

# “Annual Conference on Probability and Related Topics”

**Hà Nội – 15/12/2021**

## Morning session

**8h55 – 9h00: Opening**

**9h00-9h20: Lương Đức Trọng** (Hanoi National University of Education)

*Strong convergence in infinite time interval of tamed-adaptive Euler-Maruyama scheme for Lévy-driven SDEs with irregular coefficients*

**9h20-9h40: Kiều Trung Thủy** (Hanoi National University of Education)

*Tamed-adaptive Euler-Maruyama approximation for SDEs with locally Lipschitz continuous drift and locally Holder continuous diffusion coefficients*

**9h40-10h00: Nguyễn Văn Quyết** (Institute of Mathematics Hanoi)

*On the universality of the super concentration in the Sherrington -Kirkpatrick spin glass model*

**10h00-10h30: Break**

**10h30-10h50: Nguyễn Thu Hằng** (Hanoi University of Mining and Geology)

*Density estimates for the exponential functionals of fractional Brownian motion*

**11h50-11h10: Hoàng Thị Phương Thảo** (VNU University of Science)

*A Berry-Esseen bound for nonlinear statistics with bounded differences*

**11h10-11h30: Trần Võ Duy** (University of Tours, France)

*On the oscillating random walk: invariant measure and recurrence properties*

## Afternoon session

**13h30-14h10: Ngô Hoàng Long** (Hanoi National University of Education)

*Numerical approximation for some class of non-colliding particle systems*

**14h10-14h50: Tạ Công Sơn** (VNU University of Science)

*The total variation distance between the laws of Malliavin differentiable random variables*

**14h50-15h10: Break**

**15h10 -15h50: Cận Văn Hảo** (Institute of Mathematics Hanoi)

*Asymptotic behavior of first passage time in frog models*

**15h50 - 16h30: Marc Peigné** (University of Tours & IRL FormathVietnam)

*On the affine recursion in dimension  $\geq 2$  in the “centered” case*

***Strong convergence in infinite time interval of tamed-adaptive Euler-Maruyama scheme for Lévy-driven SDEs with irregular coefficients***

**Lương Đức Trọng**

(Hanoi National University of Education)

A tamed-adaptive Euler-Maruyama approximation scheme is proposed for Lévy-driven stochastic differential equations with locally Lipschitz continuous, polynomial growth drift, and locally Holder continuous, polynomial growth diffusion coefficients. The new scheme converges in both finite and infinite time intervals under some suitable conditions on the regularity and the growth of the coefficients.

***Tamed-adaptive Euler-Maruyama approximation for SDEs with locally Lipschitz continuous drift and locally Holder continuous diffusion coefficients***

**Kiều Trung Thủy**

(Hanoi National University of Education)

We propose a tamed-adaptive Euler-Maruyama approximation scheme for stochastic differential equations with locally Lipschitz continuous, polynomial growth drift, and locally Holder continuous, polynomial growth diffusion coefficients. We consider the strong convergence and stability of the new scheme. In particular, we show that under some sufficient conditions for the stability of the exact solution, the tamed-adaptive scheme converges strongly in any infinite time interval.

***On the universality of the superconcentration in the Sherrington-Kirkpatrick's spin glass model***

**Nguyễn Văn Quyết**

(Institute of Mathematics Hanoi)

Superconcentration is the phenomenon that the usual techniques via concentration measures give sub-optimal bounds on the fluctuation of random objects. In this talk, we will present some results on the universality of the superconcentration for the S-K model. Precisely, we will show that the variance of the free energy grows sublinearly in the size of its expectation when: (i) the disordered random variable, say  $y$ , has the first four moments matching to those of the standard normal distribution; or (ii)  $y$  is a smooth Gaussian functional having the symmetric law. This is joint work with V. H. Can and H. S. Vu.

*Density estimates for the exponential functionals of fractional Brownian motion*

**Nguyễn Thu Hằng**

(Hanoi University of Mining and Geology)

We investigate the density of the exponential functional of the fractional Brownian motion. We use the techniques of Malliavin's calculus to obtain a log-normal upper bound for the density.

*A Berry-Esseen bound for nonlinear statistics with bounded differences*

**Hoàng Thị Phương Thảo**

(VNU University of Science)

We provide an explicit Berry-Esseen bound in the central limit theorem for nonlinear statistics with bounded differences. Some examples are provided as well.

*On the oscillating random walk: invariant measure and recurrence properties*

**Trần Võ Duy**

(University of Tours, France)

The aim of this talk is to give an overview of the crossing random walk on  $\mathbb{Z}$ , which has many applications in statistics, information theory, etc,... Firstly, the irreducibility of such kind of process as well as that of its corresponding sub-process, where we consider only states at the crossing times, is taken into account with specific examples. Secondly, in the restricted case, we will discuss the invariant measures of the full process and its sub-process which allow us to propose some moment conditions for recurrence. Finally, we prove the recurrence property of the general case under some sharp moment conditions.

*Numerical approximation for some class of non-colliding particle systems*

**Ngô Hoàng Long**

(Hanoi National University of Education)

This talk considers approximation schemes for some class of non-colliding particle systems defined by stochastic differential equations with singular coefficients. We study the rates of convergence of these schemes in  $L^p$ -norm. This talk is based on several joint works with Dai Taguchi (Okayama University), Luong Duc Trong (HNUE), Do Minh Thang (HNUE).

***The total variation distance between the laws of Malliavin differentiable random variables***

**Tạ Công Sơn**

(VNU University of Science)

In this report, based on the techniques of the Malliavin calculus, we first provide an explicit bound on the difference between two Malliavin differentiable random variables. Then, we apply our bound to estimate the rate of convergence in the the Carathéodory approximation scheme of stochastic differential equations and the total variation distance between the solutions to stochastic Volterra equations and SDEs.

***Asymptotic behavior of first passage time in frog models***

**Cần Văn Hảo**

(Institute of Mathematics Hanoi)

Frog models are simple but well-known models in the study of the spread of infection. In these models, individuals (also called frogs) move on the integer lattice  $\mathbb{Z}^d$  and have one of two states infected (active) and healthy (passive). We assume that at the beginning, there is only one infected frog at the origin, and there are healthy frogs at other sites of  $\mathbb{Z}^d$ . When a healthy frog encounters an infected one, it becomes infected forever. While the healthy frogs do not move, the infected frogs perform independent simple random walks. In this talk, we will discuss on the asymptotic behavior, in particular the law of large numbers, fluctuation, large deviation principles, of the time that a given vertex gets the infection. This talk is based on joint works with Shuta Nakajima (University of Basel) and Naoki Kubota (Nihon University).

***On the affine recursion in dimension  $\geq 2$  in the "centered" case***

**Marc Peigné**

(University of Tours & IRL FormathVietnam)