

MATHEMATICS SEMINAR
of the
UNIVERSITY OF LUXEMBOURG
in cooperation with the
LUXEMBOURG MATHEMATICAL SOCIETY

March 2010

2 March 2010, at 5 pm

Room B02

Janusz Grabowski
Polish Academy of Sciences

Pontryagin Maximum Principle for optimal control on Lie algebroids

Abstract

The fundamental theorem of the theory of optimal control, the Pontryagin Maximum Principle (PMP), is extended to the setting of Lie algebroids. This formulation of the PMP may be viewed as a scheme comprising reductions of optimal control problems, like the Euler-Poincaré equations arise as reductions of the Euler-Lagrange equations for the rigid body. The framework is based on a very general concept of homotopy of admissible paths and geometry of Lie algebroids and goes back to some ideas of the Lagrangian and Hamiltonian formalisms in this general setting.

! 8 March 2010, at 5:30 pm !

Room B02

Sophie Morier-Genoud
University Paris 6

A series of algebras generalizing the octonions

Abstract

The algebra of quaternions is not commutative. However, viewed as a graded algebra over $(\mathbb{Z}_2)^2$ or $(\mathbb{Z}_2)^3$, the algebra of quaternions becomes graded-commutative. More generally, any Clifford algebra is an associative graded-commutative algebra. We will show that this property completely characterizes (simple) Clifford algebras.

The classical algebra of octonions is neither commutative nor associative, but it also becomes graded-commutative and graded-associative over $(\mathbb{Z}_2)^3$. We will introduce a series of algebras generalizing the octonions in the same way as Clifford algebras generalize the quaternions. We will discuss the main properties of these algebras.

The talk will be accessible to graduate students, no particular background is required.

9 March 2010, at ! 4 pm !

Room B02

Raza Lahiani
University of Luxembourg
Ph.D. defense

Harmonic analysis on certain Lie groups with polynomial growth

Abstract

Let N be a connected, simply connected, nilpotent Lie group and let K be a compact subgroup of $\text{Aut}(N)$ acting smoothly on N . In this talk, certain important harmonic analysis problems (Fourier inversion theorems, retract problems, density of Schwartz functions in the kernel of the K -orbit, characterization of prime ideals,...) are studied with respect to the action of the compact group K .

16 March 2010, at 5 pm

Room B02

Hidenori Fujiwara
Kinki University, Japan

Harmonic analysis on solvable homogeneous spaces

Abstract

We discuss some topics in harmonic analysis for solvable homogeneous spaces using examples. It concerns nilpotent Lie groups, exponential solvable Lie groups, unitary representations and the orbit method.

Ergodicity of Stochastic Curve Shortening Flows

Max von Renesse (TU Berlin)

Time **Monday, March 15, 2010 at 15:00**

Place **Campus Kirchberg, room B21**

We discuss a model of curvature flow for a $1 + 1$ dimensional interface in an $2D$ isotropic Brownian flow. Well posedness of the dynamics is established in the classical variational SPDE framework, using a modified coercivity condition. In the additive noise case we also show ergodicity by adapting the lower bound technique proposed recently by Komorowski, Peszat and Szarek.

23 March 2010, at 5 pm

Room B02

Adrien Brochier
Institut de Recherche Mathématique Avancée, Strasbourg

Title: ~~TBA~~ A Kohno-Drinfeld theorem for some complex braid groups
Abstract: view below

30 March 2010, at 5 pm

Room B02

Alexei Davydov
Max Planck Institute, Bonn

Witt group of modular categories

Abstract

We describe an abelian group structure on the set of classes of modular categories modulo some equivalence relation. The resulting Witt group of modular categories resembles (and contains) the Witt group of finite abelian groups with quadratic forms. The conjecture of Moore and Seiberg, that all RCFTs come from reductive groups via WZW, coset and orbifold constructions, can be interpreted as a statement about generators of this Witt group. (joint with A. Kitaev, M. Müger, D. Nikshych, V. ~~Ostrik~~)

Adrien Brochier (Talk: 23 March), Abstract:

The goal of this talk is to sketch the proof of an analog of the Kohno-Drinfeld theorem for some generalized braid groups. The Kohno-Drinfeld theorem asserts that there is an equivalence between the representations of the Artin braid group coming from the monodromy of the Knizhnik-Zamolodchikov differential system and those obtained by an algebraic construction involving "quantum groups". I will recall these constructions and the main steps of the proof of the KD theorem, whose crucial ingredient is the KZ Drinfeld associator. Then, I will give an algebraic construction of representations of some complex braid groups, and relate them to the monodromy representations of a "cyclotomic" version of the KZ system.