

Seminaris Curs 2010-2011.

22/09/2010 Luis Gorostiza.

Memoria larga en tiempos de ocupación de sistemas de partículas.

Abstract:

Veremos algunos procesos autosimilares de memoria larga que se obtienen como límites de tiempos de ocupación de una clase de sistemas de partículas. Entre ellos se encuentran procesos Gaussianos como el movimiento browniano fraccionario y el movimiento browniano subfraccionario. También veremos una aproximación fuerte del movimiento browniano fraccionario por medio de procesos de transporte.

27/10/2010 Laurent Denis, Université d'Évry, France.

The Lent Particle Method and its applications.

Abstract:

We present a new approach to absolute continuity and regularity of laws of Poisson functionals. The theoretical framework is that of local Dirichlet forms. The method gives rise to a new explicit calculus that we first show on some simple examples : it consists in adding a particle and taking it back after computing the gradient. This method permits to develop a Malliavin calculus on the Poisson space and to obtain in a simple way existence of density and regularity of laws of Poisson functionals : Levy areas, solutions of SDE's driven by Poisson measure... We also shall focus on non classical examples such as a new kind of (non linear) subordination.

24/11/2010 Martin Ondreját, Mathematics Institute, Academy of Sciences of the Czech Republic.

Stochastic wave equations with polynomial nonlinearities.

Abstract:

A survey of recent results on existence, uniqueness and temporal regularity for nonlinear wave equations perturbed by spatially homogeneous Wiener processes.

13/01/2011 Eulalia Vares. Centro Brasileiro de Pesquisas Fisicas. Rio de Janeiro, Brasil.

One dimensional ferromagnetic systems: Kac model and long range perturbation.

Abstract:

Within the context of (classical) statistical mechanical models, one-dimensional ferromagnetic systems with long range interactions constitute an important class of examples, in part due to their rich and interesting behaviour. These models have been studied since the 1980s, following the seminal article J. Froehlich and T. Spencer (CMP, 1982).

Kac type models were introduced in the sixties, playing a fundamental role in the understanding of rigorous mean field theory. Their analysis exhibited a tremendous growth in the 1990s, in part due to its role in the study of phase transitions in the continuum (Lebowitz, Mazel and Presutti, JSP 1999). The recent monograph by E. Presutti (2009) is a must for those who want to learn the subject, and discusses the fundamental ideas and techniques around the various delicate issues that are involved.

In the seminar, planned for non-specialists, after a brief introduction to these models I will discuss properties as phase transitions for a class of one dimensional systems obtained by a long range perturbation of the usual Kac model [1]. If time allows I will discuss other related approaches and questions involving percolation and multi-scale analysis[2].

References:

M. Cassandro, I. Merola, M. E. Vares. *Study of a long range perturbation of a one-dimensional Kac model*. (preprint 2010, available on arXiv, submitted)

D.H.U. Marchetti, V. Sidoravicius, M.E. Vares. *Oriented percolation in one-dimensional $1/|x - y|^2$ percolation models*. *J. Stat Phys*, 139, 941–958 (2010).

23/02/2011 Albert Ferreiro, UAB.

Inversion of Analytic Characteristic Functions and Infinite Convolutions of Exponential and Laplace Densities.

Abstract:

We prove that certain quotients of entire functions are characteristic functions. Under some conditions, the probability measure corresponding to a characteristic function of that type has a density which can be expressed as a generalized Dirichlet series, which in turn is an infinite linear combination of exponential or Laplace densities. These results are applied to several examples. We also explore the Lévy processes with such Lévy measures.

15/12/2010 Maria Jolis, UAB.

Càlcul estocàstic de Stratonovich i Skorohod per a processos Gaussians.

Abstract:

En aquest treball conjunt amb Yaozhong Hu i Samy Tindel obtenim fórmules d'Itô tipus Stratonovich i tipus Skorohod per a processos Gaussians multidimensionals que són vàlides per al moviment Brownià fraccionari amb qualsevol paràmetre H de l'interval $(0,1/2]$. També obte-

nim una interpretació com a límit de sumes de Riemann adjients per a la integral de Skorohod. Per l'obtenció dels resultats es combinen tècniques de la teoria de 'rough paths' i d'anàlisi estocàstica.

06/04/2011 Evsey Morozov, Institute of Applied Mathematical Research, Russian Academy of Sciences, Petrozavodsk.

Verification of stability region of a retrial queuing system by regenerative method.

Abstract:

We present a new retrial system which can be used to describe, for instance, behavior of short TCP transfers or ALOHA type multiple access protocol. We use regenerative simulation to verify stability region of the system and also show how such approach can be used to estimate blocking probability in instability region. This approach is numerically illustrated for a single-server system with no buffer and Poisson input. This is joint work with K.Avrachenkov (INRIA) and G. Goricheva (Russian Academy of Sciences).

06/04/2011 Zbigniew J. JUREK, University of Wrocław, Poland.

The random integral representation conjecture. A quarter of a century later.

Abstract:

In the *Annals of Probability* vol. 13 (1985) No. 2, on page 607 and later on, in *Probability Theory and Related Fields* vol. 78 (1988), on page 474, I stated the conjecture that:

Each class of limit distributions, derived from sequences of independent random variables, is the image of some subset of ID by some mapping defined as a random integral.

More explicitly, it claims that each class of limit laws coincide with a collection of random integrals of the form $\int_{(a,b]} h(t)dY_\nu(r(t))$, for some deterministic functions h, r (that represent space and time change, respectively) and some Lévy process $Y_\nu(t)$, $t \geq 0$.

In a lecture we will review situations where a such claim indeed holds true (among others, generalized self-decomposability, infinite divisibility in free-probability), give some historical comments and present open questions.

13/05/2011 Daria Filatova, University of Kielce, Poland.

Methods for Structural and Parametric Synthesis of Bio-economic Models with fractals.

Abstract:

The talk is dedicated to the new parameter estimation method for the stochastic differential equation (SDE) with time-varying parameters. This method is based on the ideas of the optimal control theory, namely on the Dubovitski-Milyutin method. The illustrations for the SDEs with the ordinary Brownian motion and SDEs with the fractional Brownian motion of this identification method show the proficiency of the presented ideas. The methods is also compared with the estimation procedures based on the maximum likelihood and Monte Carlo simulations principles. The solution of the harvest optimal control problem closes the presentation.

25/05/2011 Nicolas Savy, Institut de mathématiques de Toulouse, France.

Sharp large deviations principle for some Ornstein Uhlenbeck Processes.

Abstract:

This talk is about sharp large deviation principles for the maximum likelihood estimator of the drift parameter θ of some Ornstein-Uhlenbeck process. The presentation of 3 different setting is proposed the setting of a O.U. directed by a Brownian motion with θ negative and with θ positive and the setting of an O.U. directed by a fractional Brownian motion with θ negative. We will present roughly the results and will focus on the technical difficulties of this kind of studies.

01/06/2011 Rama Cont, Laboratoire de Probabilités et Modeles Aléatoires. Université Paris VI-VII..

Functional Ito calculus.

Abstract:

We develop a non-anticipative functional calculus which extends the Ito calculus to path-dependent functionals of right-continuous semimartingales [1, 3]. Our framework only requires the existence of certain directional derivatives and is sufficiently general to cover functionals depending on quadratic variation, functionals involving exit times of a process.

This functional calculus is shown to be a non-anticipative analogue of the Malliavin calculus; however, the construction makes no use of the Gaussian properties of the Wiener space and allows to extend various classical results of the Ito calculus to path dependent functionals for a large class of processes. First, we obtain a martingale representation formula for square integrable functionals of an Ito process. Second, we characterize local martingales which satisfy a regularity property as solutions of a (deterministic) functional differential equation, for which a uniqueness result is given.

These results have applications in stochastic control and mathematical finance: they allow

to derive a universal pricing equation and a general hedging formula for path-dependent options, and a functional HJB equation for non-Markovian control problems.

Based on joint work with David FOURNIE (Columbia University).

[1] R Cont and D Fournie (2010) A functional extension of the Ito formula, Comptes Rendus de l'Academie des Sciences, Volume 348, Issues 1-2, January 2010, Pages 57-61.

[2] R Cont and D Fournie (2009) Functional Ito calculus and stochastic integral representation of martingales, to appear in Annals of Probability. <http://arxiv.org/abs/1002.2446>.

[3] R Cont and Fournie (2010) Change of variable formulas for non-anticipative functionals on path space, Journal of Functional Analysis, Volume 259, No 4, Pages 1043-1072.

08/06/2011 Björn Birnir, Center for Complex and Nonlinear Science and Department of Mathematics, University of California, Santa Barbara.

The invariant measure of the stochastic NavierStokes equation.

Abstract:

The mathematical proof of Kolmogorov's (1962) statistical theory of turbulence consists of proving the existence of the invariant measure of the Navier-Stokes equation, on which the statistical theory is based. In this talk we discuss how the laminar solution of the Navier-Stokes equation becomes unstable for large Reynolds number and the stable solution is the solution of the stochastic Navier-Stokes equation. This is the unique solution that describes fully-developed turbulence. In order to compare with experiments and simulations we solve the stochastic Hopf's equation for the invariant measure. The Feynmann-Kac formula produces log-Poisson processes from the stochastic Navier-Stokes equation. These processes, first found by She, Leveque, Waymire and Dubrulle give the intermittency corrections to the structure functions of turbulence. The probability density function of the two-point statistics that can be compared to experiments and simulations turn out be the generalized hyperbolic distributions of Barndorff- Nilsen.

29/06/2011 Ivan Nourdin, Université Henri Poincaré, Nancy.

Cumulants and optimal rates on the Wiener space.

Abstract:

We will show how to use recursive computations of cumulants in order to determine optimal rates of convergence in the normal approximation of functionals of general Gaussian processes. Joint works with A. Bonami, H. Biermé and G. Peccati.

29/06/2011 Carlo Marinelli, Libera Università di Bolzano.

Existence of weak solutions for a class of semilinear stochastic wave equations.

Abstract:

We prove existence of weak solutions (in the probabilistic sense) for a general class of stochastic semilinear wave equations on bounded domains of \mathbb{R}^d driven by a possibly discontinuous square integrable martingale.

29/06/2011 David Nualart, University of Kansas, USA.

Central limit theorems for Brownian local time increments.

Abstract:

The purpose of this talk is to present some central limit theorem for the modulus of continuity in the space variable of the Brownian local time increments. The main ingredient to derive these results is the Clark-Ocone representation formula, which provides an explicit expression for the stochastic integral representation of functionals of the Brownian motion in terms of its derivative in the sense of Malliavin calculus.