Simion Stoilow
Institute of Mathematics
of the Romanian Academy

A Mini-Conference on
Probability and Related Fields
May 23 - 24, 2011

Invited Speakers:

Daniel W. Stroock (MIT)

Elton P. Hsu (Northwestern University)

Moritz Kassmann (Bielefeld University)

Conference supported by Marie Curie Action grant nr. 249200 and SOFTWIN Group.

Program

Monday, May 23rd (Ground Floor Hall)

14:00-14:50 - Daniel W. Stroock (MIT) - *Some random thoughts about Cauchy's functional equation, Banach spaces, and Gaussian measures*

15:00-15:50 - Moritz Kassmann (Bielefeld University) - *Local regularity of harmonic functions with respect to non-degenerate jump processes*

Coffee Break

16:10-17:00 - Lucian Beznea (IMAR) - *Measure-valued branching processes and a nonlinear Dirichlet problem*

Tuesday, May 24th (Ground Floor Hall)

9:00-9:50 - Elton P. Hsu (Nortwestern University) - *Volume growth and escape rate of Brownian motion on a complete Riemannian manifold*

Coffee Break

10:10- 11:00 - Ionel Popescu (Georgia Tech. and IMAR) - *The one dimensional free Poincaré inequality*

11:10-12:00 - Mihai N. Pascu (Transilvania Univ. of Braşov) - *Mirror couplings of reflecting Brownian motion and applications*

ABSTRACTS

Some random thoughts about Cauchy's functional equation, Banach spaces, and Gaussian measures

Daniel W. Stroock
Massachusetts Institute of Technology

I will begin by reviewing classical results about Cauchy's functional equation

$$f(x+y) = f(x) + f(y) \text{ for all } (x,y) \in \mathbb{R}^2.$$

I will then consider the variant, suggested by P. Erdös, in which the everywhere condition is replaced by

$$f(x+y) = f(x) + f(y) \text{ for Lebesgue almost every } (x,y) \in \mathbb{R}^2$$

and, borrowing ideas from probability theory, will show that any measurable solution is Lebesgue almost everywhere equal to a linear function. Finally, in whatever time remains, I will discuss the analogous questions in the Banach space setting.

Local regularity of harmonic functions with respect to non-degenerate jump processes

Moritz Kassmann
Bielefeld University,

In this talk we present techniques that allow to extend the local regularity results for diffusion operators to nonlocal operators generating jump processes. A reformulation of Harnack's inequality from 1881 turns out to be very useful.

Measure-valued branching processes and a nonlinear Dirichlet problem

Lucian Beznea
Simion Stoilow Institute of Mathematics of the Romanian Academy

We present relations between two classes of measure-valued Markov processes (super-processes and processes with discrete branching) and nonlinear operators of the form $\Delta u \pm u^2$. A Dirichlet problem associated with the operator $\Delta u + u^2$ is solved. We follow the pioneering works of M. Nagasawa, S. Watanabe, M.L. Silverstein, and the approach of E.B. Dynkin. It turns out that potential theoretical methods are efficient for our treatment.

Volume growth and escape rate of Brownian motion on a complete Riemannian manifold

Elton P. Hsu
Northwestern University

We give an effective upper escape rate function for Brownian motion on a complete Riemannian manifold in terms of the volume growth of the manifold. An important step in the work is estimating the small tail probability of the crossing time between two concentric geodesic spheres by reflecting Brownian motions on the larger geodesic ball. This is a joint work with Guangnan Qin.

The one dimensional free Poincaré inequality

Ionel Popescu
Georgia Institute of Technology
and
Simion Stoilow Institute of Mathematics of the Romanian Academy

This is obtained as a limit from the classical Poincaré on large random matrices. In the classical case Poincare is obtained in a rather easy way from other functional inequalities as for instance Log-Sobolev and transportation. In the free case, the same story becomes more intricate. This is joint work with Michel Ledoux.

Mirror couplings of reflecting Brownian motion and applications

Mihai N. Pascu

Faculty of Mathematics and Computer Science, Transilvania University of Braşov

We will present some results on the mirror couplings of reflecting Brownian motions introduced by W. S. Kendal and developed by K. Burdzy et. al, and a recent extension of it. As an application of the former, we present a resolution of the Laugesen-Morpurgo conjecture, and as an application of the later we present a unifying proof of the results of I. Chavel and W. S. Kendall on Chavel's conjecture on the domain monotonicity of the Neumann heat kernell.