

# 会议须知

## 一、会议宗旨

为促进随机偏微分方程及相关领域的发展，加强相关专家学者之间的交流与合作，共同探讨随机分析的最新理论和应用成果，兹定于 2026 年 8 月 24-26 日在安徽合肥举办“随机偏微分方程及相关领域青年学者研讨会”。

## 二、会议信息

**会议时间：** 2026 年 8 月 24-26 日

**住宿地点：** 悦雅江南春酒店（合肥中科大店）

**会议地点：** 中国科学技术大学东校区第五教学楼 5106 教室

## 三、组织委员会

翟建梁    尚世界    杨赛赛

会议联系人：卢珊珊 18256524983

## 四、主办单位及资助单位

中国科学技术大学

国家自然科学基金委面上项目

国家重点研发计划

# 会议总日程表

报告地点：科大东区第五教学楼5106教室

|               |             |                                                                                                       |            |
|---------------|-------------|-------------------------------------------------------------------------------------------------------|------------|
| 8月 25日        |             |                                                                                                       |            |
| 08:30 – 09:05 | 马杰          | An exponential improvement for Ramsey lower bounds (and beyond)                                       | 主持人<br>张土生 |
| 09:05 – 09:40 | 吴付科         | Two-time-scale McKean--Vlasov Systems                                                                 |            |
| 09:40 – 10:00 | 休息          |                                                                                                       |            |
| 10:00 – 10:35 | 邵井海         | Permanence and extinction in periodic stochastic competitive Lotka-Volterra system                    | 主持人<br>翟建梁 |
| 10:35 – 11:10 | 刘伟          | Functional inequalities for mean-field interacting particle systems and McKean–Vlasov SDEs            |            |
| 11:10 – 11:45 | 何辉          | Limit of Brownian trees with exponential weight on its height                                         |            |
| 11:50 – 14:30 | 午餐（校内专家楼）   |                                                                                                       |            |
| 14:30 – 15:05 | 杜恺          | Sharp convergence rates for a self-reinforced return process toward quasi-stationary distributions    | 主持人<br>吴付科 |
| 15:05 – 15:40 | 巫静          | On stochastic functional differential equations with reflection: well-posedness and Markov property   |            |
| 15:40 – 16:00 | 休息          |                                                                                                       |            |
| 16:00 – 16:35 | 黄璐静         | Spectral dimensions for one-dimensional critical long-range percolation                               | 主持人<br>邵井海 |
| 16:35 – 17:10 | 彭旭辉         | Ergodicity for 2D Navier-Stokes equations with a degenerate pure jump noise                           |            |
| 17:10 – 17:45 | 杨赛赛         | Small-time annealed large deviations principle for one-dimensional diffusions in a random environment |            |
| 18:00 –       | 晚宴（悦雅江南春酒店） |                                                                                                       |            |

|                  |           |                                                                                                                                     |            |
|------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------|------------|
| 8月 26日           |           |                                                                                                                                     |            |
| 08:30 – 09:05    | 张登        | Continuous energy solutions and Lagrangian chaos associated to stochastic Navier-Stokes equations                                   | 主持人<br>杨赛赛 |
| 09:05 – 09:40    | 赵国焕       | Phase transition properties of distributions of drifted Brownian motions                                                            |            |
| 09:40 – 10:00    | 休息        |                                                                                                                                     |            |
| 10:00 – 10:35    | 石权        | 嵌入布朗局部时的稳定Levy过程                                                                                                                    | 主持人<br>张登  |
| 10:35 – 11:10    | 廖华夫       | Robust mean field control: an application to optimal execution under composite uncertainty                                          |            |
| 11:10 – 11:45    | 尚世界       | Transportation-cost inequalities for invariant measures of stochastic reaction-diffusion equations driven by space-time white noise |            |
| 11:50 –          | 午餐（校内专家楼） |                                                                                                                                     |            |
| 8月26 日    下午自由讨论 |           |                                                                                                                                     |            |

# 报告摘要

报告题目：An exponential improvement for Ramsey lower bounds (and beyond)

报告人：马杰 中国科学技术大学

摘要：

Abstract: We prove a new lower bound on the Ramsey number  $r(\ell, C\ell)$  for any constant  $C > 1$  and sufficiently large  $\ell$ , showing that there exists  $\varepsilon(C) > 0$  such that  $r(\ell, C\ell) \geq \left(p_C^{-1/2} + \varepsilon(C)\right)^\ell$ , where  $p_C$  denotes the unique solution in  $(0, 1/2)$  satisfying  $C = \log p_C / \log(1 - p_C)$ . This provides the first exponential improvement over the classical lower bound by Erdős since 1947. We will also aim to discuss some recent development related to this approach. Joint work with Wujie Shen and Shengjie Xie.

报告题目：Two-time-scale McKean--Vlasov systems

报告人：吴付科 华中科技大学

摘要：

This paper is concerned with the averaging principle for a class of two-time-scale McKean--Vlasov stochastic differential equations. The study is largely motivated by the current trend in analyzing mean-field control and game problems in which McKean--Vlasov equations need to be treated. The system under consideration consists of a slow component and a fast component. A salient feature here is that both the fast and slow dynamics depend on the distribution of the slow component. The time scale separation is used either because of the systems inherently involving two-time scales or being introduced as a way to reduce computational complexity. Using probabilistic methods, in particular, weak convergence methods, we obtain averaging principles. The main difficulty lies in the low regularity of the coefficients together with the absence of dissipativity for the fast dynamics. To overcome these difficulties, we establish several tightness results and extend the occupation measure approach to the McKean--Vlasov setting. In addition, we prove the continuity of the averaged coefficients, which is interesting in its own right. Combining the martingale problem formulation with a suitable frozen variable procedure, we then establish the desired averaging principle. Finally, we provide explicit conditions ensuring that the assumptions imposed on the system are satisfied. In particular, the classical dissipative condition and the partially dissipative condition both fall within our framework as special cases.

报告题目：Permanence and extinction in periodic stochastic competitive Lotka-Volterra system

报告人：邵井海 天津大学

摘要:

This work studies the extinction problem for stochastic Lotka-Volterra models with periodic coefficients, in the almost sure convergence sense. The species are classified into three categories: those whose inherent stochastic fluctuations inevitably lead to extinction; those that inevitably go extinct due to a combination of stochastic fluctuations and interspecific competition; and those that may either go extinct or persist, requiring further analysis to determine their asymptotic behavior. Explicit conditions are provided to ensure the persistence of one species or multiple species. Moreover, the limit processes are also characterized when the species is persistent. Examples are constructed to illustrate the application of the derived criteria and their accuracy.

报告题目: Functional inequalities for mean-field interacting particle systems and McKean–Vlasov SDEs

报告人: 刘伟 武汉大学

摘要:

In this talk, we will show various functional inequalities for mean-field interacting particle systems and McKean–Vlasov SDEs under non-globally dissipative conditions. These inequalities include Poincaré, transportation, logarithmic Sobolev, concentration, and covariance inequalities. They provide powerful tools for characterizing exponential ergodicity, concentration phenomena, and error analysis for stochastic particle algorithms.

报告题目: Limit of Brownian trees with exponential weight on its height

报告人: 何辉 北京师范大学

摘要:

Given a Brownian CRT, by putting exponential weights on its height and conditioning the size of the tree to go to infinity, we obtain kinds of local limits according to the form of the weights. The talk is based on joint works with Abraham, Delmas and Unel.

报告题目: Sharp convergence rates for a self-reinforced return process toward quasi-stationary distributions

报告人: 杜恺 复旦大学

摘要:

We study a self-reinforced return process for approximating the quasi-stationary distribution of a diffusion killed at the boundary. After each absorption, the process is restarted according to its accumulated occupation measure. For bounded smooth domains in dimensions two and three, we establish matching upper and lower bounds for both the mean-square  $H^{-1}$  and

the 2-Wasserstein distance. The convergence rate is determined by the relative spectral gap between the first two Dirichlet eigenvalues and exhibits slow, critical, and fast regimes. The proof combines projective spectral coordinates, a weighted random clock, one-excursion negative-energy estimates, and weighted transport arguments.

报告题目: On stochastic functional differential equations with reflection: well-posedness and Markov property

报告人: 巫静 中山大学

摘要:

In this talk we are concerned with well-posedness of weak and strong solutions, Markov property for a type of stochastic functional differential equations with reflections, which generalizes reflected SDEs with and without delay, and reflected SDEs with path-dependent coefficients.

报告题目: Spectral dimensions for one-dimensional critical long-range percolation

报告人: 黄璐静 福建师范大学

摘要:

Consider critical long-range percolation on  $\mathbb{Z}$ , where an edge connects  $i$  and  $j$  independently with probability  $1 - \exp\{-\beta \int_{i+1}^{i+2} \int_{j+1}^{j+2} |u-v|^{-2} du dv\}$  for  $|i-j| > 1$  for some fixed  $\beta > 0$  and with probability 1 for  $|i-j| = 1$ .

We prove that both the quenched and annealed spectral dimensions of the associated simple random walk are  $2/(1+\delta)$ , where  $\delta \in (0,1)$  (depending only on  $\beta$ ) is the exponent of the effective resistance in this model, as derived in [Theorem 1.1]{DFH25+}.

报告题目: Ergodicity for 2D Navier-Stokes equations with a degenerate pure jump noise

报告人: 彭旭辉 湖南师范大学

摘要:

We establish the ergodicity for stochastic 2D Navier-Stokes equations driven by a highly degenerate pure jump Levy noise. The noise could appear in as few as four directions. The case of Gaussian noise was treated in Hairer and Mattingly [Ann. of Math., 164(3):993--1032, 2006]. To obtain the uniqueness of invariant measure, we use Malliavin calculus and anticipating stochastic calculus to establish the equi-continuity of the semigroup, the so-called e-property, and prove some weak irreducibility of the solution process. This talk is based on a joint work with Jianliang Zhai and Tusheng Zhang.

报告题目：Small-time annealed large deviations principle for one-dimensional diffusions in a random environment

报告人：杨赛赛 中国科学技术大学

摘要：

In this talk, we prove the small-time annealed path large deviation principle for one-dimensional diffusions in a random environment with generator

$$\begin{equation} \{\mathcal{L}_W f(x) = e^{-\rho(x, W)} \operatorname{bigl}(e^{a(x, W)} f(x) \bigr)'. \end{equation}$$

Our primary interest lies in the case where the coefficients  $\{\rho(x, \cdot) : x \in \mathbb{R}\}$  and  $\{a(x, \cdot) : x \in \mathbb{R}\}$  are random. We assume that the coefficients  $\rho$  and  $a$  are continuous for each fixed realization of  $W$ , and locally exponentially integrable with respect to the random environment. We do not impose higher regularity or linear growth conditions on the coefficients, which allows our framework to include the Brox diffusion. The Itô-McKean representation of the diffusions, together with the first-exit time estimates that we derive, will play a crucial role.

报告题目：Continuous energy solutions and Lagrangian chaos associated to stochastic Navier-Stokes equations

报告人：张登 上海交通大学

摘要：

In this talk we will show some recent results on stochastic Navier-Stokes equations. More precisely, we will first show that, for arbitrarily prescribed finite energy divergence-free initial data, there exist infinitely many global-in-time weak solutions with continuous energy profiles to both the 3D deterministic and stochastic Navier-Stokes equations. For the critical initial data, we also prove the existence of infinitely many dissipative solutions to the 3D Navier-Stokes and MHD equations.

Furthermore, we consider the Lagrangian flow associated with the 2D Navier-Stokes equations, where the random force is bounded and is highly degenerate, acting only a small number of Fourier modes. We show that the Lagrangian flow exhibits chaotic behavior characterized by the strict positivity of the top Lyapunov exponent.

报告题目：Phase transition properties of distributions of drifted Brownian motions

报告人：赵国焕 中国科学院数学与系统科学研究院

摘要：

In this talk, we study distributional properties of diffusion processes with singular divergence-free drifts. We discuss when the law of such a diffusion is mutually singular with respect to Wiener measure, and when the classical Varadhan formula remains valid at critical

regularity. In particular, we show that the Varadhan formula holds under suitable Lorentz-space assumptions. We also present examples revealing a phase transition: at more singular distributional levels, such as  $W^{-1,\infty}$ , the Euclidean Varadhan constant may fail.

报告题目：嵌入布朗局部时的稳定 Levy 过程

报告人：石权 中国科学院数学与系统科学研究院

摘要：

We construct a random partition of the (local) time-space half-plane  $\mathbb{R}_+ \times \mathbb{R}$ , which is measurable with respect to a single Brownian motion. The construction is driven by two objects canonically associated with this Brownian path: a white noise that drives a pair of coupled squared Bessel flows whose parameters differ by  $\delta \in (0, 2)$ , and a continuous space-filling exploration of the half-plane. Exceptional bifurcation points of the coupled flows generate a random partition of the half-plane, up to a zero-measure gasket, whose widths are given by squared Bessel excursions with negative parameter  $-\delta$ . A suitable time-change of the Brownian exploration arranges these excursions, in exploration order, as marks attached to the jumps of a spectrally positive stable Lévy process of index  $1 + \delta/2$ .

As applications, we recover the interval partition evolutions of Forman et al. (2020) as horizontal slices of our construction, and using this representation we prove the independence between their total mass evolution and normalized partition evolution, as conjectured in the same work. We also prove that the gasket of our partition is homeomorphic to the half-plane analogue of the stable shredded sphere introduced by Björnberg, Curien, and Stefánsson (2022).

Joint work with Elie Aïdékon and Chengshi Wang.

报告题目：Robust mean field control: an application to optimal execution under composite uncertainty

报告人：廖华夫 大连理工大学

摘要：

We provide a framework for robust mean field control problems that describe multi-dimensional optimal liquidation problems under uncertainty from both the underlying stochastic process and the deterministic model parameters. The verification results are established with Hamilton-Jacobi-Bellman-Isaacs (HJBI) equations where the variables are probability measures and the Hamiltonian nonlinearly involves the joint distribution of position and momentum. Using novel a priori estimates, we establish the well-posedness of the HJBI equations featuring general or quadratic Hamiltonians that are neither displacement convex nor concave in their momentum. The a priori estimates and well-posedness results are extended during their application to optimal liquidation problems, where we allow the Hamiltonian to have derivatives of linear growth and solve the constrained multi-dimensional

linear quadratic optimal liquidation problem under composite uncertainty. This talk is based on the joint work with Shuhui Liu, Chenchen Mou and Defeng Sun.

报告题目：Transportation-cost inequalities for invariant measures of stochastic reaction-diffusion equations driven by space-time white noise

报告人：尚世界 中国科学技术大学

摘要：

In this talk, we study transportation-cost inequalities for invariant measures of stochastic reaction-diffusion equations driven by multiplicative space-time white noise. In particular, the transportation-cost inequalities are established with respect to the  $L^1$  metric, the  $L^2$  metric and the uniform metric under different dissipativity strengths of the drift. We first obtain a global-in-time and spatially uniform moment estimate for stochastic convolutions driven by space-time white noise, which is of independent interest. We then establish Lipschitz continuity of the solutions to the associated stochastic controlled equations with respect to the controls with a time-independent Lipschitz constant. Applying this Lipschitz continuity estimate, we finally prove transportation-cost inequalities for the invariant measures of stochastic reaction-diffusion equations.

# 参会人员名单

| 序号 | 姓名  | 单位              |
|----|-----|-----------------|
| 1  | 陈萍  | 合肥工业大学          |
| 2  | 杜恺  | 复旦大学            |
| 3  | 何辉  | 北京师范大学          |
| 4  | 黄璐静 | 福建师范大学          |
| 5  | 李琪  | 中国科学技术大学        |
| 6  | 李月  | 南京理工大学          |
| 7  | 廖华夫 | 大连理工大学          |
| 8  | 廖开屹 | 中国科学技术大学        |
| 9  | 刘孔韬 | 中国科学技术大学        |
| 10 | 刘伟  | 武汉大学            |
| 11 | 马杰  | 中国科学技术大学        |
| 12 | 彭旭辉 | 湖南师范大学          |
| 13 | 任崇阳 | 中国科学技术大学        |
| 14 | 邵井海 | 天津大学            |
| 15 | 尚世界 | 中国科学技术大学        |
| 16 | 石权  | 中国科学院数学与系统科学研究院 |
| 17 | 王鹏宇 | 中国科学技术大学        |
| 18 | 王文楠 | 中国科学技术大学        |
| 19 | 王一多 | 中国科学技术大学        |
| 20 | 魏茸  | 安徽师范大学          |
| 21 | 巫静  | 中山大学            |
| 22 | 吴付科 | 华中科技大学          |
| 23 | 徐诚  | 中国科学技术大学        |
| 24 | 杨浩  | 合肥工业大学          |
| 25 | 杨赛赛 | 中国科学技术大学        |
| 26 | 翟建梁 | 中国科学技术大学        |
| 27 | 张登  | 上海交通大学          |
| 28 | 张土生 | 中国科学技术大学        |
| 29 | 赵国焕 | 中国科学院数学与系统科学研究院 |
| 30 | 赵桃妍 | 中国科学技术大学        |
| 31 | 郑吴亭 | 安徽建筑大学          |