where an edge connects i and j independently with probability $1-\exp\{-\beta \int_i^{i+1} \int_j^{j+1} |u-v|^{-2} \mathrm{d}u\mathrm{d}v\}$ 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 $\delta(\beta) \in (0,1)$. Finally, we will consider the heat kernel estimates of the random walk on this model. The talk is based on joint works with Jian Ding and Zherui Fan.

Exponential ergodicity in relative entropy for multiplicative SDEs under partially dissipative conditions

Xing Huang *Tianjin University*

Abstract: In this paper, the exponential ergodicity in relative entropy is derived for non-degenerate SDEs with multiplicative noise under partially dissipative condition. Instead of the important tool of log-Sobolev inequality, we adopt the hypercontractivity of the associated semigroup so that we do not require the famous Bakry-Émery curvature lower bound condition $\Gamma_2(f) \geqslant \rho\Gamma_1(f)$ for some constant $\rho \in \mathbb{R}$. The result greatly improves the ones in the additive noise case.

A large deviation principle for nonlinear stochastic wave equation driven by rough noise

Ruinan Li *Shanghai University of International Business and Economics*

Abstract: In this talk, we focus on the Freidlin-Wentzell's large deviation principle for one dimensional nonlinear stochastic wave equation driven by a Gaussian noise which is white in time and fractional in space with Hurst parameter $\frac{1}{4} < H < \frac{1}{2}$. The variational framework and the modified weak convergence criterion proposed by Matoussi, Sabbagh, Zhang (2021) are adopted here.

Optimal production control with carbon trading and sticky price: Nash and social solutions

Tongqing Li *Xidian University*

Abstract: In response to the severe consequences of global warming, mainly resulting from excessive anthropogenic carbon emissions, carbon emission trading systems have been established to foster emissions reduction in a cost-effective manner. In this talk, we study Nash and social solutions for many firms producing a type of products with sticky prices in a carbon emission trading system when the prices of products and carbon equilibrium allowances have mean field interactions. By solving auxiliary limiting optimal control problems subject to the consistent condition, two sets of decentralized strategy pairs are derived. Moreover, we show that these strategy pairs asymptotically attain Nash equilibrium and social optima respectively as the number of firms is large.

Method of polynomial moments in Random Matrix Theory

Dangzheng Liu *University of Science and Technology of China*

Abstract: The method of moments, a cornerstone technique in probability theory, was first rigorously employed by Pafnuty Chebyshev in 1887 to establish a proof of the Central Limit Theorem. Its significance expanded into random matrix theory by Eugene Wigner in 1955 to derive the celebrated Wigner semicircle law, while Alexander Soshnikov leveraged it in 1999 to characterize the Tracy-Widom distribution for Wigner matrices. Notably, it continues to demonstrate formidable power within RMT, from random band matrices to inhomogeneous ensembles. This talk provides a brief survey.

Some results of Poisson's equation for Markov chains

Jinpeng Liu *Xidian University*

Abstract: Poisson's equation for Markov chains has numerous applications across various fields, such as potential theory, perturbation theory, and limit theory, among others. In this talk, we introduce some results of Poisson's equation for Markov chains, including the methods for solving Poisson's equation， Poisson's equation for non-recurrent Markov chains, and the monotonicity of the solution of Poisson's equation. This work is based on joint research with Yuanyuan Liu, Yiqiang Q.Zhao and Wendi Li.

Large deviation inequalities for the nonlinear unbalanced urn model

Yu Miao *Hunan University*

Abstract: In this talk, we consider the two-color nonlinear unbalanced urn model, under a drawing rule reinforced by a concave function and an unbalanced replacement matrix. The large deviation inequalities for the nonlinear unbalanced urn model are established by using the stochastic approximation theory. As an auxiliary theory, we give a specific large deviation inequality for a general stochastic approximation algorithm.

Asymptotic theory for explosive fractional Ornstein-Uhlenbeck processes

Yajuan Pan *Wuhan University*

Abstract: This paper proposes estimators for the parameters of an explosive fractional Ornstein-Uhlenbeck process. The asymptotic properties for the diffusion estimators are developed under the in-fill asymptotic scheme, while the asymptotic properties for the drift estimators are developed under the double asymptotic scheme for the full range of the Hurst parameter. The double asymptotic distribution of the estimator of the persistency parameter explicitly depends on the initial condition. Simulation results demonstrate the effectiveness of the proposed estimators, and the asymptotic distributions provide a good approximation in finite samples. An empirical application is presented to demonstrate the model's usefulness and the practical value of the asymptotic theory.

Asymptotic behaviors of multiscale McKean-Vlasov stochastic systems

Huijie Qiao *Southeast University*

Abstract: In this paper, we investigate a class of multiscale McKean-Vlasov stochastic systems, where the entire system depends on the distributions of both fast and slow components. First of all, by applying the Poisson equation method, we prove that the slow component converges to the solution of the averaging equation in the L^p $(p \geqslant 2)$ space with the optimal convergence order $\frac{1}{2}$. Then we establish a central limit theorem for these systems and derive the weak convergence rate using the Poisson equation technique and the regularity properties of the associated Cauchy problem.

Invariant probability measures for path-dependent regime-switching processes

Jinghai Shao *Tianjin University*

Abstract: We consider stochastic functional differential equations with Markovian regime-switching on a (infinitely) countable state space. We prove the Feller property and contraction in L_1-Wasserstein distance of the semigroup associated with the segment process to show the existence and uniqueness of invariant probability measure. In particular, to cope with switching on an infinite state space, we develop a truncation method based on a construction of coupling processes to estimate the exponential functionals for Markov chains, which generalizes the corresponding estimate for Markov chains on finite state space depending essentially on the Perron-Frobenius theorem.

On viscosity and distribution solutions of PDEs with Neumann conditions

Jing Wu *Sun Yat-sen University*

Abstract: In this talk we will apply the probabilistic approach to discuss the relations between viscosity and distribution solutions to PDEs with Neumann boundary conditions.

Limit theorems for functionals of linear processes in critical regions

Fangjun Xu *East China Normal University*

Abstract: Let $X = \{X_n : n \in \mathbb{N}\}$ be the linear process defined by $X_n = \sum_{j=1}^{\infty} a_j \varepsilon_{n-j}$, where the coefficients $a_j = j^{-\beta}\ell(j)$ are constants with $\beta > 0$ and ℓ a slowly varying function, and the innovations $\{\varepsilon_n\}_{n\in\mathbb{Z}}$ are i.i.d. random variables belonging to the domain of attraction of an α-stable law with $\alpha \in (0, 2]$. Limit theorems for the partial sum $S_{[Nt]} = \sum_{n=1}^{[Nt]}[K(X_n) - \mathbb{E}K(X_n)]$ with proper measurable functions K have been extensively studied, except for two critical regions: I. $\alpha \in (1, 2), \beta = 1$ and II. $\alpha\beta = 2, \beta \geqslant 1$. In this paper, we address these open scenarios and identify the asymptotic distributions of $S_{[Nt]}$ under mild conditions.

Asymptotic properties of a class of fractional Poisson approximation processes

Qingshan Yang *Northeast Normal University*

Abstract: We investigate LDP and MDP for a class of fractional Poisson approximation processes, with convergence measured in the p-variation norm. Under mild regularity conditions imposed on the kernels, the proposed framework accommodates the classical fractional kernel where the Hurst index resides in the interval $(\frac{1}{3}, 1)$. Analogous results are equally established for Strassen series. The technical methodology primarily relies on GRR concentration inequalities and the Radermacher constants.

Stochastic Zakharov systems in dimensions three and four

Deng Zhang *Shanghai Jiao Tong University*

Abstract: In this talk we review very recent progresses on stochastic Zakharov systems in dimensions three and four. The Zakharov system couples Schrödinger and wave equations, and reaches the energy criticality in dimension four. We will mainly show the global well-posedness below the ground state and the noise regularization effects on blow-up and scattering dynamics.

General large deviations and functional iterated logarithm law for multivalued McKean-Vlasov SDEs

Fengwu Zhu *Wuhan University*

Abstract: In this talk, we focus on multivalued McKean-Vlasov SDEs with non-Lipschitz coefficients. First, we demonstrate the existence and uniqueness of the corresponding solutions. Second, by weak convergence approach, some sufficient conditions and criteria for general large and moderate deviation principles of multivalued McKean-Vlasov SDEs are given. Furthermore, by applying the large deviation estimates we obtain the functional iterated logarithm law for the solutions of multivalued McKean-Vlasov SDEs. This is a joint work with L.Y. Cheng, W. Liu and H.J. Qiao.

Participants 参会人员

Name (姓名)	Affiliation (单位)	Email (电子邮箱)
鲍建海	天津大学	jianhaibao@tju.edu.cn
薄立军	西安电子科技大学	lijunbo@xidian.edu.cn
陈佳睿	武汉大学	2022202010054@whu.edu.cn
程丽娟	杭州师范大学	lijuan.cheng@hznu.edu.cn
成灵妍	南京理工大学	cly@njust.edu.cn
范锡良	安徽师范大学	fanxiliang0515@163.com
韩邦先	山东大学	hanbangxian@gmail.com
黄璐静	福建师范大学	huanglj@fjnu.edu.cn
黄兴	天津大学	xinghuang@tju.edu.cn
蒋辉	南京航空航天大学	huijiang@nuaa.edu.cn
江一鸣	南开大学	ymjiangnk@nankai.edu.cn
李瑞囡	上海对外经贸大学	ruinanli@amss.ac.cn
李童庆	西安电子科技大学	litongqing@xidian.edu.cn
李文迪	西安电子科技大学	liwendi@xidian.edu.cn
刘党政	中国科学技术大学	dzliu@ustc.edu.cn
刘红	东北师范大学	liuh653@nenu.edu.cn
刘金鹏	西安电子科技大学	liujinpeng123@xidian.edu.cn
刘伟	武汉大学	wliu.math@whu.edu.cn
苗雨	河南师范大学	yumiao728@126.com
潘雅娟	武汉大学	panyajuan@nuaa.edu.cn
乔会杰	东南大学	hjqiaogean@seu.edu.cn
申广君	安徽师范大学	gjshen@ahnu.edu.cn
巫静	中山大学	wjjosie@hotmail.com
徐方军	华东师范大学	fjxu@finance.ecnu.edu.cn
阳芬芬	上海大学	yangfenfen@shu.edu.cn
杨青山	东北师范大学	yangqr66@gmail.com
张登	上海交通大学	dzhang@sjtu.edu.cn
周国立	重庆大学	zhouguoli736@126.com
朱凤梧	澳门大学	fwzhu_math@whu.edu.cn

付振	哈尔滨工业大学	fzmath@163.com
李建阁	哈尔滨工业大学	jiange.li@hit.edu.cn
魏晓利	哈尔滨工业大学	xiaoli.wei@hit.edu.cn
尹晟	哈尔滨工业大学	sheng.yin@hit.edu.cn
张朝恩	哈尔滨工业大学	chaoenz@gmail.com