# Scientific Program of the International Workshop

# "Statistics meets Stochastics"

# November, 26 – 29, 2014, "Snegiri", Moscow Region

*The official language of the workshop is English.*

# Wednesday, 26

**15:30 - 17:00** - **Yu. Davydov (University Lille 1, Lille, France).**

***On convex hulls of sequences of stochastic processes***.


*Summary:*

We are studying the convex hull of $n$ independent copies of a given random process. We prove that for all bounded Gaussian processes with probability 1 there exists a nonrandom limit shape and give its description in terms of the correlation function of the initial process.
It is shown that in non-Gaussian case, in contrast, the typical situation is completely different: the appropriately normalized convex hulls converge weakly to the convex hull of a Poissonian point process, and this random limit shape frequently is a polytope. Some statistical applications will be discussed.


# Thursday, 27

**11:00 – 12:30** - **E. Mammen (Heidelberg University, Germany – HSE, Moscow, Russia)**

***Asymptotics for Stochastic Volatility Models with Application to GARCH-in-Mean Models.***


*Summary:*

The aim of this talk is to develop asymptotic theory for the Quasi-Maximum Likelihood Estimator in GARCH-in-Mean (GARCH-M) models. We will explain why the proof of asymptotic normality is so difficult in this simple classical parametric model. There is a mathematical motivation to look at this model because difficulties in the study of the model come from non stationarities of derivatives of the likelihood function which creates some nonstandard mathematical difficulties. The asymptotics is based on a study of the volatility as process of the parameter. The proof makes use of stochastic recurrence equations for this random function, and uses empirical process theory to localize the problem. The theory does not treat yet all standard specifications of the mean function. The talk reports on joint work with Christian Conrad, Heidelberg


**13:00 – 14:30** - **O. Lepskii (University Aix – Marseille, Marseille, France)**

***Upper functions for $L_p$-norm of kernel type Gaussian processes and its application to the adaptive estimation over the scale of anisotropic Nikolskii* classes.**


*Summary:*

The talk consists of two parts. In the first part we present several constructions of upper functions for the family of $L_p$-norm, $1\leq p\leq\infty$, of kernel type Gaussian processes parameterized by multi-bandwidths being vector-functions. We will show that found upper functions are sharp in order. In the second part we study the problem of adaptive minimax estimation in white Gaussian noise model under $L_p$--loss, $1\leq p\leq\infty,$ on the anisotropic Nikolskii classes. The upper functions found in the first part play the key role in the construction of our estimation procedure. We prove the existence of rate-

adaptive estimators and fully characterize behavior of the minimax risk for different relationships between regularity parameters and norm indexes in definitions of the functional class and of the risk. This is a joint work with Alexander Goldenchluger.

**15:30 – 17:00** **- M. Kelbert (HSE, Moscow, Russia)**

***Principle of the Maximal Weighted Entropy***

*Summary:*

The basic fact that the maximized of Shannon's entropy has a Gibbsian form plays a central role in many applications in statistics and physics. We develop a similar approach for the weighted entropy. This is a joint work with Yuri Suhov.

**17:30 – 18:15** **- A. Markova (HSE, Moscow, Russia).**

***Local limit theorems for Markov chains with linearly increasing trend component.***

*Summary:*

We consider the procedure of excluding of the linearly increasing trend for the diffusion model and for the Markov chain. This procedure allows to use the modified parametrix method for models with linearly increasing trend component. This is a joint work with Valentin Konakov.

**18:15-19:00** **- S. Lapinova (HSE, Nizhniy Novgorod, Russia)**

***Extremes of a non-complete bridge.***

*Summary:*

We study the properties of the joint probability of global extremes of the Wiener bridge. In addition to the application to the diffusion process, the results can be used to solve the wave and quantum problems, for example, in order to find the wave functions in the potential wells with moving walls or sonar waves in the offshore areas. As well as the construction of efficient estimators of volatility of financial processes.

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# Friday, 28

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**11:00 – 12:30** **- S. Menozzi (University of Ivry, France, HSE, Moscow, Russia)**

***Some results on degenerate Kolmogorov equations.***

*Summary:*

Degenerate Kolmogorov equations can be viewed as the solution of a system of $n$ differential equations of dimension $d$, the first one being forced by non-degenerate random noise and the $n-1$ other ones being degenerate. When the coefficients of the system are Lipchitz continuous, we show that the density of the solution satisfies Gaussian bounds with non-diffusive time scales. When the coefficients are smoother we also provide a short time asymptotics of the density. This is a joint work with Francois Delarue, Sergio Polidoro and Chiara Cinti.

**13:00 – 14:30** **- O. Klopp (University of Paris X, Paris, France)**

***1-bit Matrix Completion.***

*Summary:*

Most works on matrix completion have focused on recovering an unknown real-valued low-rank matrix from a random sample of its entries. Here, we investigate the case of highly quantized observations when the measurements can take only a small number of values. These quantized outputs are generated according to a probability distribution parameterized by the unknown matrix of interest. This model corresponds, for example, to ratings in recommender systems or labels in multi-class classification. This is a joint work with Jean Lafond, Eric Moulines and Joseph Salmon.

**15:30 – 16:15** **- V. Panov (HSE, Moscow, Russia)**

***Convergence rates of maximal deviation distribution for projection estimates of Levy densities.***

*Summary:*

In this paper, we consider projection estimates for Levy densities in high-frequency setup. We give a unified treatment for different sets of basis functions and focus on the asymptotic properties of the maximal deviation distribution for these estimates. This is a joint work with Valentin Konakov.

**16:15 – 17:00** **- M. Savelov (Moscow State University, Moscow, Russia)**

**Extremal characteristics of optimal criteria for the several hypotheses case.**

*Summary:*

Suppose that for a finite set of probabilistic measures only total variation distances for all pairs of measures are known. We investigate extremal characteristics of optimal criteria for testing corresponding hypotheses sets.

**17:30-19:00** **- A. Gushchin (Steklov Mathematical Institute, HSE, Moscow, Russia)**

***On stationary solutions of delay differential equations driven by Levy processes.***

*Summary:*

We consider affine stochastic delay differential equations driven by a Levy process. It is assumed that a stationary solution of this equation exists. The law of the Levy process is fixed and contains a Gaussian component. It is shown that invariant distributions corresponding to different delay measures are equivalent and that the weak convergence of a sequence of delay measures implies the convergence of the corresponding invariant distributions in the total variation norm. This is a joint work with Oleg Butkovsky.