The 18th Workshop on Markov Processes and Related Topics

July 30-August 2, 2023

Chair: Mu-Fa Chen (BNU)

Organization Committee: Dayue Chen, Wenming Hong, Zenghu Li, Yong-Hua Mao, Wei Liu, Jian Wang, Feng-Yu Wang, Xianping Guo, Yingchao Xie, Xicheng Zhang

Local Organizer: Feng-Yu Wang, Jinghai Shao, Jianhai Bao, Huaiqian Li, Eryan Hu, Xing Huang

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【Session 2】Zoom ID：9582 9648 771 Password:123456

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Website: http://math0.bnu.edu.cn/probab/Workshop2023/

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Sign in:

Tianjin Huigao Garden Hotel(天津汇高花园酒店)

No. 236 Baidi Road, Nankai District, Tianjin, China.

Traffic:

Aerodrome

Marina International Airport

The driving distance is 22 km.
The taxi is expected to cost ¥70 .

Railway Station

Tianjin Railway Station

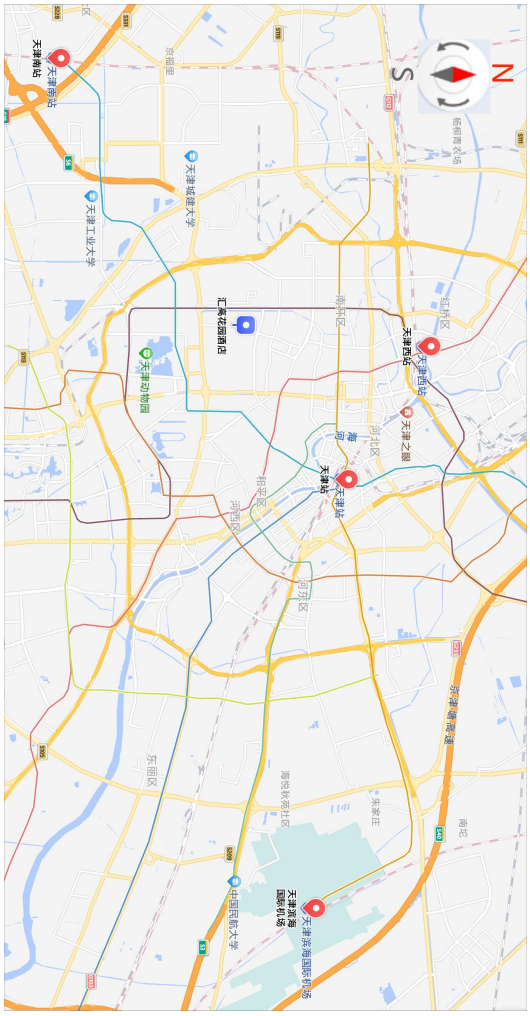
The driving distance is 7 km.
The taxi is expected to cost ¥30.

Tianjin West Railway Station

The driving distance is 8 km.
The taxi is expected to cost ¥30 .

Tianjin South Railway Station

The driving distance is 18 km.
The taxi is expected to cost ¥50 .



Schedule - Session 1

花园厅(Huayuan Hall) ZOOM ID : 98017146723 Passcode : 123456

Beijing Time (GMT+8)	July 30 (Sunday)	July 31 (Monday)	August 1 (Tuesday)	August 2 (Wednesday)
Chairman	**Feng-Yu Wang**	**Xianping Guo**	**Zhao Dong**	**Yingchao Xie**
08:10-08:30	OPENING			
08:30-09:00	Fuqing Gao	Fubao Xi	Yi Zhang	Huaizhong Zhao
09:00-09:30	Litan Yan	Jianliang Zhai	Xin Chen	Deng Zhang
09:30-10:00	Jing Wu	Zimo Hao	Xuhui Peng	Fei Pu
	Tea break	Tea break	Tea break	Tea break
Chairman	**Yongjin Wang**	**Fubao Xi**	**Jinghai Shao**	**Huaizhong Zhao**
10:30-11:00	Wei Sun	Liming Wu	Yingchao Xie	Chao Zhu
11:00-11:30	Changsong Deng	Bo Wu	Qin Zhou	Lijun Bo
11:30-12:00	Yajing Ma	Haifeng Huo	Tao Wang	Xian Chen
	Lunch	Lunch	Lunch	Lunch
Chairman	**Tusheng Zhang**	**Liming Wu**		**Jian Wang**
14:00-14:30	Chia-Li Wang	Tusheng Zhang		Shizan Fang
14:30-15:00	Lijuan Cheng	Xiliang Fan		Jianhai Bao
15:00-15:30	Wei Mao	Guoli Zhou		Lujing Huang
	Tea break	Tea break	Discussion	
Chairman	**Chia-Li Wang**	**Wei Sun**		
16:00-16:30	Chenggui Yuan	Michael Röckner		
16:30-17:00	Xiaobin Sun	Xing Huang		
17:00-17:30	Fenfen Yang	Quanxin Zhu		
	Dinner	Banquet	Dinner	Dinner

- Huayuan Hall (花园厅) is on the 4th floor. Lunch and Dinner are held on the 1st floor.
- There are Posters during Tea break.

Schedule - Session 2

汇好厅(Huihao Hall) ZOOM ID : 95829648771 Passcode : 123456

Beijing Time (GMT+8)	July 30 (Sunday)	July 31 (Monday)	August 1 (Tuesday)	August 2 (Wednesday)
Chairman	**Zenghu Li**	**Dayue Chen**	**Xicheng Zhang**	**Yanxia Ren**
08:10-08:30	OPENING			
08:30-09:00	Quansheng Liu	Renming Song	Xiangdong Li	Yaozhong Hu
09:00-09:30	Yong Liu	Chingwei Ho	Shaoqin Zhang	Wei Liu (WHU)
09:30-10:00	Ran Wang	Zhongwei Liao	Xin Guo	Guangqiang Lan
	Tea break	Tea break	Tea break	Tea break
Chairman	**Quansheng Liu**	**Renming Song**	**Xiaowen Zhou**	**Yong-Hua Mao**
10:30-11:00	Jian Ding	Hao Wu	Yanxia Ren	Panki Kim
11:00-11:30	Chenlin Gu	Yichao Huang	Zhenyao Sun	Wei Liu (JSNU)
11:30-12:00	Xinxin Chen	Xinxing Chen	Shukai Chen	Mingyang Sun
	Lunch	Lunch	Lunch	Lunch
Chairman	**Jian Ding**	**Hao Wu**		**Wei Liu (JSNU)**
14:00-14:30	Lihu Xu	Junping Li		Xiaowen Zhou
14:30-15:00	Xu Yang	Hui Xiao		Chunhua Ma
15:00-15:30	You Lv	Jiangrui Tan		Peisen Li
	Tea break	Tea break	Discussion	
Chairman	**Lihu Xu**	**Junping Li**		
16:00-16:30	Yuanyuan Liu	Fang Chen		
16:30-17:00	Huaming Wang	Qian Du		
17:00-17:30	Yaping Zhu	Dan Yao		
	Dinner	Banquet	Dinner	Dinner

- Huihao Hall (汇好厅) is on the 4th floor. Lunch and Dinner are held on the 1st floor.
- There are Posters during Tea break.

July 30 (Sunday)

Session 1

Chairman: Yong-Hua Mao

08:10-08:30 *OPENING*

Chairman: Feng-Yu Wang

08:30-09:00 Fuqing Gao (Wuhan University, Wuhan)

Moderate deviations for lattice gases with mixing conditions

09:00-09:30 Litan Yan (Donghua University)

Parameter estimation of stochastic heat equation

09:30-10:00 Jing Wu (Sun Yat-sen University)

On viscosity and distribution solutions to PDEs with Neumann boundary conditions

Chairman: Yongjin Wang

10:30-11:00 Wei Sun (Concordia University, CA)

Using computers to assist in discovering and proving new math theorems

11:00-11:30 Changsong Deng (Wuhan University, Wuhan)

Wasserstein-1 *distance between SDEs driven by Brownian motion and stable process*

11:30-12:00 Yajing Ma (Capital Normal University)

Minimal Joint Entropy and Order-Preserving Couplings

Chairman: Tusheng Zhang

14:00-14:30 Chia-Li Wang (National Dong Hwa University, Hualien)

The Equilibrium Strategy of a Random Arrival Process

14:30-15:00 Lijuan Cheng (Hangzhou Normal University)

Hessian estimates for Dirichlet and Neumann eigenfunctions of Laplacian

15:00-15:30 Wei Mao (Jiangsu Second Normal University)

Stabilization of hybrid systems by noise

Chairman: Chia-Li Wang

16:00-16:30 Chenggui Yuan (Swansea Universtiy, UK)

Distribution dependent SDEs driven by fractional Brownian motion

16:30-17:00 Xiaobin Sun (Jiangsu Normal University)

Optimal strong convergence rate for multi-scale stochastic differential equations with state-dependent switchin

17:00-17:30 Fenfen Yang (Shanghai University)

Mean-field stochastic differential equations driven by G-Brownian motion

July 30 (Sunday)

Session 2

Chairman: Zenghu Li

08:30-09:00 Quansheng Liu (Université de Bretagne-Sud, France)

L^p convergence and large deviations for supercritical multi-type branching processes in random environments

09:00-09:30 Yong Liu (Peking University)

Some ergodic properties on eventual continuous Markov-feller semigroups

09:30-10:00 Ran Wang (Wuhan University, Wuhan)

Chung-type law of the iterated logarithm for the bifractional Brownian motion at the origin

Chairman: Quansheng Liu

10:30-11:00 Jian Ding (Peking University)

One-arm exponent for the critical level-set of metric graph Gaussian free field in high dimensions

11:00-11:30 Chenlin Gu (Tsinghua University)

Quantitative homogenization of interacting particle systems

11:30-12:00 Xinxin Chen (Beijing Normal University)

Domain of attraction of the fixed points for branching Brownian motion

Chairman: Jian Ding

14:00-14:30 Lihu Xu (University of Macau)

Stable central limit theorem and its convergence rate

14:30-15:00 Xu Yang (Northern University for Nationalities)

Well-posedness of the martingale problem for super-Brownian motion with interactive branching

15:00-15:30 You Lv (Donghua University)

The survival probability of a branching random walk in random environment with a barrier

Chairman: Lihu Xu

16:00-16:30 Yuanyuan Liu (Central South University)

On Poisson's equation for Markov chains

16:30-17:00 Huangming Wang (Anhui Normal University)

Local time of transient random walk on the lattice of positive half line

17:00-17:30 Yaping Zhu (Peking University)

The asymptotic behaviors for super-Brownian motion with absorption

July 31 (Monday)

Session 1

Chairman: Xianping Guo

08:30-09:00 Fubao Xi (Beijing Institute of Technology, Beijing)

Convergence and exponential ergodicity of regime-switching stochastic functional differential equations with infinite delay

09:00-09:30 Jianliang Zhai (University of Science and Technology of China)

Irreducibility of SPDEs driven by pure jump noise

09:30-10:00 Zimo Hao (Bielefeld University)

SDEs with supercritical distributional drifts and RDEs with subcritical drifts

Chairman: Fubao Xi

10:30-11:00 Liming Wu (l'Université Clermont-Auvergne/Harbin Institute of Technology)

Sharp Bernstein's inequality and applications to machine learning

11:00-11:30 Bo Wu (Fudan University)

Transportation-cost inequality on Gaussian path space

11:30-12:00 Haifeng Huo (Guangxi University of Science and Technology)

Risk probability minimization problems for piecewise deterministic Markov decision processes with varying discount factors

Chairman: Liming Wu

14:00-14:30 Tusheng Zhang (University of Science and Technology of China, Hefei)

Stochastic heat equations on moving domains

14:30-15:00 Xiliang Fan (Anhui Normal University)

Regularities for distribution dependent SDEs with fractional noises

15:00-15:30 Guoli Zhou (Chongqing University)

Global well-posedness and regularity of 3D stochastic Burgers equation with random initial data

Chairman: Wei Sun

16:00-16:30 Michael Röckner (Bielefeld University)

Nonlinear FPE with fractional Laplacian and MK-V SDEs

16:30-17:00 Xing Huang (Tianjin University)

Probability Distance Estimates Between Diffusion Processes and Applications to Singular McKean-Vlasov SDEs

17:00-17:30 Quanxin Zhu (Hunan Normal University)

Stability and control of stochastic highly nonlinear delay systems with neutral-term

July 31 (Monday)

Session 2

Chairman: Dayue Chen

08:30-09:00 Renming Song (University of Illinois Urbana-Champaign, USA)

Potential theory of Markov processes degenerate at the boundary

09:00-09:30 Ching-Wei Ho (Institute of Mathematics, Academia Sinica)

Heat flow on plane GAF

09:30-10:00 Zhongwei Liao (Beijing Normal University, Zhuhai)

The delay-dependent control problem for finite-horizon continuous-time decision process

Chairman: Renming Song

10:30-11:00 Hao Wu (Tsinghua University)

Multiple SLE and Dyson Brownian motion

11:00-11:30 Yichao Huang (Beijing Institute of Technology)

Random analytic functions via random measures

11:30-12:00 Xinxing Chen (Shanghai JiaoTong University)

Some properties for the critical series-parallel random graphs

Chairman: Hao Wu

14:00-14:30 Junping Li (Central South University)

The multi-birth property of Markov branching processes with immigration

14:30-15:00 Hui Xiao (Chinese Academy of Sciences)

Large deviation expansions for the coefficients of random walks on the general linear group

15:00-15:30 Jiangrui Tan (Beijing Normal University)

On fixed points of infinite-dimensional generating functions

Chairman: Junping Li

16:00-16:30 Fang Chen (Sun Yat-sen University)

Two-person zero-sum risk-sensitive stochastic games with incomplete reward information on one side

16:30-17:00 Qian Du (Beijing Normal University)

Quasi-stationary distribution for R-recurrent Markov chains

17:00-17:30 Dan Yao (Beijing Normal University)

Conditional central limit theorem for subcritical branching random walk

August 1 (Tuesday)

Session 1

Chairman: Zhao Dong

08:30-09:00 Yi Zhang (University of Birmingham, UK)

On Markov decision processes with a cemetery

09:00-09:30 Xin Chen (Shanghai JiaoTong University)

Heat kernel estimates for Schödinger operators

09:30-10:00 Xuhui Peng (Hunan Normal University)

Well-posedness and large deviations for 2D stochastic Navier-Stokes equations with jumps

Chairman: Jinghai Shao

10:30-11:00 Yingchao Xie (Jiangsu Normal University)

华罗庚经济优化新理论

11:00-11:30 Qin Zhou (Jiangsu Normal University)

华氏经济优化新理论的实证案例

11:30-12:00 Tao Wang (Jiangsu Normal University)

Exponential and strong ergodicity for time-changed symmetric stable processes

August 1 (Tuesday)

Session 2

Chairman: Xicheng Zhang

08:30-09:00 Xiangdong Li (Chinese Academy of Sciences, Beijing)

On the LLN and CLT for Dyson Brownian motions

09:00-09:30 Shaoqin Zhang (Central University of Finance and Economics)

Some non-uniqueness results on stationary distributions for McKean-Vlasov SDEs

09:30-10:00 Xin Guo (Sun Yat-sen University)

New conditions for the average optimality of non-stationary Markov decision processes

Chairman: Xiaowen Zhou

10:30-11:00 Yanxia Ren (Peking University)

Double jump in the maximum of two-type reducible branching Brownian motion

11:00-11:30 Zhenyao Sun (Beijing Institute of Technology)

On the regularization of reaction-diffusion equations by the Wright-Fisher white noise

11:30-12:00 Shukai Chen (Fujian Normal University)

Exponential ergodicity of generalized branching processes

August 2 (Wednesday)

Session 1

Chairman: Yingchao Xie

08:30-09:00 Huaizhong Zhao (Durham University/Shandong University)

Periodic measures and Wasserstein distance for analysing periodicity of time series datasets

09:00-09:30 Deng Zhang (Shanghai JiaoTong University)

Multi solitary waves to stochastic nonlinear Schroedinger equations

09:30-10:00 Fei Pu (Beijing Normal University)

Poisson approximation for the level sets of parabolic Anderson model

Chairman: Huaizhong Zhao

10:30-11:00 Chao Zhu (University of Misconsin-Milwasukee, USA)

On Some Ergodic Impulse Control Problems with Applications

11:00-11:30 Lijun Bo (University of Science and Technology of China/Xidian University)

A stochastic control problem arising from relaxed wealth tracking with a monotone benchmark process

11:30-12:00 Xian Chen (Xiamen University)

Risk-sensitive average Markov decision processes in general spaces

Chairman: Jian Wang

14:00-14:30 Shizan Fang (University of Bourgogne, France)

Stochastic calculus on Wasserstein spaces

14:30-15:00 Jianhai Bao (Tianjin University)

Limit theorems for SDEs with irregular drifts

15:00-15:30 Lujing Huang (Fujian Normal University)

Explicit results for ergodic properties of SDEs driven by cylindrical symmetric stable noises

August 2 (Wednesday)

Session 2

Chairman: Yanxia Ren

08:30-09:00 Yaozhong Hu (University of Alberta at Edmonton, CA)

Mean-field super-Brownian motion

09:00-09:30 Wei Liu (Wuhan University)

Long time behaviors of mean field interacting particle systems and McKean-Vlasov equations

09:30-10:00 Guangqiang Lan (Beijing University of Chemical Technology)

Mean square exponential stability of numerical methods for stochastic differential delay equations

Chairman: Yong-Hua Mao

10:30-11:00 Panki Kim (Seoul National University, Korea)

Potential theory of Dirichlet forms with jump kernels blowing up at the boundary

11:00-11:30 Wei Liu (Jiangsu Normal University)

Long time asymptotics of stochastic PDEs

11:30-12:00 Mingyang Sun (Beijing Normal University)

Scaling limit of the local time of random walk conditioned to stay positive

Chairman: Wei Liu (JSU)

14:00-14:30 Xiaowen Zhou (Concordia University, CA)

Speed of explosion for CSBP with nonlinear branching

14:30-15:00 Chunhua Ma (Nankai University)

Stationarity and ergodicity for affine processes

15:00-15:30 Peisen Li(Beijing Institute of Technology)

Quasi-stationary distribution for continuous-state branching processes with competition

LIMIT THEOREMS FOR SDES WITH IRREGULAR DRIFTS

Jianhai Bao *Tianjin University*, E-mail: jianhaibao13@gmail.com

Abstract: In this talk, we are concerned with limit theorems (e.g., law of large numbers and central limit theorem) for additive functionals associated with several class of SDEs with irregular drifts. In particular, the theories formulated are applicable to SDEs with Hölder continuous drifts (which might be unbounded) and SDEs with discontinuous drifts.

A STOCHASTIC CONTROL PROBLEM ARISING FROM RELAXED WEALTH TRACKING WITH A MONOTONE BENCHMARK PROCESS

Lijun Bo *University of Science and Technology of China/Xidian University*, E-mail: lijunbo@ustc.edu.cn

Abstract: We study a nonstandard stochastic control problem motivated by the optimal consumption with wealth tracking of a non-decreasing benchmark process. In particular, the monotone benchmark is modelled by the running maximum of a drifted Brownian motion. We consider a relaxed tracking formulation using capital injection such that the wealth compensated by the injected capital dominates the benchmark process at all times. The stochastic control problem is to maximize the expected utility on consumption deducted by the cost of the capital injection under the dynamic floor constraint. By introducing two auxiliary state processes with reflections, an equivalent auxiliary control problem is formulated and studied such that the singular control of capital injection and the floor constraint can be hidden. To tackle the HJB equation with two Neumann boundary conditions, we establish the existence of a unique classical solution to the dual PDE in a separation form using some novel probabilistic representations involving the dual reflected processes and the local time, and a homogenization technique of Neumann boundary conditions. The proof of the verification theorem on the optimal feedback control can be carried out by some technical stochastic flow analysis of the dual reflected processes and estimations of the optimal control.

TWO-PERSON ZERO-SUM RISK-SENSITIVE STOCHASTIC GAMES WITH INCOMPLETE REWARD INFORMATION ON ONE SIDE

Fang Chen *Sun Yat-sen University*, E-mail: chenf76@mail2.sysu.edu.cn

Abstract: This study considers two-person zero-sum risk-sensitive discrete-time stochastic games with incomplete reward information on one side. We prove the existence of the value function, derive a new Shapley equation by introducing a functional of rewards, and prove that the value function solves the Shapley equation, which is used to construct an optimal policy for the informed player. To show the existence of an optimal policy for the uninformed player, we introduce an auxiliary dual risk-sensitive game and construct an optimal policy for the uninformed player in the primal game by the optimal policy in the dual game. Finally, we give an example to illustrate the effects of the reward information and risk-sensitive parameters on the value function and optimal policies.

EXPONENTIAL ERGODICITY OF GENERALIZED BRANCHING PROCESSES

Shukai Chen *Fujian Normal University*, E-mail: skchen@fjnu.edu.cn

Abstract: We present sufficient conditions for the exponential ergodicity in a weighted total variation distance of some generalized branching processes. The key strategy is the analysis of Markov couplings technique and making full use of Lyapunov-type conditions.

RISK-SENSITIVE AVERAGE MARKOV DECISION PROCESSES IN GENERAL SPACES

Xian Chen *Xiamen University*, E-mail: chenxian@xmu.edu.cn

Abstract: We study discrete-time Markov decision processes with Borel state and action spaces under the risk-sensitive average cost criterion. The cost function can be unbounded. We introduce a new operator and prove the quasi-compactness of the operator from which the multiplicative Poisson equation is derived. Moreover, we develop a new approach to show the existence of a solution to the risk-sensitive average cost optimality equation and obtain the existence of an optimal deterministic stationary policy. Furthermore, we give two examples to illustrate our results. This is a joint work with Qingda Wei.

HEAT KERNEL ESTIMATES FOR SCHÖDINGER OPERATORS

Xin Chen *Shanghai JiaoTong University*, E-mail: chenxin217@sjtu.edu.cn

Abstract: We will introduce some probabilistic methods to study heat kernel estimates for Schödinger operators $L = -\Delta + V$, based on which the interaction between the behaviors of Brownian motions $\{B_t\}_{t\geq 0}$ and the potential V will be applied. Our results include the case that V is unbounded or V is decaying to 0 at infinity. Moreover, two-sided Green's function estimates associated with $L = -\Delta + V$ are also obtained.

DOMAIN OF ATTRACTION OF THE FIXED POINTS FOR BRANCHING BROWNIAN MOTION

Xinxin Chen *Beijing Normal University*, E-mail: xinxin.chen2021@icloud.com

Abstract: We consider one-dimensional branching Brownian motion (BBM) started from a point process. We introduce a suitable metric space of locally finite point measures on which we

- prove that BBM with critical drift is a well-defined Markov process which satisfies Feller property;
- characterize all invariant measures/fixed points;

- characterize the domain of attraction of each fixed point.

SOME PROPERTIES FOR THE CRITICAL SERIES-PARALLEL RANDOM GRAPHS

Xinxing Chen *Shanghai JiaoTong University*, E-mail: chenxinx@sjtu.edu.cn

Abstract: We consider the series-parallel random graph introduced by Hambly and Jordan (2004), which is a hierarchical graph with a parameter $p \in [0, 1]$. The graph is known to possess a change of phases phenomenon at $p = p_c := 1/2$.

HESSIAN ESTIMATES FOR DIRICHLET AND NEUMANN EIGENFUNCTIONS OF LAPLACIAN

Lijuan Cheng *Hangzhou Normal University*, E-mail: 20220006@hznu.edu.cn

Abstract: In this talk, I will use the methods of stochastic analysis on Riemannian manifolds to derive explicit constants $c(D)$ for n-dimensional compact manifolds D with boundary such that

$$\frac{\lambda}{n} \|\phi\|_\infty \leq \|\mathrm{Hess}\phi\|_\infty \leq c(D)\lambda \|\phi\|_\infty,$$

where ϕ is some Dirichlet and Neumann eigenfunction of $-\Delta$ with eigenvalue λ.

WASSERSTEIN-1 DISTANCE BETWEEN SDES DRIVEN BY BROWNIAN MOTION AND STABLE PROCESS

Changsong Deng *Wuhan University, Wuhan*, E-mail: dengcs@whu.edu.cn

Abstract: We are interested in the following two (d-dimensional) SDEs:

$$dX_t = b(X_t)\,dt + dL_t,$$

$$dY_t = b(Y_t)\,dt + dB_t, ,$$

where L_t is a rotationally symmetric α-stable Lévy process, and B_t is a standard Brownian motion. We show that (as $\alpha \uparrow 2$)

$$W_1(\mu_\alpha, \mu) \leq C(2 - \alpha),$$

where μ_α and μ are the ergodic measures of X_t and Y_t, respectively. The rate is optimal for the Ornstein–Uhlenbeck processes.

ONE-ARM EXPONENT FOR THE CRITICAL LEVEL-SET OF METRIC GRAPH GAUSSIAN FREE FIELD IN HIGH DIMENSIONS

Jian Ding *Peking University*, E-mail: dingjian@math.pku.edu.cn

Abstract: In this talk I will report a recent joint work with Zhenhao Cai on the one-arm probability for the critical level-set of the Gaussian free field on the metric graph of lattices in dimensions higher than.

QUASI-STATIONARY DISTRIBUTION FOR R-RECURRENT MARKOV CHAINS

Qian Du *Beijing Normal University*, E-mail: lqduqian@163.com

Abstract: The quasi-stationary distribution for the R-recurrent Markov chain and the criteria of the R-positivity are obtained. A representation of the quasi-distribution is also provided by a new Markov chain.

REGULARITIES FOR DISTRIBUTION DEPENDENT SDES WITH FRACTIONAL NOISES

Xiliang Fan *Anhui Normal University*, E-mail: fanxiliang0515@163.com

Abstract: In this paper, we investigate the regularities for a class of distribution dependent SDEs driven by two independent fractional noises B^H and $\tilde{B}^{\tilde{H}}$ with Hurst parameters $H \in (0,1)$ and $\tilde{H} \in (1/2,1)$.We establish the log-Harnack inequalities and Bismut formulas for the Lions derivative to this type of equations with distribution dependent noise, in both non-degenerate and degenerate cases.

Our proofs consist of utilizing coupling arguments which are indeed backward couplings introduced by F.-Y. Wang (Ann. Probab., 2014), together with a careful analysis of fractional derivative operator.

STOCHASTIC CALCULUS ON WASSERSTEIN SPACES

Shizan Fang *University of Bourgogne, France*, E-mail: fang@u-bourgogne.fr

Abstract: This talk will be based on a joint work with Hao Ding and Xiang-dong Li. We will formulate intrinsic Itô stochastic calculus on the Wasserstein space: Itô formula will be presented, as well as stochastic parallel translations along stochastic regular curves.

MODERATE DEVIATIONS FOR LATTICE GASES WITH MIXING CONDITIONS

Fuqing Gao *Wuhan University, Wuhan*, E-mail: fqgao@whu.edu.cn

Abstract: We study moderate deviations for additive functionals of stochastic lattice gases. Under a mixing condition, we prove that the additive functional of any local function satisfies a moderate deviation principle. The main tool is the logarithmic Sobolev inequality obtained by Yau. (This is a joint work with Jeremy Quastel.)

QUANTITATIVE HOMOGENIZATION OF INTERACTING PARTICLE SYSTEMS

Chenlin Gu *Tsinghua University*, E-mail: guchenlin@hotmail.com

Abstract: This talk presents that, for a class of interacting particle systems in continuous space, the finite-volume approximations of the bulk diffusion matrix converge at an algebraic rate. The models we consider are reversible with respect to the Poisson measures with constant density, and are of non-gradient type. This approach is inspired by recent progress in the quantitative homogenization of elliptic equations. Along the way, a modified Caccioppoli inequality and a multiscale Poincare inequality are developed, which are of independent interest. The talk is based on a joint work with Arianna Giunti and Jean-Christophe Mourrat.

NEW CONDITIONS FOR THE AVERAGE OPTIMALITY OF NON-STATIONARY MARKOV DECISION PROCESSES

Xin Guo *Sun Yat-sen University*, E-mail: guox87@mail.sysu.edu.cn

Abstract: We aim to give new conditions for the existence and computation of average optimal policies for non-stationary Markov decision processes with non* uniformly bounded rewards and Borel spaces. To achieve this goal, we present an extension of the span-fixed point theorem for a span-semi-norm to a sequence of operators. Second, we give a new set of conditions, which is the generalization of the ergodicity ones in the existing literature. Under the new conditions, by the extension of the span-fifixed point theorem, we not only prove the existence of a solution to the average optimality equations (AOEs), but also find an approximation sequence of the solution and an error estimation of the approximation. From the AOEs, we establish the existence of average $\epsilon(\geq 0)$-optimal Markov policies.

SDES WITH SUPERCRITICAL DISTRIBUTIONAL DRIFTS AND RDES WITH SUBCRITICAL DRIFTS

Zimo Hao *Bielefeld University*, E-mail: zhao@math.uni-bielefeld.de

Abstract: In this talk, we investigate the following stochastic differential equation (SDE) driven by Brownian motion

$$\mathrm{d}X_t = b(t, X_t)\mathrm{d}t + \sqrt{2}\mathrm{d}W_t, \tag{SDE}$$

where $b \in L^q(\mathbb{R}_+; H^{\alpha,p}(\mathbb{R}^d))$ with some $\alpha \leq 0$ and $\frac{d}{p} + \frac{2}{q} < 1$. Formally, by the scaling observation, the critical condition is $\frac{d}{p} + \frac{2}{q} - \alpha = 1$.

In the case of $\alpha = -1$, corresponding to a supercritical condition, we construct a unique martingale solution to (SDE) when div$b = 0$ (This part is based on a joint work with Xicheng Zhang, Rongchan Zhu and Xiangchan Zhu);

For the subcritical case $\alpha = 0$, we establish the path-by-path uniqueness for the following rough differential equation (RDE) related to (SDE):

$$\mathrm{d}X_t = b(t, X_t)\mathrm{d}t + \sigma(X_t)\mathrm{d}\mathbf{W}_t,$$

where $\mathbf{W}_t = (W_t, \int_0^t W_s \mathrm{d}W_s)$ represents a rough path and σ is uniformly elliptic with $\sigma \in \mathbf{C}^3$ (This part is based on a joint work with Khoa Lê).

HEAT FLOW ON PLANE GAF

Ching-Wei Ho *Institute of Mathematics, Academia Sinica*, E-mail: chwho@gate.sinica.edu.tw

Abstract: It is well-known that the backward heat operator applied to the monomials gives Hermite polynomials. In this talk, I will talk about a differential operator similar to the backward heat operator (which we call the heat flow operator)

$$e^{-\frac{\tau}{2}\frac{\partial}{\partial z^2}},$$

where the time τ is allowed to be complex, acting on entire functions with certain growth rate. The zero of an entire function under heat flow satisfy the rational Calogero–Moser equation. We will focus on the heat flow on the plane GAF. I will talk about the distribution of zeros and the trajectories of the zeros of the plane GAF under heat flow. If time permits, I will briefly talk about the relation between the heat flow on GAF and the metaplectic representation of $SU(1,1)$. This is joint work with Brian Hall, Jonas Jalowy, and Zakhar Kabluchko.

MEAN-FIELD SUPER-BROWNIAN MOTION

Yaozhong Hu *University of Alberta at Edmonton, CA*, E-mail: yaozhong@ualberta.ca

Abstract: The talk is on the mean-field stochastic partial differential equation (SPDE) corresponding to a mean-field super-Brownian motion (sBm). In this mean-field sBm, the branching-particle lifetime is allowed to depend upon the probability distribution of the sBm itself, producing an SPDE whose space-time white noise coefficient has, in addition to the typical sBm square root, an extra factor that is a function of the probability law of the density of the mean-field sBm. This novel mean-field SPDE is thus motivated by population models where things like overcrowding and isolation can affect growth. A two step approximation method is employed

to show existence for this SPDE under general conditions. Then, mild moment conditions are imposed to get uniqueness. Finally, smoothness of the SPDE solution is established under a further simplifying condition.

EXPLICIT RESULTS FOR ERGODIC PROPERTIES OF SDES DRIVEN BY CYLINDRICAL SYMMETRIC STABLE NOISES

Lujing Huang *Fujian Normal University*, E-mail: lujingh@yeah.net

Abstract: We consider exponentially ergodic properties for the system of SDEs in $\mathbb{R}^n$ driven by cylindrical stable processes (possibly with different indexes in different coordinates). The approach is based on the well-known Foster – Lyapunov criteria and the careful choice of Lyapunov functions, as well as the recent developments on regularity and transition density estimates for solutions of SDEs driven by Lévy processes with independent coordinates. Our results are new even in one-dimensional case. In particular, our results indicate that multiplicative cylindrical stable processes would accelerate the ergodicity of the system when the indexes of stable noises for all directions are in $[1, 2)$.

PROBABILTY DISTANCE ESTIMATES BETWEEN DIFFUSION PROCESSES AND APPLICATIONS TO SINGULAR MCKEAN-VLASOV SDES

Xing Huang *Tianjin University*, E-mail: xinghuang@tju.edu.cn

Abstract: The L^k-Wasserstein distance $\mathbb{W}_k (k \geq 1)$ and the probability distance $\mathbb{W}_\psi$ induced by a concave function ψ, are estimated between different diffusion processes with singular coefficients. As applications, the well-posedness, probability distance estimates and the log-Harnack inequality are derived for McKean-Vlasov SDEs with multiplicative distribution dependent noise, where the coefficients are singular in time-space variables and $(\mathbb{W}_k + \mathbb{W}_\psi)$-Lipschitz continuous in the distribution variable. This improves existing results derived in the literature under the $\mathbb{W}_k$-Lipschitz or derivative conditions in the distribution variable.

RANDOM ANALYTIC FUNCTIONS VIA RANDOM MEASURES

Yichao Huang *Beijing Institute of Technology*, E-mail: yichao.huang@outlook.com

Abstract: We define a random analytic function ϕ on the unit disc by letting a Gaussian multiplicative measure to be one of its Clark measures. We show that ϕ is almost surely a Blaschke product and we provide rather sharp estimates for the density of its zeroes. This is joint work with Eero Saksman (Univ. of Helsinki).

RISK PROBABILITY MINIMIZATION PROBLEMS FOR PIECEWISE DETERMINISTIC MARKOV DECISION ROCESSES WITH VARYING DISCOUNT FACTORS

Haifeng Huo *Guangxi University of Science and Technology*, E-mail: xiaohuo08ok@163.com

Abstract: This talk is devoted to the study of a risk probability minimization problem for piecewise deterministic Markov decision processes with varying discount factors. Only using the assumption of non-explosion of the controlled state processes as well as the finiteness of actions available at each state, we not only establish the existence and uniqueness of a solution to the corresponding optimality equation, but also prove the existence of a risk probability optimal policy. Finally, we give two examples to illustrate our results.

POTENTIAL THEORY OF DIRICHLET FORMS WITH JUMP KERNELS BLOWING UP AT THE BOUNDARY

Panki Kim *Seoul National University, Korea*, E-mail: pkim@snu.ac.kr

Abstract: In this talk we discuss the potential theory of Dirichlet forms on the half-space defined by the jump kernel $J(x,y) = |x-y|^{-d-\alpha}B(x,y)$ and the killing potential $\kappa x_d^{-\alpha}$, where $\alpha \in (0,2)$ and $B(x,y)$ can blow up to infinity at the boundary. The jump kernel and the killing potential depend on several parameters. For all admissible values of the parameters involved and all $d \geq 1$, the boundary Harnack principle holds. Moreover, sharp two-sided estimates on the Green functions of these processes is obtained. This is a joint work with Renming Song (University of Illinois, USA) and Zoran Vondraček (University of Zagreb, Croatia).

MEAN SQUARE EXPONENTIAL STABILITY OFNUMERICAL METHODS FOR STOCHASTIC DIFFERENTIAL DELAY EQUATIONS

Guangqiang Lan *Beijing University of Chemical Technology*, E-mail: langq@buct.edu.cn

Abstract: Mean square exponential stability of θ-EM and modified truncated Euler-Maruyama (MTEM) methods for stochastic differential delay equations (SDDEs) are investigated in this paper. We present new criterion of mean square exponential stability of the θ-EM and MTEM methods for SDDEs, which are different from most existing results under Khasminskii-type conditions. Two examples are provided to support our conclusions.

THE MULTI-BIRTH PROPERTY OF MARKOV BRANCHING PROCESSES WITH IMMIGRATION

Junping Li *Central South University*, E-mail: jpli@csu.edu.cn

Abstract: In this paper, we consider the multi-birth property of Markov branching processes with immigration. The joint probability generating function of multi-birth numbers for Markov

branching processes with immigration until time t is obtained by constructing a new Q-process. In particular, the probability generating function of multi-birth number is also obtained for Markov branching processes until its extinction.

QUASI-STATIONARY DISTRIBUTION FOR CONTINUOUS-STATE BRANCHING PROCESSES WITH COMPETITION

Peisen Li *Beijing Institute of Technology*, E-mail: peisenli@bit.edu.cn

Abstract: We consider the continuous-state branching process with competition introduced in Berestycki, Fittipaldi and Fontbona (Probab. Theory Relat. Fields, 2018). We establish the strong Feller property, excursion Feller property and irreducibility. These properties allow us to obtain a sufficient condition for the uniqueness and existence of the quasi-stationary distribution.

ON THE LLN AND CLT FOR DYSON BROWNIAN MOTIONS

Xiangdong Li *Chinese Academy of Sciences, Beijing*, E-mail: xdli@amt.ac.cn

Abstract: In this talk, I will present some recent results in the study of the LLN and CLT for the empirical measures of the Dyson Brownian motion and the Wishart Dyson Brownian motion, which are the eigenvalues of Hermitian matrix valued and Wishart matrix valued diffusion processes. Joint work with Songzi Li, Yongxiao Xie and Rong Lei.

THE DELAY-DEPENDENT CONTROL PROBLEM FOR FINITE-HORIZON CONTINUOUS-TIME DECISION PROCESS

Zhongwei Liao *Beijing Normal University, Zhuhai*, E-mail: zhwliao@hotmail.com

Abstract: This paper investigates the optimal control problem for the continuous-time decision processes with an enlarged class of control policies, i.e. delay-dependent control policies. We show that, under certain conditions, among the class of delay-dependent control policies, there is an optimal one which is Markovian. Such result is obtained by characterizing the value function to be a unique viscosity solution to certain differential-difference Hamilton-Jacobi-Bellman (HJB) equation in the setting of discrete space. In particular, the comparison principle is established for such HJB equations.

L^P CONVERGENCE AND LARGE DEVIATIONS FOR SUPERCRITICAL MULTI-TYPE BRANCHING PROCESSES IN RANDOM ENVIRONMENTS

Quansheng Liu *Université de Bretagne-Sud, France*, E-mail: quansheng.liu@univ-ubs.fr

Abstract: Consider a d-type supercritical branching process $Z_n^i = (Z_n^i(1), \cdots, Z_n^i(d)),\ n \geq 0$, in an independent and identically distributed random environment $\xi = (\xi_0, \xi_1, \ldots)$, starting with one initial particle of type i, whose offspring distributions of generation n depend on the environment ξ_n at time n. In [1] we have established a Kesten-Stigum type theorem for Z_n^i, which implies that for any $1 \leq i, j \leq d$, $Z_n^i(j)/E_\xi Z_n^i(j) \to W^i$ in probability as $n \to +\infty$, where E_ξ denotes the conditional expectation given the environment ξ, and W^i is a non-negative and finite random variable for which a criterion for non-degeneracy is obtained. Here we present the following results established in [2]: a necessary and sufficient condition for the convergence in L^p of the normalized population size $Z_n^i(j)/E_\xi Z_n^i(j)$, a theorem giving its exponential convergence rate, and similar results for the associated fundamental martingale (W_n^i). We also present a result on the precise large deviations for the total population size $\|Z_n\|_1 := \sum_{j=1}^n Z_n(j)$ of generation n recently established in [3], whose proof uses the L^p convergence and a similar large deviation result on products of random matrices proved in [4].

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LONG TIME ASYMPTOTICS OF STOCHASTIC PDES

Wei Liu *Jiangsu Normal University*, E-mail: weiliu@jsnu.edu.cn

Abstract: In this talk we first recall the classical variational framework for SPDE and briefly review some recent progress in this field. Then we present our results concerning the long time asymptotics of a class of SPDEs.

LONG TIME BEHAVIORS OF MEAN FIELD INTERACTING PARTICLE SYSTEMS AND MCKEAN-VLASOV EQUATIONS

Wei Liu *Wuhan University*, E-mail: wliu.math@whu.edu.cn

Abstract: In this talk, we will present our recent studies about the long time behaviors of mean-field interacting particle systems and the McKean-Vlasov equation, by using two different methods: coupling method and functional inequalities. This talk is based on the joint works with Arnaud Guillin, Liming Wu and Chaoen Zhang.

SOME ERGODIC PROPERTIES ON EVENTUAL CONTINUOUS MARKOV-FELLER SEMIGROUPS

Yong Liu *Peking University*, E-mail: liuyong@math.pku.edu.cn

Abstract: In this talk, we introduce the eventual continuity of Markov-Feller semigroups firstly, and then we show some ergodic properties of eventual continuous Markov-Feller semigroups. We also provide some applications of these ergodic properties. This is a joint work with Fuzhou GONG (AMSS,CAS), Yuan LIU (AMSS,CAS) and Ziyu LIU (PKU).

ON POISSON'S EQUATION FOR MARKOV CHAINS

Yuanyuan Liu *Central South University*, E-mail: liuyy@csu.edu.cn

Abstract: In this talk, we will present some recent results on Poisson's equation for Markov chains. For irreducible and positive recurrent discrete-time Markov chains, we will consider the issues of numerical approximations, analytical bounds and stochastic monotonicity for solutions of Poisson's equation. For null recurrent discrete-time Markov chains, solutions of Poisson's equation will be also considered, and explicit solutions will be derived for single-birth or single-death processes.

THE SURVIVAL PROBABILITY OF A BRANCHING RANDOM WALK IN RANDOM ENVIRONMENT WITH A BARRIER

You Lv *Donghua University*, E-mail: 13468667191@163.com

Abstract: Consider a supercritical branching random walk in a time-inhomogeneous random environment. We impose a selection (called barrier) on survival in the following way. The position of the barrier may depend on the generation and the environment. In each generation, only the individuals born below the barrier can survive and reproduce. We consider the survival probability and its asymptotic behavior under different barriers and different types of convergence.

STATIONARITY AND ERGODICITY FOR AFFINE PROCESSES

Chunhua Ma *Nankai University*, E-mail: mach@nankai.edu.cn

Abstract: The affine Markov processes introduced by Duffie et al. (2003) have been used widely in the financial world. In this talk, we give a necessary and sufficient condition guaranteeing that the limiting distribution exists. Then we turn to a two dimensional affine process for simplicity. Its ergodicity in the total variation can be derived via a thorough analysis of the large jumps and the coupling method inspired by Wang (2011).

MINIMAL JOINT ENTROPY AND ORDER-PRESERVING COUPLINGS

Yajing Ma *Capital Normal University, Beijing*, E-mail: mayajing121@126.com

Abstract: This talk focuses on the extreme-value problem for Shannon entropy of the joint distribution with given marginals. It is proved that the minimum-entropy coupling must be of order-preserving, while the maximum-entropy coupling coincides with the independent one. Note that in this sense, we interpret entropy as a measure of system disorder.

NONLINEAR FPE WITH FRACTIONAL LAPLACIAN AND MK-V SDES

Michael Röckner *Bielefeld University*, E-mail: roeckner@math.uni-bielefeld.de

Abstract: This talk is concerned with the existence of mild solutions to nonlinear Fokker–Planck equations with fractional Laplace operator $(-\Delta)^s$ for $s \in (\frac{1}{2}, 1)$. The uniqueness of Schwartz distributional solutions is also proved under suitable assumptions on diffusion and drift terms. As applications, weak existence and uniqueness of soultions to McKean–Vlasov equations with Lévy–Noise, as well as the Markov property for their laws are proved.

Joint work with:
Viorel Barbu, Al.I. Cuza University and Octav Mayer Institute of Mathematics of Romanian Academy, Iaşi, Romania

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STABILIZATION OF HYBRID SYSTEMS BY NOISE

Wei Mao *Jiangsu Second Normal University*, E-mail: mwzy365@126.com

Abstract: In this talk, we mainly use white noise to study the stabilization of unstable deterministic systems. Firstly, when stochastic hybrid systems has an equilibrium solution, the asymptotic exponential stability of the hybrid systems is studied by using intermittent stochastic noise; At the same time, when there is no equilibrium solution for stochastic hybrid systems, the stability in distribution of the hybrid system driven by intermittent stochastic noise is studied, and it is proved that the transition probability distribution of the systems converge to a unique invariant probability measure.

WELL-POSEDNESS AND LARGE DEVIATIONS FOR 2D STOCHASTIC NAVIER-STOKES EQUATIONS WITH JUMPS

Xuhui Peng *Hunan Normal University*, E-mail: xhpeng@hunnu.edu.cn

Abstract: We prove the existence and the uniqueness of a global strong (in both the probabilistic and the PDE senses) H_2^1-valued solution to the 2D stochastic Navier-Stokes equations (SNSEs) driven by a multiplicative Lévy noise under the natural Lipschitz on balls and linear growth assumptions on the jump coefficient.

Secondly, we prove a Girsanov-type theorem for Poisson random measures and apply this result to a study of the well-posedness of the corresponding stochastic controlled problem for these SNSEs.

Thirdly, we apply these results to establish a Freidlin-Wentzell-type large deviation principle for the solutions of these SNSEs by employing the weak convergence method.

The talk is based on a joint work with Zdzislaw Brzezniak and Jianliang Zhai.

POISSON APPROXIMATION FOR THE LEVEL SETS OF PARABOLIC ANDERSON MODEL

Fei Pu *Beijing Normal University*, E-mail: fei.pu@bnu.edu.cn

Abstract: We consider the number of spatial points of the solution to parabolic Anderson model that exceeds a certain level. Assuming a distance condition on these spatial points, we formulate a Poisson limit theorem, using Poincare inequality and the asymptotic behavior of tail probability of the solution to parabolic Anderson model. This is based on ongoing collaboration with Davar Khoshnevisan.

DOUBLE JUMP IN THE MAXIMUM OF TWO-TYPE REDUCIBLE BRANCHING BROWNIAN MOTION

Yanxia Ren *Peking University*, E-mail: yxren@math.pku.edu.cn

Abstract: Consider a two-type reducible branching Brownian motion in which particles' diffusion coefficients and branching rates are influenced by their types. Here reducible means that type 1 particles can produce particles of type 1 and type 2, but type 2 particles can only produce particles of type 2. The maximum of this process is determined by two parameters: the ratio of the diffusion coefficients and the ratio of the branching rates for particles of different types. Belloum and Mallein (EJP, 2021) identified three phases of the maximum and the extremal process, corresponding to three regions in the parameter space.

We investigate how the extremal process behaves asymptotically when the parameters lie on the boundaries between these regions. An interesting consequence is that a double jump occurs in the maximum when the parameters cross the boundary of the so called anomalous spreading region, while only single jump occurs when the parameters cross the boundary between the remaining two regions. The talk is based on a joint work with Heng Ma.

POTENTIAL THEORY OF MARKOV PROCESSES DEGENERATE AT THE BOUNDARY

Renming Song *University of Illinois Urbana-Champaign, USA*, E-mail: rsong@illinois.edu

Abstract: In this talk, I will present some recent results on the potential theory of Symmetric Markov processes with jump kernels degenerate at the boundary.

SCALING LIMIT OF THE LOCAL TIME OF RANDOM WALK CONDITIONED TO STAY POSITIVE

Mingyang Sun *Beijing Normal University*, E-mail: sunmingyang@mail.bnu.edu.cn

Abstract: In this talk, we consider the local time of random walk conditioned to stay positive, and prove that it converges to the local time of 3-dimensional Bessel process by proper scaling. Our proof is based on Tanaka's pathwise construction for conditioned random walks and the method of moments. Joint work with Professor Wenming Hong.

USING COMPUTERS TO ASSIST IN DISCOVERING AND PROVING NEW MATH THEOREMS

Wei Sun *Concordia University, CA*, E-mail: wei.sun@concordia.ca

Abstract: The idea of using non-traditional methods to solve challenging math problems is not new. Computers not only verify some finite statements, which can be completed by pencil and paper in principle, but also help us discover new math theorems and provide us with deeper insight into why the results are correct.In this talk, I will use the extreme value problem of Levy processes and the Gaussian product inequality as examples to explain this point of view.

OPTIMAL STRONG CONVERGENCE RATE FOR MULTI-SCALE STOCHASTIC DIFFERENTIAL EQUATIONS WITH STATE-DEPENDENT SWITCHIN

Xiaobin Sun *Jiangsu Normal University*, E-mail: xbsun@jsnu.edu.cn

Abstract: In this talk, we discuss the asymptotic behavior for a class of multi-scale stochastic differential equations with state-dependent switching. Using the technique of Poisson equation, we can obtain the optimal convergence order 1/2 in the strong sense, which seems new in the existing results. To do this, we need to establish the regularity of the solution of Poisson equation associated to a Markov chain. This is a joint work with Professor Yingchao Xie.

ON THE REGULARIZATION OF REACTION-DIFFUSION EQUATIONS BY THE WRIGHT-FISHER WHITE NOISE

Zhenyao Sun *Beijing Institute of Technology*, E-mail: zhenyao.sun@gmail.com

Abstract: We give the weak uniqueness of a class of one-dimensional stochastic reaction-diffusion equations with Wright-Fisher white noise. Our results cover examples such as

$$\partial_t u_t = \frac{1}{2}\partial_x^2 u_t + u_t^\alpha(1-u_t) + \sqrt{u_t(1-u_t)}\dot{W},$$

where $\alpha \in [0,1]$ and W is a space-time white noise. Traditionally, the weak uniqueness of this equation is only established when $\alpha = 1$. However, recent work (Comm. Math. Phys. **384** (2021), no. 2) has shown that this weak uniqueness also holds when $\alpha \in [\frac{1}{2}, 1)$, provided the initial value u_0 has a compact interface. Our results imply the weak uniqueness of the aforementioned example for every $\alpha \in [0,1)$ without any assumptions regarding the support of the initial value. This is based on ongoing joint work with Clayton Barnes and Leonid Mytnik.

ON FIXED POINTS OF INFINITE-DIMENSIONAL GENERATING FUNCTIONS

Jiangrui Tan *Beijing Normal University*, E-mail: jr_tan@mail.bnu.edu.cn

Abstract: This talk is concerned with the characterizations of fixed points of the generating function of branching processes with countably many types. We assume each particle of type i can only give offspring of type $j \geq i$, whose number only depends on $j-i$. We prove that, for these processes, there are at least countably many fixed points of the offspring generating function, while the extinction probability set of the process has only 2 elements. This phenomenon contrasts sharply with those of finite-type branching processes. Our result takes one step forward on the related conjecture on the fixed points of infinite-dimensional generating functions in literatures.

LOCAL TIME OF TRANSIENT RANDOM WALK ON THE LATTICE OF POSITIVE HALF LINE

Huaming Wang *Anhui Normal University*, E-mail: huamingking@mail.bnu.edu.cn

Abstract: Consider spatially inhomogeneous random walks on the lattice of positive half line. Fix a positive integer a. Let C be the collection of points at which the local times of the random walk are exactly a. We give a criterion to tell whether C is a finite set or not. Our result answer an open problem proposed by E. Csáki, A. Földes, P. Révész [J. Theoret. Probab. 23 (2) (2010) 624-638]. When $a = 1$, C is just the set of strong cutpoints studied in the above mentioned paper. By a moment method, when the local drift of the walk at $i \geq 1$ is $1/i$, we show that $2|C \cap [0,n]|/\log n \to S$ in distribution as $n \to \infty$, where S is an exponentially distributed random variable with $P(S > t) = e^{-t},\ t > 0$.

THE EQUILIBRIUM STRATEGY OF A RANDOM ARRIVAL PROCESS

Chia-Li Wang *National Dong Hwa University, Hualien*, E-mail: cwang@mail.ndhu.edu.tw

Abstract: The surge of service and commerce platforms, such as e-commerce and internet-of-things, have rapidly changed our lives. To avoid the congestion and get the task done in the platform becomes a common problem that requires users to make decisions of when to enter the platform.

We consider a simple platform that is composed of random numbers of buyers and sellers for some item. Upon a trade, the buyer and the seller gain respective profits, yet they pay the

cost of waiting in the platform. So, both buyers and sellers can choose their entering times to maximize respective expected payoffs. This creates an interesting and practical framework of a game that is played among buyers, among sellers, and between them. Hence, the strategy employed by a player is not only against players of its type, but also a response to those of the other type.

The players' best response, a Nash equilibrium (NE) strategy profile is derived by a pair of differential equations, and shown to exist uniquely. From its structure, valuable insights of how the entering strategy of one side (buyers or sellers) is affected by the entering behavior of the other side are gained. Further comparisons between the social welfares (the sum of the payoffs incurred by individual participants) obtained by the optimal strategy and by the NE strategy, the price of anarchy, will show the efficiency loss relative to the socially optimal solution.

Chung-type law of the iterated logarithm for the bifractional Brownian motion at the origin

Ran Wang *Wuhan University, Wuhan*, E-mail: wangran@ustc.edu.cn

Abstract: For any given constants $H \in (0,1)$ and $K \in (0,2)$, the bifractional Brownian motion is a centered Gaussian process with covariance function

$$R^{H,K}(s,t) := (t^{2H} + s^{2H})^K - |t-s|^{2HK}.$$

We prove the existence of the small ball constant for the bifractional Brownian motion, and establish Chung's laws of the iterated logarithm at the origin when $H \in (0,1)$ and $K \in (1,2)$ with $HK \in (0,1)$ or $H = 1/2$ and $K \in (1/2,1)$.

This is a joint work with Ciprian A. TUDOR and Yimin XIAO.

EXPONENTIAL AND STRONG ERGODICITY FOR TIME-CHANGED SYMMETRIC STABLE PROCESSES

Tao Wang *Jiangsu Normal University*, E-mail: wang_tao@mail.bnu.edu.cn

Abstract: We obtain explicit criteria for both exponential ergodicity and strong ergodicity for time-changed symmetric α-stable processes with $\alpha \in (1,2)$. Explicit lower bounds for ergodic convergence rates are given. Our proofs are based on the estimates for the first Dirichlet eigenvalues and Green functions of killed processes.

ON VISCOSITY AND DISTRIBUTION SOLUTIONS TO PDES WITH NEUMANN BOUNDARY CONDITIONS

Jing Wu *Sun Yat-sen University*, E-mail: wjjosie@hotmail.com

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

TRANSPORTATION-COST INEQUALITY ON GAUSSIAN PATH SPACE

Bo Wu *Fudan University*, E-mail: wubo@fudan.edu.cn

Abstract: In this talk, we will first introduce quasi-invariant theorems and Logarithmic Sobolev inequalities on Gaussian path spaces. And by which we will establish transportation-cost inequality with respect to Gaussian Wiener measure on this space.

MULTIPLE SLE AND DYSON BROWNIAN MOTION

Hao Wu *Tsinghua University*, E-mail: haowu@mail.tsinghua.edu.cn

Abstract: Under a proper parameterization, the driving function of multiple SLE becomes Dyson Brownian motion. In this talk, we explain the connection between multiple SLE and Dyson Brownian motion, and give some application.

Sharp Bernstein's inequality and applications to machine learning

Liming Wu *l'Université Clermont-Auvergne/Harbin Institute of Technology*, E-mail: wuliming@hit.edu.cn

Abstract: We present some probabilistic problems related with the empirical risk principle (ERP) in Machine Learning (ML). By proving some sharp Bernstein's inequality, we give a dimension-free lower bound of the minimal error of a learning machine with high confidence level.

We present also some results and reflections about the corresponding upper bound ensuring the efficiency of a learning machine, basing on Talagrand's concentration inequality and VC dimension.

CONVERGENCE AND EXPONENTIAL ERGODICITY OF REGIME-SWITCHING STOCHASTIC FUNCTIONAL DIFFERENTIAL EQUATIONS WITH INFINITE DELAY

Fubao Xi *Beijing Institute of Technology, Beijing*, E-mail: xifb@bit.edu.cn

Abstract: In this work we consider a class of regime-switching stochastic functional differential equations with infinite delay, in which the switching component may have finite or countably infinite many states. We first establish the existence and uniqueness of the underlying process by an interlacing procedure. Under suitable conditions, we then investigate the convergence of both the solution $X(t)$ and the solution map X_t. We show that two solutions (resp. solution maps) from different initial data living in the same initial switching regime will be close with high probability as time variable tends to infinity. Moreover, we prove the existence and uniqueness

of the invariant probability measure of two-component Markov-Feller process $(X_t, \Lambda(t))$, and establish the exponential ergodicity for this process under Wasserstein distance.

LARGE DEVIATION EXPANSIONS FOR THE COEFFICIENTS OF RANDOM WALKS ON THE GENERAL LINEAR GROUP

Hui Xiao *Chinese Academy of Sciences*, E-mail: xiaohui@amss.ac.cn

Abstract: Consider $(g_n)_{n\geq 1}$ a sequence of independent and identically distributed random matrices and the left random walk $G_n := g_n \dots g_1$ on the general linear group $GL(d, \mathbb{R})$. Under suitable conditions, we establish Bahadur-Rao-Petrov type large deviation expansions for the coefficients $\langle f, G_n v\rangle$ of the product G_n, where $v \in \mathbb{R}^d$ and $f \in (\mathbb{R}^d)^*$. In particular, we obtain an explicit rate function in the large deviation principle, thus improving significantly the known large deviation bounds. Moreover, we prove local limit theorems with large deviations for the coefficients, and large deviation expansions under Cramér's change of probability measure. For the proofs we establish the Hölder regularity of the invariant measure of the Markov chain $(\mathbb{R}G_n v)$ under the changed probability, which is of independent interest. Joint work with I. Grama and Q. Liu.

华罗庚经济优化新理论

Yingchao Xie *Jiangsu Normal University*, E-mail: 6019820127@jsnu.edu.cn

Abstract: 介绍华老关于经济最优化的探索及仙逝前的重要更新，该结果沉睡37年后才被陈木法院士唤醒。上世纪80年代末，陈先生就开始华氏经济最优化理论的研究。2021年11月，他发现了华老最后更新中的过失，并对其进行更新，发展了新的理论和算法，具体的有一次修正、一次再更新和五次新发展:稳定性分析的新方法;产品(产业)等级(排序);预测与调整;经济结构优化;重排序与大矩阵主特征值的高效算法。难得的是，多种变换给出完全相同的非稳定性时间和产品。上世纪90年代初，陈先生利用马氏链的遍历性证明了华老的经济崩溃定理，最近的全部成果都是基于马氏链的转移概率矩阵。这些成果已被应用于我国国家级和省级的投入产出表，检验了理论的合理性和可靠性。

STABLE CENTRAL LIMIT THEOREM AND ITS CONVERGENCE RATE

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Abstract: We will first review the stable central limit theorem and its convergence rate in the Kolmogorov distance, then talk the very recent development about this theorem in the Wasserstein-1 distance and the total variation distance. Our method is via a recently developed probability approximation frame. This talk is based on the joint works with Peng Chen, Ivan Nourdin, Qi-Man Shao, Xiaochuan Yang, and Rui Zhang.

PARAMETER ESTIMATION OF STOCHASTIC HEAT EQUATION

Litan Yan *Donghua University*, E-mail: litanyan@dhu.edu.cn

Abstract: In this talk, we consider parameter estimation of stochastic heat equation with fractional noise by using the least squares method and weighted-quadratic variations.

MEAN-FIELD STOCHASTIC DIFFERENTIAL EQUATIONS DRIVEN BY G-BROWNIAN MOTION

Fenfen Yang *Shanghai University*, E-mail: yangfenfen@shu.edu.cn

Abstract: In this paper, by utilizing the Banach fixed point theorem, the existence and uniqueness of the solution for the mean-field stochastic differential equations driven by G-Brownian motion (mean-field G-SDEs) are investigated. Moreover, by the method of coupling by change of measures, the Harnack and log-Harnack inequalities for mean-field G-SDEs are established.

WELL-POSEDNESS OF THE MARTINGALE PROBLEM FOR SUPER-BROWNIAN MOTION WITH INTERACTIVE BRANCHING

Xu Yang *Northern University for Nationalities*, E-mail: xuyang@mail.bnu.edu.cn

Abstract: In this talk a martingale problem for super-Brownian motion with interactive branching is derived. The uniqueness of the solution to the martingale problem is obtained by using the pathwise uniqueness of the solution to a corresponding system of SPDEs with proper boundary conditions. The existence of the solution to the martingale problem and the local Hölder continuity of the density process are also studied.

CONDITIONAL CENTRAL LIMIT THEOREM FOR SUBCRITICAL BRANCHING RANDOM WALK

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Abstract: Consider a subcritical branching random walk on $\mathbb{R}$. Let $Z_n(A)$ be the number of the individuals in the n-th generation located in $A \in \mathcal{B}(\mathbb{R})$, and $N_n := Z_n(R)$ denote the size of n-th generation. Under some conditions, we prove that when $0 < \mathbf{E}N_1 = m < 1$, for all $x \in \mathbb{R}$, as $n \to \infty$,

$$\mathcal{L}\left(Z_n((-\infty, \sqrt{n}x]) \mid N_n > 0\right) \Longrightarrow \mathcal{L}(\xi \mathbf{1}_{\{\mathcal{N} \le x\}}),$$

where $\Rightarrow$ means convergence in law, ξ is the Yaglom limit of the Galton-Watson process $\{N_n; n \ge 0\}$ conditioned on non-extinction, $\mathcal{N}$ is a standard normal random variable and independent of ξ . This is a joint work with Wenming Hong.

DISTRIBUTION DEPENDENT SDES DRIVEN BY FRACTIONAL BROWNIAN MOTION

Chenggui Yuan *Swansea Universtiy, UK*, E-mail: c.yuan@swansea.ac.uk

Abstract: In this talk, we present small-noise asymptotic behaviors for a class of distribution dependent stochastic differential equations driven by fractional Brownian motions with Hurst parameter $H \in (1/2, 1)$ and magnitude ϵ^H. By building up a variational framework and two weak convergence criteria in the factional Brownian motion setting, we establish the large and moderate deviation principles for these types of equations. Besides, we also obtain the central limit theorem, in which the limit process solves a linear equation involving the Lions derivative of the drift coefficient.

IRREDUCIBILITY OF SPDES DRIVEN BY PURE JUMP NOISE

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Abstract: The irreducibility is fundamental for the study of ergodicity of stochastic dynamical systems. In the literature, there are very few results on the irreducibility of stochastic partial differential equations (SPDEs) and stochastic differential equations (SDEs) driven by pure jump noise. The existing methods on this topic are basically along the same lines as that for the Gaussian case. They heavily rely on the fact that the driving noises are additive type and more or less in the class of stable processes. The use of such methods to deal with the case of other types of additive pure jump noises appears to be unclear, let alone the case of multiplicative noises.

We develop a new, effective method to obtain the irreducibility of SPDEs and SDEs driven by multiplicative pure jump noise. The conditions placed on the coefficients and the driving noise are very mild, and in some sense they are necessary and sufficient. This leads to not only significantly improving all of the results in the literature, but also to new irreducibility results of a much larger class of equations driven by pure jump noise with much weaker requirements than those treatable by the known methods. As a result, we are able to apply the main results to SPDEs with locally monotone coefficients, SPDEs/SDEs with singular coefficients, nonlinear Schrodinger equations, Euler equations etc. We emphasize that under our setting the driving noises could be compound Poisson processes, even allowed to be infinite dimensional. It is somehow surprising.

MULTI SOLITARY WAVES TO STOCHASTIC NONLINEAR SCHROEDINGER EQUATIONS

Deng Zhang *Shanghai JiaoTong University*, E-mail: dzhang@sjtu.edu.cn

Abstract: In this talk we will present the recent work on the multi solitary waves to stochastic nonlinear Schr´odinger equations driven by linear multiplicative noise, in both the mass-critical and subcritical cases. Unlike in the deterministic case, the existence of stochastic multi-solitons cannot be obtained from that of stochastic multi-bubble blow-up solutions, due to the absence of pseudo-conformal invariance. We present a constructive proof by utilizing the rescaling approach and the modulation method. The constructed multi-solitons behave asymptotically as a sum

of finitely many solitary waves, and the convergence rate of the remainders can be of either exponential or polynomial type, which reflects the effects of noise on the asymptotical behavior of solutions.

SOME NON-UNIQUENESS RESULTS ON STATIONARY DISTRIBUTIONS FOR MCKEAN-VLASOV SDES

Shaoqin Zhang *Central University of Finance and Economics*, E-mail: zhangsq@cufe.edu.cn

Abstract: The existence of several stationary distributions is referred to as the phase transition. We discuss some results on the existence, non-uniqueness and bifurcation on stationary distributions for McKean-Vlasov stochastic differential equations.

STOCHASTIC HEAT EQUATIONS ON MOVING DOMAINS

Tusheng Zhang *University of Science and Technology of China, Hefei*, E-mail: Tusheng.Zhang@manchester.ac.uk

Abstract: In this talk, I will present a recent work on the well-posedness of stochastic heat equations on moving domains. This amounts to solving a system of interacting , infinitely many stochastic differential equations.

ON MARKOV DECISION PROCESSES WITH A CEMETERY

Yi Zhang *University of Birmingham, UK*, E-mail: y.zhang.29@bham.ac.uk

Abstract: We consider a Markov decision process (MDP) with a Borel state space $\mathbf{X} \cup \{\Delta\}$, where Δ is an absorbing state (cemetery), and a Borel action space $\mathbf{A}$. We consider the space of finite occupation measures restricted on $\mathbf{X} \times \mathbf{A}$, and the extreme points in it. It is possible that some strategies have infinite occupation measures. Nevertheless, we prove that every finite extreme occupation measure is generated by a deterministic stationary strategy. Then, for this MDP, we consider a constrained problem with total undiscounted criteria and J constraints, where the cost functions are nonnegative. By assumption, the strategies inducing infinite occupation measures are not optimal. Then, our second main result is that, under mild conditions, the solution to this constrained MDP is given by a mixture of no more than $J + 1$ occupation measures generated by deterministic stationary strategies.

PERIODIC MEASURES AND WASSERSTEIN DISTANCE FOR ANALYSING PERIODICITY OF TIME SERIES DATASETS

Huaizhong Zhao *Durham University/Shandong University*, E-mail: huaizhong.zhao@durham.ac.uk

Abstract: In this talk, I will talk about the results in a new paper, jointly written with Chunrong Feng and Yujia Liu, mainly on the probability foundation of the periodic measure approach inanalysing periodicity of a dataset. It is based on recent work of random periodic processes. While random periodic paths provide a pathwise model for time series datasets with a periodic pattern, their law is a periodic measure and gives a statistical description and the ergodic theory offers a scope of statistical analysis. The connection of a sample path and the periodic measure is revealed in the law of large numbers (LLN). We prove first the period is actually a deterministic number and then for discrete processes, Bézout's identity comes in naturally in the LLN along an arithmetic sequence of an arbitrary increment. The limit is a periodic measure whose period is equal to the greatest common divisor between the test period and the true period of the random periodic process. This leads to a new scheme of detecting random periodicity of a dataset and finding its period, as an alternative to the Discrete Fourier Transformation (DFT) and periodogram approach. We find that in some situations, the classical method does not work robustly, but the new one can work efficiently. We prove that the periodicity is quantified by the Wasserstein distance, in which the convergence of empirical distributions is established.

GLOBAL WELL-POSEDNESS AND REGULARITY OF 3D STOCHASTIC BURGERS EQUATIONWITH RANDOM INITIAL DATA

Guoli Zhou *Chongqing University*, E-mail: zhouguoli736@126.com

Abstract: Global well-posedness for 3D deterministic Burgers equation with $\mathbb{L}^2(\mathbb{T}^3;\mathbb{R}^3)$ valued initial data is not solved. Here, by a suitable randomization for the initial data in $\mathbb{L}^2(\mathbb{T}^3;\mathbb{R}^3)$, we are able to establish the local existence and uniqueness of weak solutions for random 3D Burgers equation. Then by developing a regularization random system, we obtain the uniform a priori estimates for the solutions to random 3D Burgers equation, which leads to the global existence of the weak solutions to this random equation.

In addition, we also establish the backward uniqueness for the random 3D Burgers equation. That is, if two solutions intersect at some time $t(> 0)$, then the two solutions are equal before t. This is a new result even for the deterministic 3D Burgers equation.

As an application of the regularities of the random 3D Burgers equation, we establish the global existence, the uniqueness and the backward uniqueness of the weak solutions to 3D Burgers equation driven by additive noise in $\mathbb{L}^2(\mathbb{T}^3;\mathbb{R}^3)$.

If the random initial data is in $\mathbb{H}^2(\mathbb{T}^3;\mathbb{R}^3)$, we further prove the global existence, the uniqueness, the backward uniqueness and the stability of the solutions to 3D Burgers equation with linear multiplicative noise.

华氏经济优化新理论的实证案例

Qin Zhou *Jiangsu Normal University*, E-mail: graceqinzhou@jsnu.edu.cn

Abstract: 本文是关于华罗庚经济最优化新理论的实证案例, 主要研究2007年、2012年和2017年中国投入产出模型的稳定性分析、产品排序与分类、预测与调整和结构优化等问题; 并将这三个年度投入产出模型的产品排序与分类进行对比分析. 所得结果展示出三个年度、跨越 15 年的产品等级排序和分类的令人吃惊的相似性, 显示出华罗庚经济最优化新理论的可靠性.

SPEED OF EXPLOSION FOR CSBP WITH NONLINEAR BRANCHING

Xiaowen Zhou *Concordia University, CA*, E-mail: xiaowen.zhou@concordia.ca

Abstract: Continuous-state branching processes (CSBPs) with nonlinear branching mechanism can be obtained from spectrally positive Lévy processes by generalized Lamperti time changes. These generalized CSBPs allow rich asymptotic behaviours such as extinction, explosion and coming down from infinity. The explosion behaviours for nonlinear CSBPs have been studied in Li and Zhou (2021) when the big jumps of the process have a finite first moment. In this talk we further consider the explosion behaviours for such processes with jumps of infinite first moment. In particular, we identify the speed of explosion when the associated Laplace exponent and rate function are both regularly varying. This talk is based on joint work with Clement Foucart and Bo Li.

ON SOME ERGODIC IMPULSE CONTROL PROBLEMS WITH APPLICATIONS

Chao Zhu *University of Misconsin-Milwasukee, USA*, E-mail: zhu@uwm.edu

Abstract: This work is focused on some ergodic impulse control problems in which the underlying controlled process between impulses is described by a diffusion process, and a long-term average cost criterion is used to evaluate decisions. We will first present a construction of the probability measure on the path space for an admissible intervention policy subject to a randomized impulse mechanism and identifies classes of impulse policies under which the resulting controlled process is Markov or the paths between interventions are independent and identically distributed following the initial cycle.

We will next study two impulse control problems. The first one deals with single-item continuous review inventory models with random supplies. Using average expected occupation and (nominal) ordering measures and weak convergence arguments, conditions will be given for the optimality of an (s_*, S_*) ordering policy in the general class of policies. The second problem studies an optimal harvesting problem with mean field interactions and derives conditions under which a mean field equilibrium strategy exists.

This is a joint work with Kurt Helmes (Humboldt University of Berlin) and Richard Stockbridge (University of Wisconsin-Milwaukee).

STABILITY AND CONTROL OF STOCHASTIC HIGHLY NONLINEAR DELAY SYSTEMS WITH NEUTRAL-TERM

Quanxin Zhu *Hunan Normal University*, E-mail: zqx22@126.com

Abstract: In this report, we introduce a class of stochastic highly nonlinear delay systems with neutral-term, which does not satisfy the linear growth condition. Under the local Lipschtiz condition and the polynomial growth condition, we study the existence and uniqueness as well as boundedness of global solution for stochastic highly nonlinear delay systems with neutral-term. By designing a discrete-time feedback control function, the stabilization of stochastic highly nonlinear delay systems with neutral-term is presented. Different from the previous literature,

our discrete-time feedback control function depends on Markov switching signals with a delay. An illustrative example is given to show the effectiveness of the obtained results.

THE ASYMPTOTIC BEHAVIORS FOR SUPER-BROWNIAN MOTION WITH ABSORPTION

Yaping Zhu *Peking University*, E-mail: zhuyp@pku.edu.cn

Abstract: Consider a one-dimensional superprocess with a supercritical branching mechanism ψ, where particles move as a Brownian motion with drift $-\rho$ and are killed when they reach the origin. It is known that the process survives with a positive probability if and only if $\rho < \sqrt{2\alpha}$ where $\alpha = -\psi'(0)$. When $\rho > \sqrt{2\alpha}$, we obtain a large-time asymptotic formula for the survival probability.

Furthermore, we investigate the decay rate of the probability that the supremum of the support deviates from its limit value for $\rho < \sqrt{2\alpha}$. As a by-product, the related Yaglom-type conditional limit theorem is obtained.

Moreover, we study the tail distribution of mass on the exit measure associated with the absorption. The key step is to analyze the asymptotic properties of the cumulant semigroup near the singularity. Based on the joint work with Zenghu Li.

Abstracts of Posters:

Milstein schemes for delay stochastic differential equations

Jiaqing Hao *Tianjin University*, E-mail: hjq_0227@tju.edu.cn

Abstract: We construct Milstein schemes for a kind of stochastic differential equations with a finite time lag or distribution memory term, possible with super-linear growth drift term. We further prove strong convergence of order one, making use of functional Itô calculus.

HJB equations with Hölder coefficients and optimal portfolio problem with stochastic volatility models

Jianrui Li *Tianjin University*, E-mail: jianruili@tju.edu.cn

Abstract: This work first studies the optimal control problem associated with diffusion processes with Hölder continuous coefficients. Based on Meyer-Tanaka's formula, we establish an estimate on the local time of diffusion processes, which enables us to characterize the value function as a unique solution of certain HJB equation. Then we investigate the optimal portfolio problem with stochastic volatility models associated with objective functions including terminal reward and cumulative reward. In this situation, besides dealing with the Hölder continuous coefficients, we also overcome the difficulty caused by the super-linear drift of the wealth process.

Littlewood–Paley–Stein Square Functions for the Fractional Discrete Laplacian on Lattices

Liying Mu *Tianjin University*, E-mail: mly18822136120@163.com

Abstract: The square function is an important research object in harmonic analysis, and has important applications in Riesz transforms, Fourier multipliers, partial differential equations, and so on. It corresponding to the quadratic variation of predictable martingales in probability theory. This paper mainly considers the "vertical" Littlewood–Paley–Stein square function associated with the fractional discrete Laplacian on the one-dimensional lattices $\mathbb{Z}$. When $q \in [2, \infty)$, we construct the corresponding predictable martingale and apply martingale inequalities to prove the l^q boundedness of the Littlewood–Paley–Stein square function. When $q \in (1, 2]$, we further develop E.M. Stein's method to prove the l^q boundedness of the modified Littlewood–Paley–Stein square function. For the latter, we construct a counterexample to show that this modified square function is necessary. Furthermore, when $q \in (1, 2]$, to demonstrate the robustness of the method used, we also extend the results to a class of non-local Schrödinger operators.

This is a joint work with Huaiqian Li.

From the optimal singular stochastic control to the optimal stopping for regime-switching processes

Taoran Tian *Tianjin University*, E-mail: Tiantr@tju.edu.cn

Abstract: This work generalizes the connection between optimal singular stochastic control problem and optimal stopping problem for regime-switching processes. Via the optimal singular stochastic control, the optimal stopping time and the continuation region are characterized. Moreover, we prove the existence of optimal singular stochastic control for a finite horizon singular control problem with the cost function containing the terminal cost. We prove it directly by the compactification method, which is based on an elaborate application of the properties of probability measures over the càdlàg space. Such a problem cannot be solved by the compactification method developed by Haussmann and Suo (SICON, 1995). Also, we do not use any convexity condition on the coefficients as in Dufour and Miller (SICON, 2004).

Conditional McKean-Vlasov SDEs with jumps and Markovian regime-switching: Wellposedness, Propagation of chaos, Averaging principle

Shen Wang *Civil Aviation University of China*, E-mail: wangs@cauc.edu.cn

Abstract: We consider the conditional McKean-Vlasov SDEs(MKV SDEs) with jumps and Markovian regime-switching, and use the L^2-Wasserstein distance to measure the regularity of the coefficients in the probability measure argument. Also, we establish the propagation of chaos for the associated mean-field interaction particle system with common noise and provide an explicit bound on the convergence rate. Furthermore, an averaging principle is established for two time-scale conditional McKean-Vlasov equations.

Well-posedness for path-distribution dependent SDEs with singular drifts

Xiaoyu Zhao *Tianjin University*, E-mail: zhxy_0628@tju.edu.cn

Abstract: In this paper, the well-posedness is derived for singular path-distribution dependent stochastic differential equations (SDEs) with non-degenerate noise, where the drift is allowed to be singular in the current state, but maintains local Lipschitz continuity in the historical path, and is Lipschitz continuous with respect to a weighted variation distance in the distribution variable. Notably, this result is new even for classical path-dependent SDEs. Moreover, by strengthening the local Lipschitz continuity to Lipschitz continuity and substituting the weighted variation distance with the Wasserstein distance, we also obtain the well-posedness.

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